Transport for Greater Manchester

STOCKPORT INTERCHANGE

Mersey Bank Survey Report

14113-WSP-SKX-XX-RP-G-0005
FEBRUARY 2019

CONFIDENTIAL

Transport for Greater Manchester

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PROJECT NO. 70031899

OUR REF. NO. 14113-WSP-SKX-XX-RP-G-0005

DATE: FEBRUARY 2019

Transport for Greater Manchester

STOCKPORT INTERCHANGE

Mersey Bank Survey Report

WSP

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QUALITY CONTROL

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APPENDICES

1 INTRODUCTION

1.1 AUTHORISATION

On the instruction of Transport for Greater Manchester (TfGM) and in accordance with our fee proposal dated 15 January 2018, WSP has undertaken a laser scan survey of a length of the southern bank of the River Mersey in Stockport in order to accurately survey the locations and measure the dimensions of the tunnel portals beneath the proposed Stockport Interchange.

1.2 OBJECTIVES & SCOPE OF WORKS

The main objectives of the work are to identify potential developmental constraints with respect to geotechnical design caused by the potential presence of tunnels beneath the proposed development: The initial scope of works comprised a laser scan survey of a length of the southern bank of the River Mersey undertaken in January 2018. A second stage of investigation comprising a drone survey was undertaken in July 2018 and was intended, primarily, to assess the potential for the tunnels to provide bat roosting environments.

In the summer of 2018, Osborne undertook a trial pitting exercise in advance of construction works for the new bridge linking Swaine Street and Astley Street. These works provided additional information relating to tunnels in the vicinity of the site.

This report is intended to detail the findings of the laser scan and drone surveys and the Osborne trial pitting.

1.3 DEVELOPMENT PROPOSALS

It is understood that the new development will comprise the following:

- A new transport interchange;
- A multi-storey residential development;
- A pedestrian link bridge from the interchange to Stockport Railway Station;
- A new vehicular bridge across the River Mersey linking Astley Street on the northern bank of the river; and,
- Associated landscaping.

1.4 BACKGROUND & PREVIOUS REPORTS

The geotechnical design of Stockport Interchange scheme is supported by the following documents;

- AECOM, 2015. '*Phase 1 Geotechnical and Geo-Environmental Desk Study Report: Stockport Bus Station'* Project 60340298, Reference: GEO/02
- AECOM, 2016, '*Stockport Interchange – Ground Investigation Report',* Job No. 60340298, Reference: 60340298/GEO/02
- Geotechnics, 2016, '*Stockport Bus Station: Factual Report*', Project No: PN153428

Neither of the AECOM reports mentions the potential presence of tunnels below the site. However, the Geotechnics factual report states *"It is understood that tunnels are present below part of the site. These are presumed to be former mill water race excavations through the rock extending from the site of existing and former mills to the River Mersey"*.

On this basis, WSP has previously undertaken a site walkover and desk based research to produce the following report, which should be read in conjunction with the current report and provides a description of the site and assesses the potential presence of tunnels beneath the proposed development:

- WSP. 2017. '*Stockport Interchange: Tunnel Assessment*'. Report No. 70031899_20171009 (hereafter referred to as the Tunnel Assessment).

1.5 CONFIDENTIALITY STATEMENT

This report is addressed to and may be relied upon by the following:

Transport for Greater Manchester
2 Piccadilly Place
Manchester
M1 3BG

This assessment has been prepared for the sole use of the above named party. This report shall not be relied upon or transferred to any other parties without the express written authorisation of WSP. No responsibility will be accepted where this report is used in its entirety, or in part, by any other party.

General Limitations are presented in **Appendix A**.

2 PREVIOUS INVESTIGATION

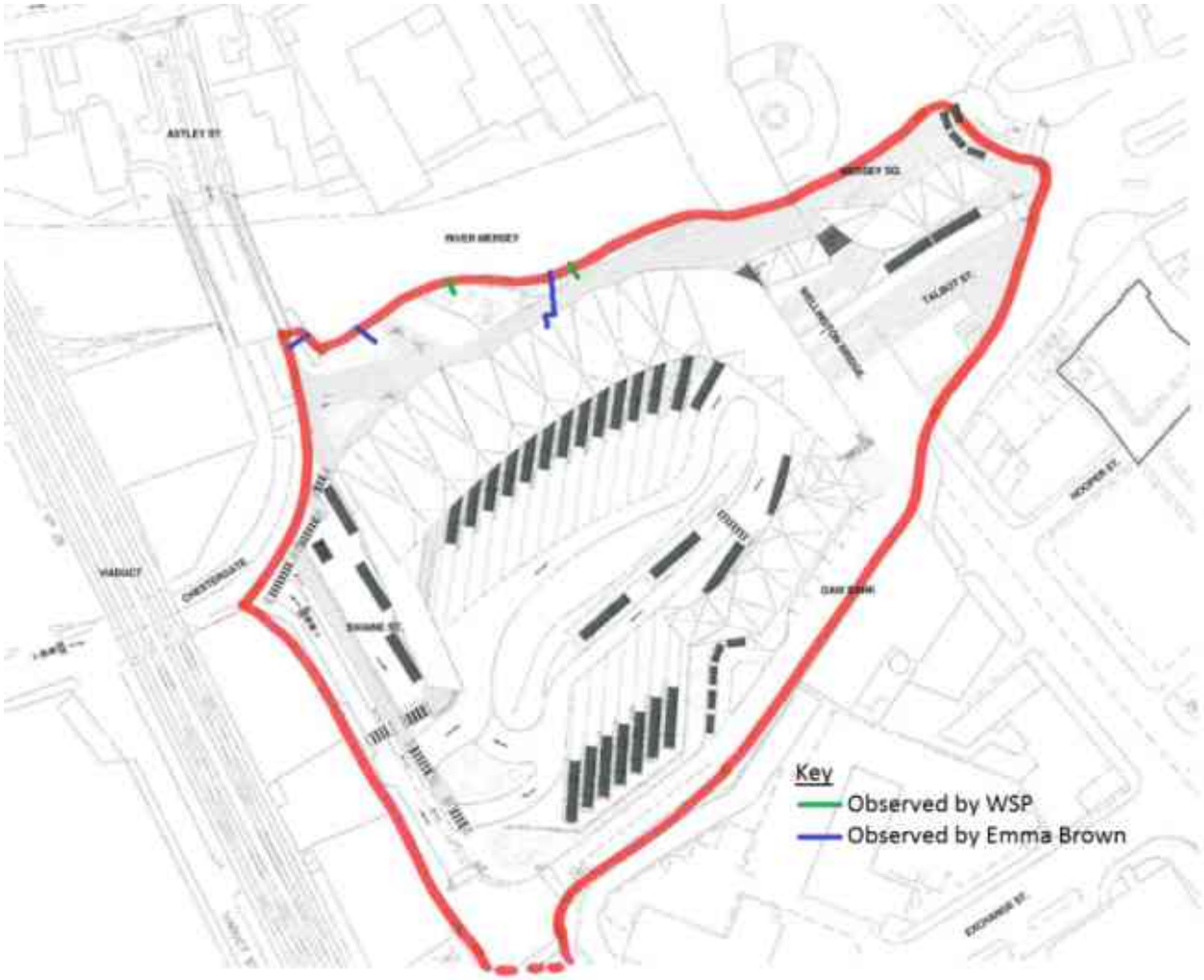
2.1 TUNNEL ASSESSMENT

The Tunnel Assessment previously undertaken by WSP (2017) was prepared using the following information sources:

- Site walkover completed by WSP on 06 October 2017;
- Historical Ordnance Survey maps and town plans obtained from Envirocheck;
- British Geological Survey 1:50,000 map, *"Stockport Sheet 98"* Solid Edition
- Photographs available online from Stockport Local Heritage Library;
- Information held by Stockport Heritage Trust; and,
- Information contained in *"Subterranean Stockport"* and conversation with the author, Emma Brown.

Based on the data obtained from these sources, the Tunnel Assessment concluded that there was evidence that five tunnels may project below the site, as indicated on **Figure 1**.

Figure 1 – Plan of Potential Tunnels



The principal geotechnical risks posed to the proposed redevelopment by the presence of tunnels beneath the site were considered to be;

- potential collapse of the tunnels affecting future foundations or external paved areas;
- the potential for piles (the most likely foundations solution) to penetrate tunnels during their formation; and,
- the risk of piles, which will likely gain most of their capacity in end bearing, terminating very close to the crown of a tunnel, possibly leading to over stressing of the ground and leading to significant deformation / collapse.

In order to quantify the risks to the scheme and, if the risks are considered to be significant, allow the development of appropriate mitigation measures, further works were considered necessary. The initial phase of works comprised a detailed survey of the river bank to establish the position, height, width and, if practicable, length and azimuth of the tunnels.

3 SURVEY WORK

3.1 FIELDWORK

LASER SCAN SURVEY

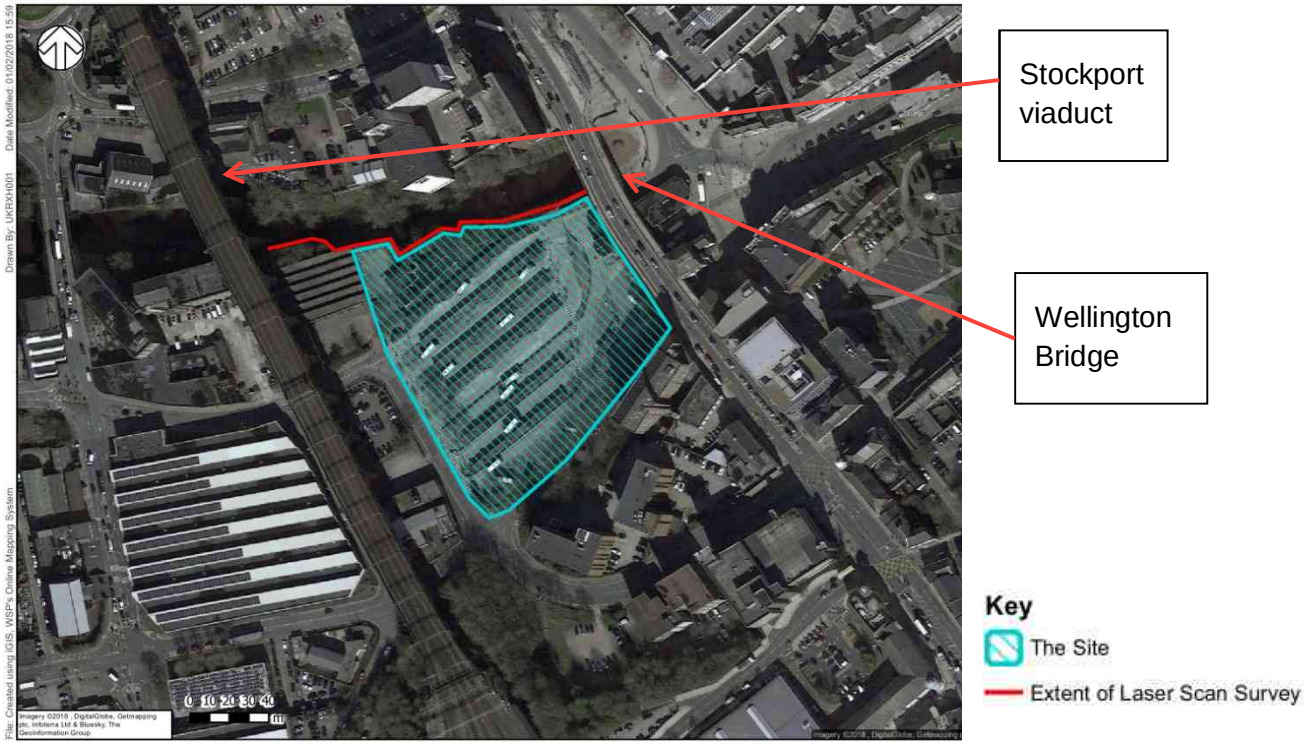
Following a review of river levels and access constraints, it was not considered safe to directly access the southern bank and, in conjunction with specialist contractors, a methodology was developed for surveying it from the northern bank.

Following a tender process, fieldworks were undertaken by Geoterra on 26 January 2018 under the supervision of WSP and comprised the following:

- Installation of temporary survey control points on the northern bank of the river;
- GPS location of each survey control point;
- Set up of survey tripods and spheres at survey control points; and,
- Set up of the FARO laser scanner system between survey control points and full colour laser scans of the southern bank of the River Mersey between the Stockport viaduct and Wellington Bridge.

The extent of survey works is illustrated on **Figure 2**.

Figure 2 – Satellite image showing extent of laser survey



DRONE SURVEY

A visual inspection of the tunnels was undertaken using an unmanned aerial vehicle (UAV) was undertaken by TexoDrone, to search for features which may provide potential roosting opportunities for bats. Relevant observations made during the survey have been used to update this report.

3.2 RESULTS

During the laser scan survey in January 2018, seven tunnel portals were observed and scanned. Two of these tunnels were located upstream (north) of the site and outwith the area previously inspected during the previous Tunnel Assessment. The UAV survey undertaken in July 2018 allowed closer inspection of the river bank and revealed that Portal D was a river scour feature and also discovered an additional tunnel. For the sake of continuity between reports, the additional portal discovered by the UAV survey has been named Portal C, and the portal referred to as Portal C in the previous issue of this report has been renamed Portal C(a). The coordinates and elevation of each tunnel's crown are presented in **Table 1**.

Table 1 - Tunnel Portal Locations

Tunnel Portal	Easting	Northing	Approx. Elevation of Portal Crown	Approx. Aperture Size (m)	Approx. Bearing (°)	Water Level (m AOD) (26/01/18)
A	389106	390270	36.3	1.0(w) x 0.8(h)	192	35.7
B	389117	390270	37.4	0.8(w) x 1.3(h)	163	
C	389127	390269	37.7	1.0(w) x 1.0(h)	120	
Ca	389128	390271	36.1	1.1(w) x 0.7(h)	120	
E	389207	390283	37.0	2.2(w) x 0.5(h)	145	
F	389229	390283	37.3	1.1(w) x 0.7(h)	231	
G	389235	390287	38.0	2.0(w) x 1.3(h)	118	

The survey has generally confirmed the locations of the portals (both observed and recorded by Emma Brown) detailed in the Tunnel Assessment report. However, it is noted that the suggested tunnel immediately to the east of the new bridge location was not found – it may be that the location indicated by Emma Brown relates to one of the three tunnels that have been identified close to the viaduct abutment.

Photographs of the tunnel portals are presented below and reference should be made to **Dwg. 70031899-PTLP-001 P03** for their locations. Screenshots of the tunnel portals from the 3D model generated from the survey works are presented in **Appendix B**.

Based on field observations, all the tunnels appear to have been cut through the sandstone bedrock.

Portal A and B

Portals A and B are unlined and cut directly into the sandstone and are located immediately to the east of the viaduct.

Based on its shape, Portal A appears to have been partially submerged beneath the river at the time of the laser scan survey. During the UAV survey of Portal A, the tunnel was observed to be silted up approximately 3.0m into the tunnel.

The UAV penetrated approximately 25m into Portal B where it encountered a blockage comprised of brick rubble. The tunnel was inclined upwards at a slight gradient.

Photograph 1: Portals A & B from the northern bank of the River Mersey

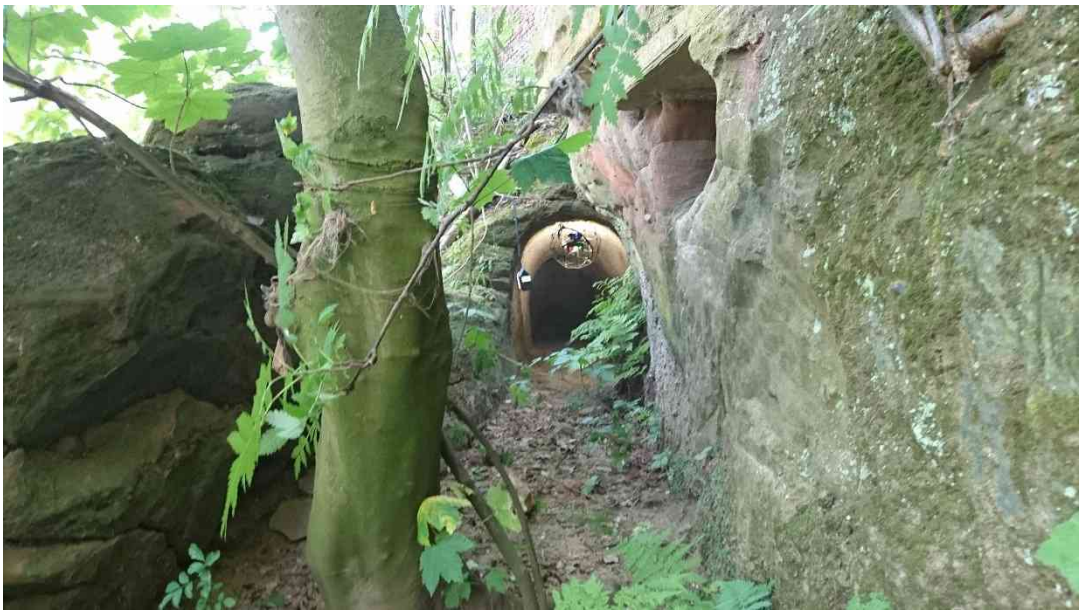
Portal C & Portal Ca

Portal C(a) appears to be unlined and is located beneath a red brick warehouse building approximately 22m east of the viaduct. Based on its shape the portal appeared to be partially submerged at the time of the survey. A UAV survey of the tunnel was not possible.

Photograph 2: Portal C and C(a) from the northern bank of the River Mersey

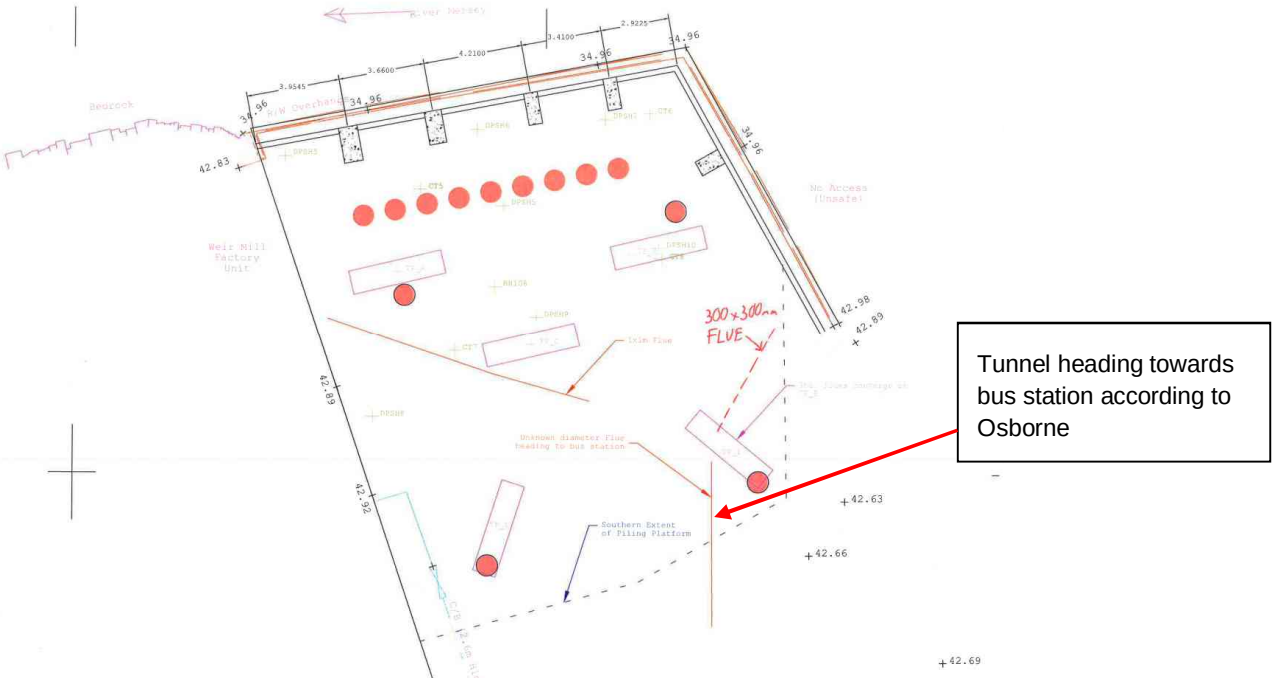
Portal C is cut into the sandstone at a higher elevation. The UAV survey encountered two smaller tunnels, which off shoot from the main tunnel. The first tunnel offshoot is orientated approximately south and comprises steps which lead to a brick lined shaft. The second tunnel offshoot is also aligned approximately south but, due to poor signal, the UAV could not further investigate its extent. The UAV encountered a blockage in the main tunnel extending from Portal C.

Photograph 3 - Portal C



As part of the constructions works for the new bridge between Swaine Street and Astley Street, the contractor (Osborne) undertook a series of trial pits and encountered three tunnels. Photographs and an annotated plan were provided by Osborne, which indicated that the main tunnel was approximately 1m x 1m in width and height and connected with two other tunnels at a three-way junction. On a drawing provided by Osborne one tunnel is indicated to be 300mm x 300mm and orientated approximately northeast. The third tunnel is of an unknown diameter and is described as "*heading to bus station*". An extract of the plan provided by Osborne summarising their trial pitting observations is presented below along with a photograph of suspected Tunnel C (Photograph 4).

Extract of Osborne Trial Pitting Summary Plan



Photograph 4 - Suspected Portal C encountered by Osborne

Portal E

Portal E appears to be an unlined, rock cut and again appears partially submerged. At the crest of the tunnel, there appears to be a vertical channel cut into the rock, possibly leading from a historical structure above. The UAV survey observed that this Portal was heavily silted up.

Photograph 5 – Portal E from the northern bank of the River Mersey

Portal F

Portal F is the unlined tunnel referred to as '*Binns' Deep*' in the Tunnel Assessment. The tunnel portal appeared to be partially submerged at the time of the laser scan survey. The UAV survey could not fully explore the extent of the tunnel.

Photograph 6 - Portal F (Binns' Deep)

Portal G

Portal G is a brick lined tunnel entrance referred to as '*Fernley Gully*' in the Tunnel Assessment and lies approximately 6m to the east of Portal F. The majority of the tunnel portal appeared to be above the river level at the time of the laser scan survey, although it was noted during the UAV survey that the tunnel brick arch (Photograph 7 is significantly larger than the tunnel itself (Photograph 8). The UAV survey observed that the brick arch portal was partially collapsed and the tunnel was heavily silted up.

Photograph 7 – Portal F (Binns' Deep) and Portal G (Fernley Gully) from the northern bank of the River Mersey

Photograph 8 - Portal G

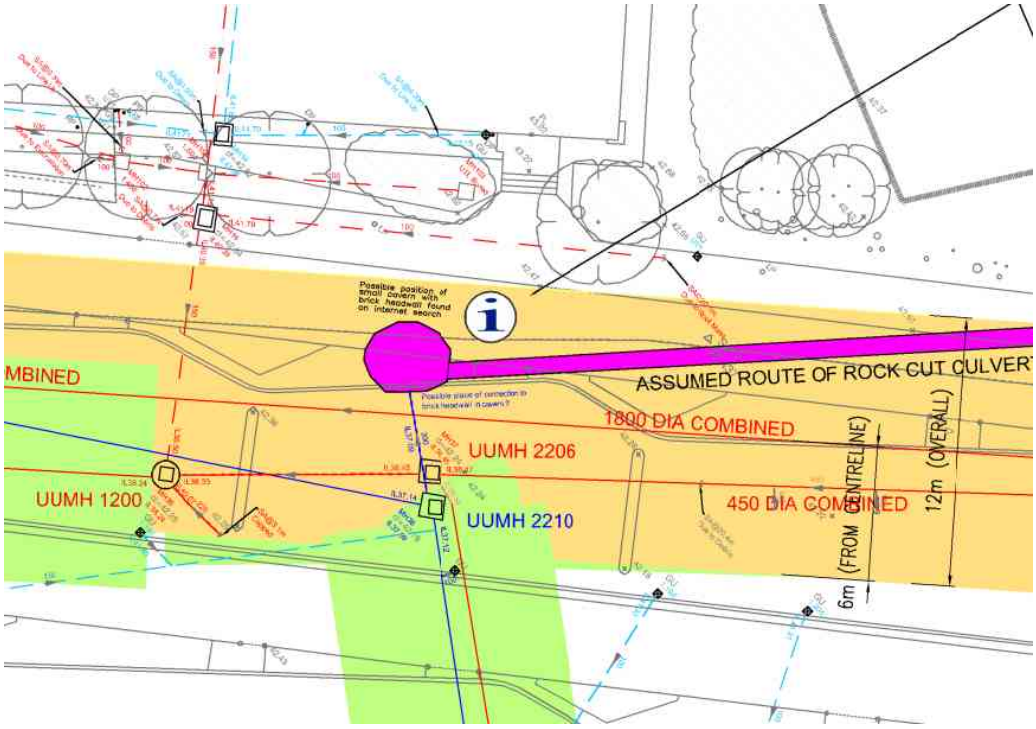
4 DISCUSSION

Dwg. 70031899-PTLP-001 in **Appendix B** shows the locations of the identified portals and, based on their geometry for the limited length that could be surveyed, their potential orientation relative to the latest scheme layout. Based on this, the following observations and recommendations are made.

- Portals A and B, fall outside the site boundary and, based on their indicated orientation, are not considered to be of further interest.
- Portal C was encountered by Osborne during a trial pitting exercise undertaken for the Swaine Street bridge abutment. The trial pitting encountered a three-way junction between the tunnel extending from Portal C and two additional tunnels. This needs further investigation.
- Further desk based investigation has been made into Portal F (Binns' Deep). Information provided by WSP's drainage team indicates that Binns' Deep is in part connected to an existing 300mm diameter public surface water sewer, which crosses the site from south to north. Dye placed into a manhole on site (MH38) as part of a drainage survey was observed to emanate from Binns' Deep (See DWG 70031899-D-001 from "*Stockport Interchange Stage 1 – Drainage and Flood Risk*" report (WSP, 2017) presented in Appendix B). It is assumed that the sewer is the clayware pipe shown projecting from a brick headwall, as observed by Emma Brown (Photograph 8).

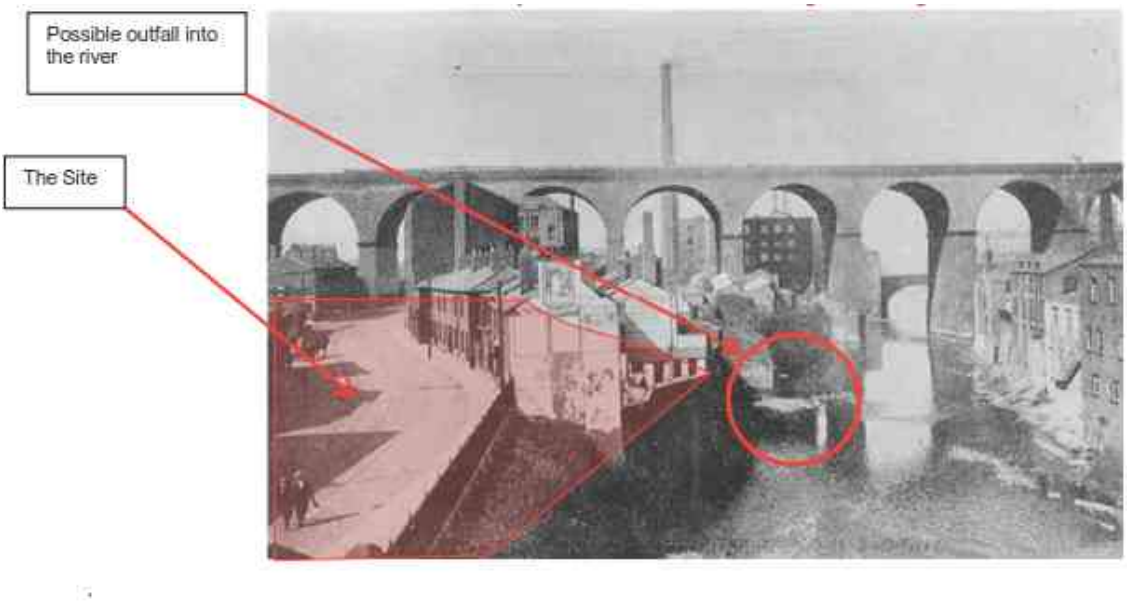
Photograph 9 – Brick headwall and pipes within Binns' Deep

Extract from DWG 70031899-D-001



Based on the suggested orientation, it appears that the course of Binns' Deep is almost parallel to the river and it may have been a head race carrying water to one of the former industrial concerns (the inlet faces up stream). If this assumption is correct, it seems unlikely that the feature extends any significant distance back into the site. However, it would also seem likely that the structure continues beyond the headwall and, in theory, there would be expected to be an associated outlet back into the river (tail race). Based on a review of historical photographs presented in our Tunnel Assessment report (and reproduced as Photograph 9 in this report), it is possible that the flowing water seen may be the tail race. Further investigation of Binns' deep is required.

Photograph 10 – Stockport Viaduct from Wellington Bridge c.1920



- The orientation measured from Portal E indicates that if it projects any significant distance back into the site, then it may intersect with Binns' Deep, to the east of the indicated sewer connection. However, such an intersection was not recorded by Emma Brown, which suggests that either;

  I. The tunnel is of limited length.

  II. Its orientation is different to that indicated from the current survey.

  Further investigation is required.

- Portal G (Fernley Gully) is also indicated to likely extend beneath the site and again requires further investigation.

4.1 FURTHER WORKS

The Tunnel Assessment desk study (WSP, 2017) suggested forming a series of boreholes across the likely projection of each tunnel and using a Cavity Auto Laser Scanning System to investigate the orientation and condition of the tunnels.

Based on the work undertaken, this is still considered the most appropriate surveying technique and a proposed borehole location plan is presented in **Appendix B**. The borehole and scanning works would be undertaken in a phased approach depending on the orientation of the tunnels. It is possible that a specialist contractor could undertake a manned, internal survey of Portal F.

Boreholes proposed to investigate Portal G are located on the existing public footpath and will require its closure.

Once a tunnel is located by borehole the laser scanning system is lowered down into the borehole and the dimensions and orientation of the cavity are measured. The survey is limited by changes in orientation of the tunnel and the next series of borehole positions will then be drilled at the extent of the survey.

The crests of the tunnel portals generally lie above the level of the River Mersey and, as such, they may provide a potential habitat for a number of animal species.

Appendix A

GENERAL LIMITATIONS

REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

GENERAL

1. WSP UK Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.

2. Unless explicitly agreed otherwise, in writing, this report has been prepared under WSP UK Limited standard Terms and Conditions as included within our proposal to the Client.

3. Project specific appointment documents may be agreed at our discretion and a charge may be levied for both the time to review and finalise appointments documents and also for associated changes to the appointment terms. WSP UK Limited reserves the right to amend the fee should any changes to the appointment terms create an increase risk to WSP UK Limited.

4. The report needs to be considered in the light of the WSP UK Limited proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

PHASE 1 GEO ENVIRONMENTAL AND PRELIMINARY RISK ASSESSMENTS

Coverage: *This section covers reports with the following titles or combination of titles: phase 1; desk top study; geo environmental assessment; development appraisal; preliminary environmental risk assessment; constraints report; due diligence report; geotechnical development review; environmental statement; environmental chapter; project scope summary report (PSSR), program environmental impact report (PEIR), geotechnical development risk register; and, baseline environmental assessment.*

5. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. WSP UK Limited cannot be held responsible for any disclosures that are provided post production of our report and will not automatically update our report.

6. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP UK Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.

7. It should be noted that any risks identified in this report are perceived risks based on the information reviewed. Actual risks can only be assessed following intrusive investigations of the site.

8. WSP UK Limited does not warrant work / data undertaken / provided by others.

REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

INTRUSIVE INVESTIGATION REPORTS

Coverage: *The following report titles (or combination) may cover this category of work: geo environmental site investigation; geotechnical assessment; GIR (Ground Investigation reports); preliminary environmental and geotechnical risk assessment; and, geotechnical risk register.*

9. The investigation has been undertaken to provide information concerning either:

- **i.** The type and degree of contamination present at the site in order to allow a generic quantitative risk assessment to be undertaken; or
- **ii.** Information on the soil properties present at the site to allow for geotechnical development constraints to be considered.

10. The scope of the investigation was selected on the basis of the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.

11. For contamination purposes, the objectives of the investigation are limited to establishing the risks associated with potential contamination sources with the potential to cause harm to human health, building materials, the environment (including adjacent land), or controlled waters.

12. For geotechnical investigations the purpose is to broadly consider potential development constraints associated with the physical property of the soils underlying the site within the context of the proposed future or continued use of the site, as stated within the report.

13. The amount of exploratory work, soil property testing and chemical testing undertaken has necessarily been restricted by various factors which may include accessibility, the presence of services; existing buildings; current site usage or short timescales. The exploratory holes completed assess only a small percentage of the area in relation to the overall size of the Site, and as such can only provide a general indication of conditions.

14. The number of sampling points and the methods of sampling and testing do not preclude the possible existence of contamination where concentrations may be significantly higher than those actually encountered or ground conditions that vary from those identified. In addition, there may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

15. The inspection, testing and monitoring records relate specifically to the investigation points and the timeframe that the works were undertaken. They will also be limited by the techniques employed. As part of this assessment, WSP UK Limited has used reasonable skill and care to extrapolate conditions between these points based upon assumptions to develop our interpretation and conclusions. The assumption made in forming our conclusions is that the ground and groundwater conditions (both chemically and physically) are the same as have been encountered during the works undertaken at the specific points of investigation. Conditions can change between investigation points and these interpretations should be considered indicative.

16. The risk assessment and opinions provided are based on currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective

effects of any future changes or amendments to these values. Specific assumptions associated with the WSP UK Limited risk assessment process have been outlined within the body or associated appendix of the report.

17. Additional investigations may be required in order to satisfy relevant planning conditions or to resolve any engineering and environmental issues.

18. Where soil contamination concentrations recorded as part of this investigation are used for commentary on potential waste classification of soils for disposal purposes, these should be classed as indicative only. Due consideration should be given to the variability of contaminant concentrations taken from targeted samples versus bulk excavated soils and the potential variability of contaminant concentrations between sampling locations. Where major waste disposal operations are considered, targeted waste classification investigations should be designed.

19. The results of the asbestos testing are factually reported and interpretation given as to how this relates to the previous use of the site, the types of ground encountered and site conceptualisation. This does not however constitute a formal asbestos assessment. These results should be treated cautiously and should not be relied upon to provide detailed and representative information on the delineation, type and extent of bulk ACMs and / or trace loose asbestos fibres within the soil matrix at the site.

20. If costs have been included in relation to additional site works, and / or site remediation works these must be considered as indicative only and must be confirmed by a qualified quantity surveyor.

EUROCODE 7: GEOTECHNICAL DESIGN

21. On 1st April 2010, BS EN 1997-1:2004 (Eurocode 7: Geotechnical Design – Part 1) became the mandatory baseline standard for geotechnical ground investigations.

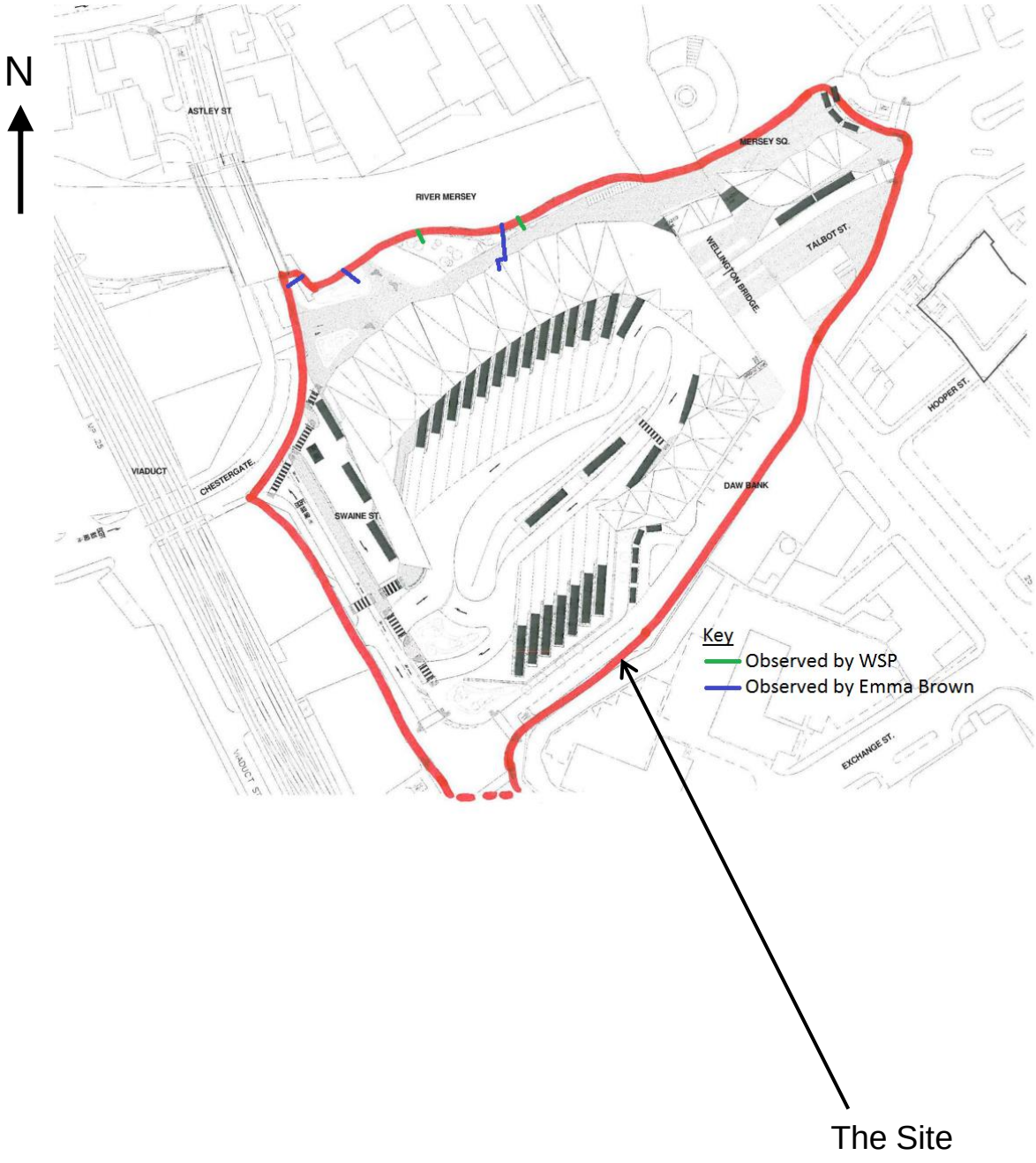
22. In terms of geotechnical design for foundations, slopes, retaining walls and earthworks, EC7 sets guidance on design procedures including specific guidance on the numbers and spacings of boreholes for geotechnical design, there are limits to methods of ground investigation and the quality of data obtained and there are also prescriptive methods of assessing soil strengths and methods of design. Unless otherwise explicitly stated, the work has not been undertaken in accordance with EC7. A standard geotechnical interpretative report will not meet the requirements of the Geotechnical Design Report (GDR) under Eurocode 7. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. The report is likely to represent a Ground Investigation Report (GIR) under the Eurocode 7 guidance.

DETAILED QUANTITATIVE RISK ASSESSMENTS AND REMEDIAL STRATEGY REPORTS

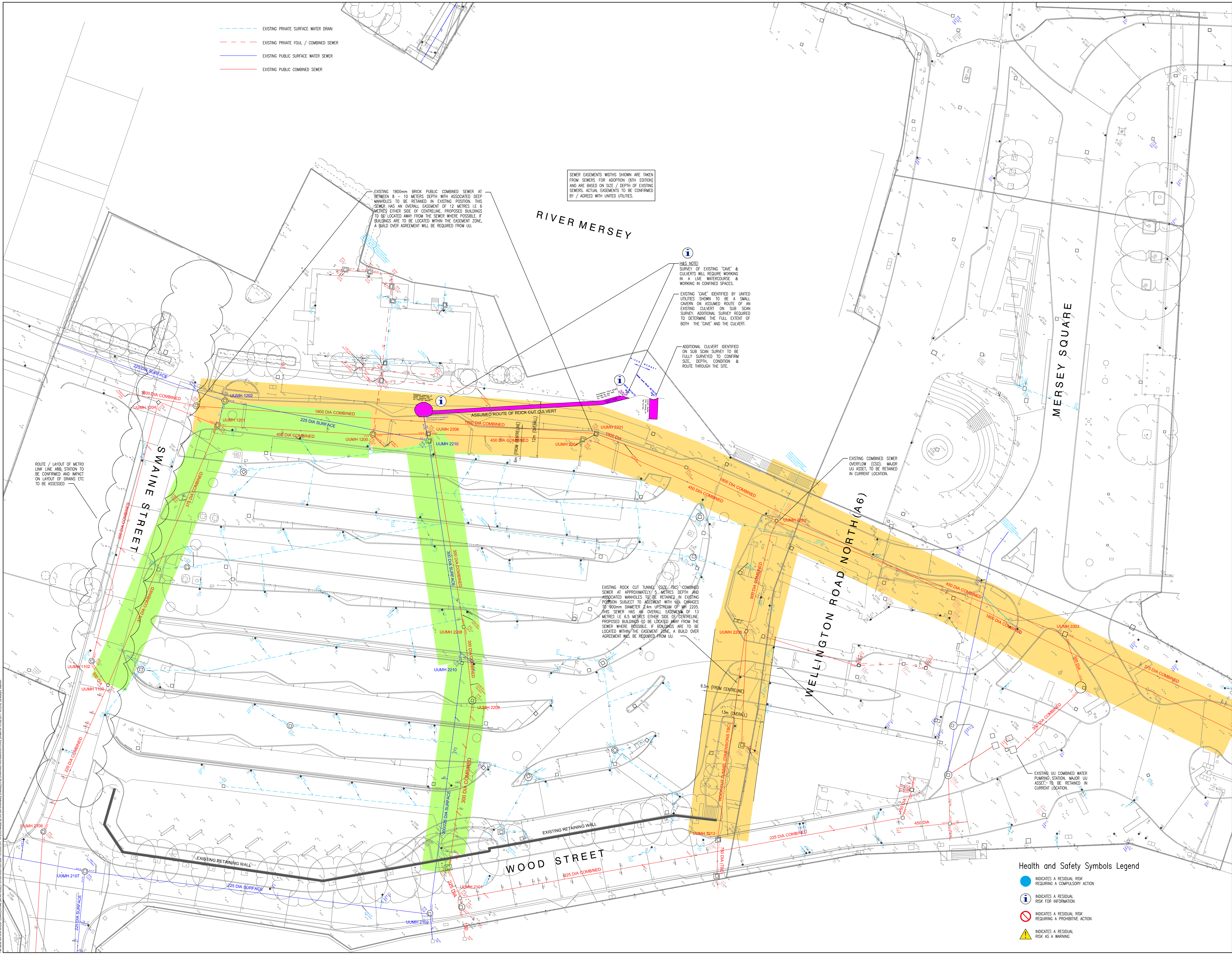
23. These reports build upon previous report versions and associated notes. The scope of the investigation, further testing and monitoring and associated risk assessments were selected on the basis of the specific development and land use scenario proposed by the Client and may not be appropriate to another form of development or scheme layout. The risk assessment and opinions provided are based on currently available approaches in the generation of Site Specific Assessment Criteria relating to contamination concentrations and are not considered to represent a risk in a specific land use scenario to a specific receptor. No liability can be accepted for the retrospective effects of any future changes or amendments to these values, associated models or associated guidance.

Appendix B

FIGURES & DRAWINGS



Site: Stockport Interchange
Ref: 70031899
Title: Figure 1 – Tunnel Plan
Scale: NTS



EXISTING PRIVATE SURFACE WATER DRAIN
EXISTING PRIVATE FOUL / COMBINED SEWER
EXISTING PUBLIC SURFACE WATER SEWER
EXISTING PUBLIC COMBINED SEWER
EXISTING 1800mm BRICK PUBLIC COMBINED SEWER AT BETWEEN 8 – 10 METERS DEPTH WITH ASSOCIATED DEEP MANHOLES TO BE RETAINED IN EXISTING POSITION. THIS SEWER HAS AN OVERALL EASEMENT OF 12 METRES I.E 6 METRES EITHER SIDE OF CENTRELINE. PROPOSED BUILDINGS TO BE LOCATED AWAY FROM THE SEWER WHERE POSSIBLE. IF BUILDINGS ARE TO BE LOCATED WITHIN THE EASEMENT ZONE, A BUILD OVER AGREEMENT WILL BE REQUIRED FROM UU.
SEWER EASEMENTS WIDTHS SHOWN ARE TAKEN FROM SEWERS FOR ADOPTION (6TH EDITION) AND ARE BASED ON SIZE / DEPTH OF EXISTING SEWERS. ACTUAL EASEMENTS TO BE CONFIRMED BY / AGREED WITH UNITED UTILITIES.
RIVER MERSEY
H&S NOTE!
SURVEY OF EXISTING 'CAVE' & CULVERTS WILL REQUIRE WORKING IN A LIVE WATERCOURSE & WORKING IN CONFINED SPACES.
EXISTING 'CAVE' IDENTIFIED BY UNITED UTILITIES SHOWN TO BE A SMALL CAVERN ON ASSUMED ROUTE OF AN EXISTING CULVERT ON SUB SCAN SURVEY. ADDITIONAL SURVEY REQUIRED TO DETERMINE THE FULL EXTENT OF BOTH THE 'CAVE' AND THE CULVERT.
ADDITIONAL CULVERT IDENTIFIED ON SUB SCAN SURVEY TO BE FULLY SURVEYED TO CONFIRM SIZE, DEPTH, CONDITION & ROUTE THROUGH THE SITE.
ASSUMED ROUTE OF ROCK CUT CULVERT
ROUTE / LAYOUT OF METRO LINK LINE AND STATION TO BE CONFIRMED AND IMPACT ON LAYOUT OF DRAINS ETC TO BE ASSESSED
SWAINE STREET
EXISTING COMBINED SEWER OVERFLOW (CSO). MAJOR UU ASSET, TO BE RETAINED IN CURRENT LOCATION.
WELLINGTON ROAD NORTH (A6)
MERSEY SQUARE
EXISTING ROCK CUT TUNNEL (SIZE TBC) COMBINED SEWER AT APPROXIMATELY 5 METRES DEPTH AND ASSOCIATED MANHOLES TO BE RETAINED IN EXISTING POSITION SUBJECT TO AGEEMENT WITH UU. CHANGES TO 900mm DIAMETER 2.4m UPSTREAM OF MH 2205. THIS SEWER HAS AN OVERALL EASEMENT OF 13 METRES I.E 6.5 METRES EITHER SIDE OF CENTRELINE. PROPOSED BUILDINGS TO BE LOCATED AWAY FROM THE SEWER WHERE POSSIBLE. IF BUILDINGS ARE TO BE LOCATED WITHIN THE EASEMENT ZONE, A BUILD OVER AGREEMENT WILL BE REQUIRED FROM UU.
6.5m (FROM CENTRELINE)
13m (OVERALL)
EXISTING UU COMBINED WATER PUMPING STATION. MAJOR UU ASSET, TO BE RETAINED IN CURRENT LOCATION.
EXISTING RETAINING WALL
WOOD STREET

DO NOT SCALE

EASEMENT FOR LARGE DIAMETER, DEEP PUBLIC SEWER WHERE BUILD OVER AGREEMENTS ARE PROPOSED.

EASEMENT FOR SHALLOWER, SMALLER DIAMETER PUBLIC SEWERS WHERE DIVERSIONS ARE FEASIBLE IF REQUIRED.

NOTE: EASEMENTS ARE NOT SHOWN ON EXISTING PUBLIC SEWERS LOCATED WITHIN PUBLIC HIGHWAYS. DIVERSIONS / ALTERATIONS TO THESE SEWERS MAY STILL BE REQUIRED.

Health and Safety Symbols Legend

- INDICATES A RESIDUAL RISK REQUIRING A COMPULSORY ACTION
- INDICATES A RESIDUAL RISK FOR INFORMATION
- INDICATES A RESIDUAL RISK REQUIRING A PROHIBITIVE ACTION
- INDICATES A RESIDUAL RISK AS A WARNING

REV	DATE	BY	DESCRIPTION	CHK	APP
P01	19/07/2017	SM	FIRST ISSUE	JF	SG

DRAWING STATUS: S0 - WORK IN PROGRESS

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CLIENT: TRANSPORT FOR GREATER MANCHESTER (TfGM)

ARCHITECT: BDP

PROJECT: STOCKPORT INTERCHANGE

TITLE: DRAINAGE CONSTRAINTS PLAN

SCALE @ A0: 1:250 @A0	CHECKED: JF		APPROVED: JF
PROJECT No: 70031899	DESIGNED: SM	DRAWN: SM	DATE: July 17

DRAWING No: 70031899-D-001 | REV: P01

DO NOT SCALE

KEY

TUNNEL PROJECTION

APPROXIMATE TUNNEL LOCATION AS MEASURED BY DRONE SURVEY

LIKELY CONNECTION POINT BETWEEN EXISTING PUBLIC SURFACE WATER SEWER & BINNS' DEEP

- DYE TEST UNDERTAKEN FROM MANHOLE 38 INDICATED OUTFLOW INTO THE RIVER MERSEY VIA BINNS' DEEP
- ASSUMED THAT THE SEWER IS THE CLAYWARE PIPE SHOWN PROJECTING FROM A BRICK HEADWALL, AS OBSERVED BY EMMA BROWN (SEE PHOTOGRAPH IN REPORT)

Heaton House

Works

River Mersey

RIVER MERSEY

RIVER MERSEY
Water Level 26.01.2018 = 35.697m

PORTAL A TUNNEL ENTRANCE

PORTAL B TUNNEL ENTRANCE

PORTAL C TUNNEL ENTRANCE

PORTAL E TUNNEL ENTRANCE

PORTAL F TUNNEL ENTRANCE

PORTAL G TUNNEL ENTRANCE

DEMOLISHED BUILDING

TUNNEL HEIGHT 1.5m

TUNNEL HEIGHT 1.3m

TUNNEL HEIGHT = 1.6m

TUNNEL HEIGHT = 1.0m

APPEARS TO BE A DISUSED WELL. APPROX. 2.0m OF EXPOSED BEDROCK AT BASE. AFTER THIS WALLS APPEAR TO BE LINED WITH LOOSE STONE WORK FOR APPROX. 2.0m. TOP NOT VISIBLE.

AS-EXPOSED BY OSBORNE

EXISTING PUBLIC SURFACE WATER SEWER

ROCK CUT SECTION

COMBINED SEWER (RESURVEY REQUIRED)

390320N

390300N

390280N

390260N

390240N

Chy

Wellington Mill

REV	DATE	BY	DESCRIPTION	CHK	APP
P02	01/10/2018	RH	TUNNEL PROJECTION REMOVED FROM PORTAL D. TUNNEL PROJECTION FROM PORTAL C ADJUSTED & DRAWING UPDATED WITH INFORMATION FROM OSBORNE TRIAL PITTING. NEW LAYOUT ADDED.	MN	MN
P01	21/02/2018	RH	FIRST ISSUE	MN	MN

S2 - FOR INFORMATION

wsp

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CLIENT: TRANSPORT FOR GREATER MANCHESTER

PROJECT: STOCKPORT INTERCHANGE

ARCHITECT: BDP

TITLE: PRELIMINARY TUNNEL LOCATION PLAN

SCALE @ A2:	CHECKED:	APPROVED:
1:500	MN	MN

PROJECT No:	DESIGNED:	DRAWN:	DATE:
70031899	RH	RH	October 18

DRAWING No: 70031899-PTLP-001

REV: P02

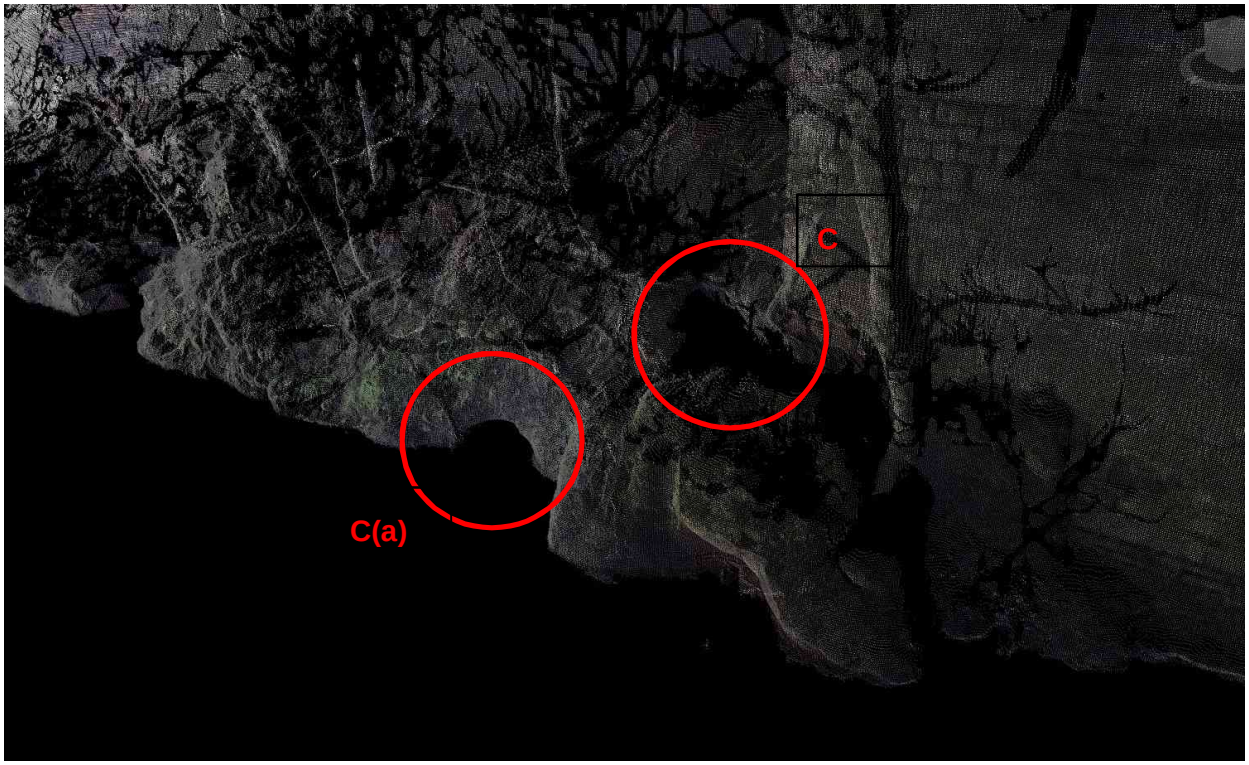
File name:\\UK.WSPGROUP.COM\CENTRAL DATA\PROJECTS\70031818\XX\70031899 - STOCKPORT INTERCHANGE\02 WIP\GE GEOTECHNICAL ENGINEERING\(08) DRAWINGS\GI18104 - GEOTERRA - W.FEB 17 GA_RECOVER.DWG, printed on 10 October 2018 13:56:08, by Home, Robert

Appendix C

3D SURVEY MODEL SCREENSHOTS

Screenshot 1 – Portals A & B

Screenshot 2 – Portal C & C(a)



Screenshot 3 – Portal D

Screenshot 4 – Portal E

Screenshot 5 – Portal F

Screenshot 6 – Portal G

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