



Victoria North Flood Defence and
Alleviation Scheme
Geoarchaeological Borehole Modelling

Victoria North Flood Defence and Alleviation Scheme
Manchester, Greater Manchester:
Geoarchaeological Borehole Monitoring.

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Abstract

This report presents the results of a geoarchaeological deposit model carried out by York Archaeology at the Victoria North Flood Defence and Alleviation Scheme, Manchester between November 2021 and March 2022. The work was commissioned by RSK ADAS Limited on behalf of Manchester City Council.

A GI survey was carried out at the site which was subject to intermittent monitoring, including visits to the core storage facility at Ian Farmer Associates. Using this data a deposit model was produced for the site to give a baseline understanding of the deposits.

The extensive post-medieval and modern development of the site is likely to have truncated the majority of the deposits associated with the River Irk, if any such deposits were ever present. The river, prior to its canalisation, was fast flowing and is likely to have eroded away the majority of deposits overlying the sandstone bedrock in this location. The presence of pockets of sand and gravel may relate to the reworking and redepositing of Devensian Till within remnants of the pre-19th century valley contour, which are shown as hacheurs on the 1st and 2nd Edition OS mapping. The difficulties in recovering this material, and its lack of cohesion, coupled with the lack of organic remains make the palaeoenvironmental potential of this site low. The lack of cultural material from these deposits would also suggest a low potential for pre-19th century archaeological remains.

*The borehole carried out in the Scotland Weir structure recovered a plug of timber which was identified as *Pinus sylvestris* sp (Scots pine) making it unsuitable for dendrochronological dating due to the lack of a long-lived pine chronology for the region. The lack of sapwood also makes it of limited use for radiocarbon dating, in addition to the likely late post-medieval date (c.1814) of the material which would return a generic late post-medieval to modern date. The timber also contained the remains of two nails, which were examined by a specialist as being undiagnostic in terms of date due to the lack of a head and are classed as broadly post-medieval.*

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1. INTRODUCTION

1.1. Site Background

1.0.1 York Archaeology Nottingham (the new trading name of Trent and Peak Archaeology) were commissioned by RSK ADAS Limited on behalf of Manchester City Council to undertake geoarchaeological monitoring and assessment in advance of the Victoria North Flood Defence and Alleviation Scheme. The Scheme is centred at approximately NGR SJ 843 993 and is an approximately 500m section of the River Irk running from a point upstream of Union Bridge to Scotland Weir downstream (Figure 1).

1.2. Geology and Topography

1.2.1 The underlying bedrock geology for the site area is the Chester Formation Sandstone, a sedimentary bedrock formed between 250 and 247.1 million years ago during the Triassic period (BGS, 2021). There are no superficial deposits mapped for the site directly but the surrounding area records Devensian Till overlying the bedrock.

1.2.2 There are numerous BGS logs available from previous boreholes drilled along the scheme, listed as follows:

1.2.3 CLEMSON & CO. BACK BOUNDARY STREET RED BANK – SJ89NW202 records Bunter soft red sandstone to a depth of 25 m. This overlies hard red marl and sandstone to a depth of 79.5 m, which in turn seals hard red sandstone to a depth of 106.5 m (BGS, 2021).

1.2.4 NEW ROGER STREET BRIDGE 2 – SJ89NW2901 records road setts up to 0.15 m deep, soft cinder, ash, and sandy clay with brick rubble from 0.15 to 2.03 m, an old storm water brick drain from 2.03 to 2.54 m, loose sand and stone fill from 2.54 to 3.18 m, soft/loose very moist to wet brown silty fine to medium grained sand with occasional cobbles from 3.18 to 4.06 m, an obstruction, possible wood, from 4.06 to 4.27 m, and very dense reddish brown silty medium grained partially cemented sand from 4.27 m to the max depth of the borehole at 6.30 m (BGS, 2021).

1.2.5 NEW ROGER STREET BRIDGE 1 – SJ89NW2900 records road setts to a depth of 0.23, compact clay and cinder fill with minor brick rubble and sand inclusions from 0.23 to 2.36 m, compact dirty sand with brick rubble from 2.36 to 2.90 m, a partial void from 2.90 to 2.97 m, brick rubble and sandstone from 2.97 to 3.10 m, moderately compact reddish brown and grey stratified sand with sandstone from 3.10 to 3.56 m, very dense shattered sandstone in a sand matrix from 3.56 to 4.11 m, and very dense reddish and orange brown slightly silty medium grained partially cemented sand from 4.11 to the max depth of 7.54m (BGS, 2021).

1.2.6 CHARLES SMITH RED BANK – SJ89NW203 records red marl to a depth of 28.35 m (BGS, 2021).

1.3. Planning Background

- 1.3.1 The works being carried out for Manchester City Council do not require planning and the works were carried out as part of the preliminary ground investigation works.
- 1.3.2 The WSI for archaeological and geoarchaeological monitoring and recording was designed to address the Client's archaeological obligations to the treatment of the historic environment, and to ensure that all impacts on the historic environment resource are mitigated or avoided (ADAS 2021). The Historic England Science Advisor was not consulted as it was not deemed necessary.

1.4. Scope of Report

- 1.4.1 This report presents the geoarchaeological results following a programme of Ground Investigation (GI) works carried out to support the Victoria North Flood Defence and Alleviation Works scheme. The report also outlines the geoarchaeological potential of the deposits observed in addition to the specialist analysis of wood and metalwork recovered within the vertical coring of the Scotland Weir. The fieldwork and report were undertaken by Tom Keyworth and Richard Lowther (Geoarchaeology Project Officers). The project was managed by Kristina Krawiec (Geoarchaeology Project Manager).

2. GEOARCHAEOLOGICAL BACKGROUND

2.1. Pleistocene

- 2.1.1 Most of the superficial deposits of the River Irk are unmapped by the BGS, however immediately surrounding the study area are substantial glacial deposits (Till and Glaciofluvial outwash) formed within the Devensian Glaciation (115,000-12,000 years before present; BGS, 2022), mostly likely during the Late Devensian stage (28,000-15,000 years before present; Stone et al., 2010).

2.2. Holocene

- 2.2.1 Holocene deposits are not mapped for the study area, however a short distance upstream on the Irk and downstream of confluence of the Irk with the Irwell, alluvial deposits are recorded (BGS, 2021) likely reflecting river sediment deposition through the Holocene (c.11,500 years ago to present).
- 2.2.2 The River Irk, rises to the east of Royton before joining the River Irwell at Dulcie Bridge, Hunt's Bank, Manchester. This is a fast-flowing river with sand and gravel dominated alluvial sequences both up and downstream of the site. The character of the valley as a whole is such that organic and fine-grained sediment deposition is not expected.

2.3 Archaeological context

Prehistoric period (Pre- AD 43)

- 2.3.1 The name of the River Irk is probably of Brittonic origin (a Celtic language originating from the Iron Age), suggested to relate to the Welsh *iwrch*, meaning roebuck (James, 2020).

Romano-British period (AD 43-410)

- 2.3.2 A fortification was established in Manchester, with five great roads branching off to Chester, Stockport, Wigan, York, and Ribchester (Farrer and Brownbill, 1911).
- 2.3.3 Numerous excavations across Manchester have revealed Roman wares, including coins, jewellery, inscribed tile fragments and foundations of a villa (Thompson Watkin, 1887).
- 2.3.4 Findspots of coins from the Romano-British period and later (MGM1767 and MGM1928) are recorded on the riverbank across from where the proposed groundworks will be carried out (Arup, 2021b).

Anglo-Saxon, Medieval, and post-Medieval period (410-1750)

- 2.3.5 The GMHER records a single early medieval asset. A 6th century funerary urn (MGM1768) is recorded just north of the Red Bank although its precise location is unknown (Arup, 2021b).
- 2.3.6 The GMHER records a watermill (MGM9863) within the western Site boundary which was recorded in Manor Surveys from 1320-1322. A later survey carried out in 1434 noted the presence of an oven associated with the watermill (Arup, 2021b).
- 2.3.7 The Irk was considered a very flood-prone and destructive river, with written testimony of the burgesses in 1480 explaining that ‘the water of the Irk had worn out’ part of the highway between Manchester and Collyhurst (Farrer and Brownbill, 1911).

Modern period (1750-present)

- 2.3.8 The Irk was a key part of Manchester’s industrial revolution, with an array of industrial activities lying on its banks within the study area present on historic mapping (1840s-1890s; National Library of Scotland, 2022), including gas, chemical, rubber, bolt, print, and dye, oil, and tanning works. A former Tannery was located on part of the site of the modern Red Bank Car park, on the northern bank of the Irk and a short distance upstream of the Scotland Weir.
- 2.3.9 The river provided an important source of water power for the textile industry. The industry along the Irk was once considered to have the greatest number of mill seats along its course than any other similar streams in England (Reynolds Clarke, 1830).
- 2.3.10 Seven bridges over the River Irk were completed by the time of the publication of Aston's *A Picture of Manchester* in 1816, including the Ducie Bridge located adjacent

to the Scotland Weir, completed in 1814 (Farrer and Brownbill, 1911). The Scotland Weir is of unknown age, but is potentially associated with a now demolished mill.

2.3.11 Historic England records four Grade II Listed Buildings within the Study Area which will not be impacted by the proposed works.

- The Grade II Listed Charter Street Mission (formerly Charter Street Ragged School and Working Girls' Home) (NHLE: 1461979) was constructed between 1892 and 1900 by Maxwell and Tuke (NHLE, 2021).
- The Grade II Listed Ashton House (NHLE: 1197764), a woman's hotel built in 1910 (NHLE, 2021).
- The Grade II Listed Parkers Hotel (NHLE: 1208963). They were formerly commercial offices and now a hotel constructed between 1900 and 1910 (NHLE, 2021).
- The Grade II Listed Union Bridge (NHLE: 1255163), a circa 18th century bridge, formerly a bridge now only used by pedestrians which crosses the River Irk (NHLE, 2021).

2.3.12 A desk-based assessment was undertaken in 2006 for a proposed development within the site boundary. This desk-based assessment concluded that the area has moderate to high potential related to the 19th century textile industry (ADS, 2021).

2.3.13 The GMHER records thirteen assets within the site boundary dated to the post-medieval, 19th century, and modern periods. These assets (MGM11060, MGM16895, MGM17186, MGM17187, MGM17188, MGM17189, MGM17190, MGM17192, MGM17193, MGM17194, MGM17195, MGM17196, and MGM17197) are the recorded sites of industrial and domestic buildings (Arup, 2021).

2.4 Project Aims and Objectives

2.4.1 The aims of the archaeological monitoring and recording as set out in the WSI are as follows:

- To ensure that any archaeological features/deposits exposed during ground works associated with the development are identified, recorded and interpreted to an acceptable standard;
- To ensure that any significant discoveries of artefactual evidence are recorded and analysed to an acceptable standard; and
- To inform a strategy to avoid or mitigate the impacts of the proposed development on any surviving archaeological remains identified.

2.4.2 The specific aims of the project as set out in the WSI will be to:

- Monitor the proposed vertical and horizontal cores and boreholes through Scotland Weir and to take timber samples if appropriate. Particular focus

should be on recording any material which may give an indication of the date, the structure, and its original nature and purpose; and

- Identify any deposits of archaeological or palaeoenvironmental interest in the river channel.

2.4.3 The fieldwork takes place within and will contribute to the goals of the regional frameworks set out in the North West England Regional Research Framework (Research Frameworks, 2021). The site has the potential to address the following:

ROMANO-BRITISH (43AD-c.410AD)
<i>R08: What evidence is there for the impact of Roman occupation on the environment?</i>
<i>R10: What was the impact of Roman industrialisation on the environment?</i>
EARLY MEDIEVAL (410AD-1066AD)
<i>EM04: What can a better understanding of urban stratigraphic sequences tell us about early medieval site activities?</i>
LATE MEDIEVAL (1066AD-1540AD)
<i>LM01: How can we improve the dendrochronological sequencing for the medieval period in the north-west?</i>
<i>LM5.02: Improve the dendrochronology sequence for the region, with more samples taken from standing buildings as well as excavated preserved wooden objects</i>
POST MEDIEVAL (1540AD-1750AD)
<i>PM05: How can dendrochronology sequences inform our understanding of building evolution, development and change during the Post-Medieval period?</i>
INDUSTRIAL (1750AD-present)
<i>Ind04: How well do we understand the survival and significance of historic water management features for industrial purposes including power and textile processing?</i>

3. GEOARCHAEOLOGICAL METHODOLOGY

3.1. Fieldwork Methodology

3.1.1. All works were undertaken in accordance with the WSI (ADAS, 2021), as approved by the Greater Manchester Archaeological Advisory Service, in their capacity as Archaeological Advisors to Manchester City Council and to standards defined by CIfA Guidelines for Recording of Archaeological Sites (2019; 2020a; 2020b).

3.1.2. The full specification of the Ground Investigation (GI) proposed to support the Victoria North Flood Defence and Alleviation Works scheme (Arup, 2021a) included:

- Vegetation clearance to allow structural inspection;
- Structural visual inspection of the channel walls, bridges and structures;
- 3D survey of the river and neighbouring structures;
- 21 No. vertical boreholes to approximately 8-10m depth to confirm existing foundations, stratigraphy of back of wall fill materials and rockhead level;

- 17 No. horizontal rotary cores, through the existing river wall to confirm material and geometry of structure and obtain samples for testing;
- 1 No. vertical rotary core immediately behind the crest of the existing Scotland Weir structure in order to confirm material and geometry of existing structure and obtain samples for testing
- 9 No. samples of river bed material to determine geotechnical, geomorphological properties and chemical classification
- There may also be a requirement for constructing boreholes in the centre of the river channel at several positions along the length. An allowance has been made for 5 No. boreholes within the river channel
- Sampling of river water.

3.1.3. On-site geoarchaeological monitoring and archaeological recording was carried out for the vertical core through Scotland Weir, in addition to monitoring of river channel boreholes. Waterlogged wood was recovered from the Scotland Weir core and was retained for further analysis at York Archaeology. Off-site recording of core samples occurred during multiple visits to the Ian Farmer Associates storage facility.

3.1.4. Where possible, core material was described using the Troels-Smith method of sediment classification. The scheme breaks down a sediment sample into four main components and allows the inclusion of extra components that are also present, but that are not dominant. Key physical properties of the sediment layers are darkness (Da), stratification (St), elasticity (El), dryness of the sediment (Sicc) and the sharpness of the upper sediment boundary (UB). A summary of the sedimentary and physical properties classified by Troels-Smith (1955) and a stratigraphic breakdown of the deposits was recorded on proforma log sheets. The logs are supplemented by digital photography (Plates 1-5).

3.1.5. Waterlogged wood was subject to species identification with reference to Schweingruber (1990) and Schoch et al. (2004). The consideration of preservation within the deposits was made with specific reference to Historic England's guidance document for Preserving Archaeological Remains (2016).

3.1.6. Small grab samples were retained from the disturbed samples examined at Ian Farmer Associate facilities.

3.2. Fieldwork constraints

3.2.1. The samples that were retained by Ian Farmer Associates were already subjected to environmental testing and therefore were incomplete. Other material that was retained was recovered in bulk bags (disturbed) not in sleeved liners. A visual record was made of the material in the bulk bags but is of limited use (Plate 1).

3.2.2. The drillers logs were made available and these were used in the construction of the model. The access for the river cores was restricted due to the small working platform and therefore cores were monitored at a distance.

3.3. Deposit modelling methodology

3.3.1. A deposit model was constructed using the results of the GI works undertaken at the site. The modelling was undertaken with reference to *Historic England Guidance for Deposit Modelling and Archaeology* (2020). The data was entered into Rockworks in order to generate cross sections.

3.3.2. The data is archived in an excel spreadsheet.

3.4. Archive

3.4.1. The site archive is currently held at the offices of YA and transferred to ADAS in due course. The local museum declined to provide an accession number or site code, the YA site code used for the work was VFD. The contents of the archive are tabulated below (Table 1).

Borehole/test pit sheets	4
Rockworks spreadsheet	1
Section sheets	0
Plans sheets	0
Colour photographs	0
B&W photos	0
Digital photos	73
Sample register	0
Drawing register	0
Watching brief forms	0
Trench Record forms	0

Table 1: Quantification of site paper archive

Bulk finds (quantity e.g. 1 bag, 1 box, 0.5 box 0.5 of a box)	2 nails
Registered finds (number of)	0
Flots and environmental remains from bulk samples	0
Palaeoenvironmental specialists sample samples (e.g. columns, prepared slides)	4 Grab samples
Waterlogged wood	One wood plug
Wet sieved environmental remains from bulk samples	0

Table 2: Quantification of artefact and environmental samples.

4. RESULTS

4.1. Lithology

4.1.1. Across the site bedrock was encountered at almost all locations. The recovery of some of the coarser, gravel-dominated made ground deposits was poor with often

no material recovered. The majority of the samples recovered were as disturbed bagged samples (Plate 1). The site has been subject to intensive development which is most clearly displayed on the 1st Edition OS mapping (Figure 3).

- 4.1.2. The made ground, for the most part, directly overlay the sandstone bedrock but in three locations (RE11, RE12 and RE15) sequences of clean sand and gravel up to 3.00m thick were recorded (Figure 2). The origin of this material is unclear and may be derived from reworked Devensian Till, which is mapped by the BGS in the areas surrounding the site, or may be derived from eroded sandstone bedrock. This material was not cohesive so was not recovered intact. These deposits may be preserved within a localised depression in the sandstone surface in the general vicinity of RE11-RE12 and RE15 (Figure 4).
- 4.1.3. The sand and gravel sequence was most extensive in RE11 and RE12, with alternating deposits of fine to coarse gravel and sand. If these deposits are derived from the weathering and reworking of the Devensian till/bedrock they may reflect the changing energy conditions within the River Irk over time.
- 4.1.4. The site as a whole was devoid of organic deposits and both the made ground and the underlying deposits were sand and gravel dominated. In RE11, the sand and gravel sequence contained a thin layer (0.40m) of gravelly sandy clay with an 'organic odour', however no organic remains were visible.

Made Ground

- 4.1.5. Across the site the made ground was characterised by sand and gravel mixed with rubble, ash and concrete. The average depth was between 2.00-4.50m and in three locations was found to be contaminated with hydrocarbons (RE05A, RE07 and RE08). In three locations the material was too coarse to be recovered (RE09, RE10, RE17B). The vertical cores recorded possible structural remains in RE02A, with successive layers of mortared brick and sandstone recorded to 4.00m below ground level. In RE09 and RE10A cobbles were found constructing the cutting shoe which may indicate the presence of a surface.

Scotland Weir

- 4.1.6. The borehole carried out in the Scotland Weir structure recovered a plug of timber which was identified as *Pinus sylvestris* sp (Scots pine) making it unsuitable for dendrochronological dating due to the lack of a long-lived pine chronology for the region (Plates 2-5). There was also a faint hydrocarbon odour noted. The lack of sapwood also makes it of limited use for radiocarbon dating, in addition to the likely late post-medieval date of the material which would return a generic late post-medieval to modern date. If the material is also contaminated with hydrocarbons then this will also effect the reliability of any dating.
- 4.1.7. The timber also contained the remains of two nails, which were examined by a specialist as being undiagnostic in terms of date due to the lack of a head and are classed as broadly post-medieval.

4.2. Deposit model

- 4.2.1. The limited results from the GI investigations were entered in to a rockworks database. An interpolated surface was also produced in ArcGis (Figure 4). The cross-sections demonstrate the level of made ground across the site.
- 4.2.2. Cross section A-B shows the thickness of potentially reworked Till within the sequence traversing the current course of the river (Figure 5). The sand recorded in RE19A is likely to represent recent deposition or weathered bedrock. The two boreholes either side of the river represent deposition of unknown age but likely pre-dated the canalisation of the river.
- 4.2.3. Cross section C-D represents the deposits at the south western end of the site, with almost all locations recording made ground straight onto bedrock (Figure 6). There were thin skims of gravel recorded in RE02A and 05A but these are likely to be related to the made ground rather than representing undisturbed river deposits.

5. THE FINDS

5.1. Summary

5.1.1. A section of waterlogged wood was recovered from the vertical core through the Scotland Weir. This find also contained embedded metalwork, fragments of which were extracted and sent for specialist analysis by Ian Riddler. The assessments of the finds are detailed below.

5.2. Waterlogged wood *by Stacey Adams*

5.2.1. A 0.53m long piece of wood, with a further two small c. 0.01-0.03m fragments, were recovered underlying a 0.53m layer of concrete from the vertical core undertaken on Scotland Weir (Plate 2). Wooden material was thought to extend to the base of the core but was not recovered, suggested to be due to softer sediments/wood towards the base of the core (Engineers pers comm.), potentially totalling a sequence of c.1.80m of wooden material. The wood also had a faint odour of hydrocarbons.

5.2.2. Both ends of the piece are damaged, likely by the coring process, suggesting that the recovered section represents a central section of a longer piece. As a result, the recovered section's depth below ground level is unknown, but ranges between the base of the concrete (0.53m BGL) and the base of the core (2.40m BGL, Plate 3). It is likely that the top of the piece was soft and degraded, possibly due to loss of waterlogging, resulting in an unknown length being damaged through coring. A similar process may have occurred towards the base of the core, with recovery impeded by soft wood and unconsolidated wet sediments. Smaller fragments of wood were recovered jammed within the coring barrel, demonstrating the difficulty coring the wooden section of the Scotland Weir (Plate 4). In addition the small part of the intact surface containing the nails was badly degraded and as such no toolmarks were preserved.

5.2.3. Two metal nails are present within the large piece (Plate 5), the longest of the two, pierces through the wood fully, with the other smaller nail embedded within the material. The nail heads have been sheared off through coring. Two/three faint cut marks, potentially from an axe, are also exhibited which may initially be suggested to have been made as finishing touches after the wood had been sawn.

5.2.4. The intact length of the wood suggests that coring occurred through an upright timber. The flat face of the wood exhibiting the nails potentially suggests of a fixing position for horizontal pieces of wood as part of the weir structure.

5.2.5. Specialist analysis has identified the wood as Scots Pine (*Pinus sylvestris*). This identification unfortunately means this find is unsuitable for dating by dendrochronology. The specialist analysis of the metalwork was subsequently commissioned to provide a broad age for the recovered find.

5.3. Metalwork by Ian Riddler

- 5.3.1. The two fragments of iron submitted for identification can both be identified as nails. The lower part survives of a large nail with a square-sectioned shaft, which tapers to a point. It is straight throughout its length, suggesting that it was hit accurately into the wood. The upper part is missing and it is not possible to determine the form of the head. Five different head forms were identified for post-medieval iron nails from the Dockyard at Deptford (Riddler 2004). Most of the nails from that site also had square-sectioned shafts, although in some cases they were rectangular in section.
- 5.3.2. The second nail lacks both its point and its head. It has the same section, but with smaller dimensions, and the shaft is lightly curved.

6. THE ENVIRONMENTAL SAMPLES

6.1. Summary

6.1.1. The lack of intact material prevented the recovery of samples. A small number of grab samples were retained although these are disturbed and are not recommended for assessment.

Core number	Depth
RE11	6.75m BGL, oxidised clay with sand
RE11	7.00m BGL, sandy clay with slight organic component
RE13A	4.00-4.50m BGL, slightly organic clayey sand. Drillers logs note the presence of concrete, hinting at likely reworking / contamination
RE14	3.20-4.00 m BGL, sand with occasional shell fragments with slightly organic clay lenses / laminations

Table 3: Grab samples recovered from the site.

7. DISCUSSION AND CONCLUSIONS

7.1. Overview of lithological sequence

- 7.1.1 The GI survey monitoring and subsequent examination of the drillers logs, has allowed a basic model of the site to be produced. In general there was between 2.00-4.50m of made ground overlying the sandstone bedrock across the site. The made ground was mainly characterised as loose, gravel-dominated rubble with three locations indicating hydrocarbon contamination.
- 7.1.2 The borehole carried out through Scotland Weir recovered a plug of timber identified as Scot's Pine. This also contained the remains of two nails, however these were not chronologically diagnostic and the timber is not suitable for dendrochronological or radiocarbon dating.
- 7.1.3 There is the suggestion of pre-19th century sand and gravel deposits in the centre of the site but these lack organic remains and are therefore of low palaeoenvironmental potential. As a whole the site has a low potential to preserve in situ remains which relate to the early evolution of the River Irk. The pockets of potentially pre-industrial preservation did not record archaeological remains and therefore the pre-industrial archaeological potential of the site is considered low.

7.2. Deposit survival and existing impacts

- 7.2.1 The site has seen extensive development with the River Irk altered from its natural planform. The 1st edition Ordnance Survey map demonstrates the range of industry practiced at the site and the surrounding area. This ranges from corn milling, iron working, bleaching, dyeing (Figure 3). This has resulted in extensive truncation of the deposits and this can be seen across the majority of the site.
- 7.2.2 The centre of the site does record a clean sand and gravel sequence which may represent intact pre-19th century deposits. These were devoid of organic remains but were fully saturated making recovery problematic and in some cases no material was able to be recovered.
- 7.2.3 From a single core, the structural extent of the weir cannot be established and therefore it is difficult at this stage to ascertain its condition. The conditions within the current weir are conducive to the preservation of the wooden inner structure of the weir, as evidenced by the large wood plug recovered during the survey, but the age of this is still unknown. The wood recovered also had a faint hydrocarbon odour which makes it unsuitable for radiocarbon dating.
- 7.2.4 In three locations the made ground was found to be contaminated with hydrocarbons (RE05A, RE07 and RE08) but for the most part the site appeared to be relatively free of contamination.

7.3. Discussion of deposits

7.3.1. The site as a whole demonstrated very little in the way of pre-19th century deposits and for the most part the made ground overlay the sandstone bedrock. In three locations (RE11, RE12 and RE15) sequences of clean sand and gravel up to 3.00m thick were recorded. The origin of this material is unclear and may be derived from reworked Devensian Till, which is mapped by the BGS in the areas surrounding the site, or may be derived from eroded sandstone bedrock. This material was not cohesive so was not recovered intact. These deposits may be preserved within a localised depression in the sandstone surface in the general vicinity of RE11-RE12 and RE15 (Figure 4).

7.3.2. Further to the north of Manchester the BGS records similar sand and gravel dominated sequences within the Irk Valley and there seems to be a general lack of fine-grained and organic deposition. This is likely due to a combination of river gradient, steep valley sides, energy and parent material. The river has mainly been fast-flowing with historical accounts of flash-flooding which overwhelmed several bridges (VCH, Farrer and Brownbill 1911).

'In 1480, in the testimony of the burgesses respecting the highway between Manchester and Collyhurst occurs the statement that 'the water of Irk had worn out' the said highway; Hulme D. no. 22. In 1787 part of Salford Bridge was carried away by a flood of the Irwell'

7.3.3. The later history of the Irk would see it described as *'not only the blackest but the most sluggish of all rivers'* by Thomas Wentworth in the 1890's. But he also suggests the name Irk is a reference to 'Irke' or roebuck and is a *'reference to its fleetness'* (Wentworth 1892, 5). The industrial pollution recorded in the 19th century has likely been flushed out by subsequent periods of fast flowing conditions. The sand and gravel deposits recorded at the site demonstrate fluctuations in energy within the system although they lack any organic component that might further elucidate the conditions of the surrounding landscape. The historic mapping available for the site shows the River Irk to broadly follow the same course with alterations to its planform at the junction of Scotland bridge and Red Bank (Figure 7).

Scotland Weir

7.3.4. The borehole carried out in the Scotland Weir structure was designed to understand the nature of the structure and to determine a more precise age. A large plug of timber which was identified as *Pinus sylvestris* sp (Scots pine) making it unsuitable for dendrochronological dating due to the lack of a long-lived pine chronology for the region. In addition, it must be considered that the timber may be derived from Baltic or wider European imports given the likely post-medieval date for the structure. From the 17th century Britain increasingly imported Scot's pine for ship-building and waterfront structures due to shortages of appropriate timber and as part of wider economic strategy (Bridge 2016, 59).

7.3.5. The lack of sapwood also makes it of limited use for radiocarbon dating, it is likely of late post-medieval date would return a generic late post-medieval to modern

date if submitted for AMS age determination. The slight hydrocarbon odour also suggests a level of contamination which may also adversely affect a radiocarbon date. The timber contained the remains of two nails, which were examined by a specialist as being undiagnostic in terms of date due to the lack of a head and are classed as broadly post-medieval.

- 7.3.6. The weir clearly has a timber core or frame but this in itself is not sufficient to suggest an early date for the structure. The timber was overlain by a large sandstone block 0.60m thick and a third attempt coring recovered a small amount of coarse sand and gravel which is suggested to be infill material (Appendix 1). Therefore the character of the construction as defined by the coring is one of a possible timber frame infilled with sand and gravel and capped with sandstone blocks. The William Green map of 1794 does not record a weir structure but Laurent's plan of 1793 does record several straight weirs. The river here is narrower than further downstream and therefore there probably wasn't the space to construct a more robust horseshoe weir. Despite the lack of more chronologically diagnostic material in the weir it is still considered likely that the structure post-dates the 18th century (Figure 7).

Made ground

- 7.3.7. The made ground at the site was characterised by sand and gravel mixed with rubble, ash and concrete. The average depth was between 2.00-4.50m (Figure 5) and in three locations was found to be contaminated with hydrocarbons (RE05A, RE07 and RE08).
- 7.3.8. There are recorded possible structural remains in RE02A, with successive layers of mortared brick and sandstone identified to 4.00m below ground level. In RE09 and RE10A cobbles were found obstructing the cutting shoe which may indicate the presence of a surface. This suggests that parts of the site preserve subsurface structures and former ground surfaces which likely represent 19th-20th century remains.

7.4 Consideration of research aims and conclusions

- 7.4.1. The monitoring and interrogation of the GI data has allowed a baseline understanding of the nature of the deposits at the site. A basic deposit model has been created which reflects the level of truncation at the site which in many locations was down to bedrock. There are pockets of potentially undisturbed River Irk deposits but these are sand and gravel dominated and are therefore of low palaeoenvironmental potential.
- 7.4.2. Unfortunately, the timber recovered from Scotland Weir was found to be unsuitable for dendrochronological dating, and so the regional research objectives related to this study outlined in section 2.4 cannot be contributed to. However, the structure does still preserve a timber core, as shown by the large plug of wood with nails recovered during the coring, and if further opportunities are available to study the structure, i.e. repairs to the weir that involve open sections, further dating evidence may be forthcoming.

BIBLIOGRAPHY

ADAS.2021. Written Scheme of Investigation for archaeological monitoring and recording Victoria North Flood Defence and Alleviation.

ARUP, 2021a. *Scope for archaeological monitoring of ground investigations_P01*. Internal Document.

ARUP, 2021b. *Victoria North – River and Flood Alleviation Works Historic Environment Baseline Assessment*.

Bridge, M. 2016. Progress in British Dendrochronology. *Archaeology International*, No 19, pp59-62.

Farrer, W. and Brownbill, J. 1911. *The city and parish of Manchester: Introduction*. In: A History of the County of Lancaster: Volume 4, pp. 174-187. London: Victoria County History.

James, A.G. 2020. *The Brittonic Language in the Old North*. A Guide to the Place-Name Evidence. Vol. 2. Guide to the Elements.

Reynolds Clarke, S. 1830. *The New Lancashire Gazetteer*. Holborn: Henry Teesdale and Co. p. 72.

Riddler, I. D. 2004. Iron Objects. In: Divers, D. Excavations at Deptford on the site of the East India Company Dockyards and the Trinity House Almshouses, London. *Post-Medieval Archaeology* 38, 84-86

Stone, P., Millward, D., Young, B., Merritt, J., Clarke, S., McCormac, M. and Lawrence, D., 2010. *British regional geology: Northern England*. Fifth edition. Keyworth, Nottingham, British Geological Survey.

Schoch, W., Heller, I., Schweingruber, F.H. and Kienast, F., 2004. *Wood anatomy of central European Species*. Swiss Federal Institute for Forest.

Schweingruber, F.H., 1990. Anatomy of European woods. *Anatomy of European woods*.

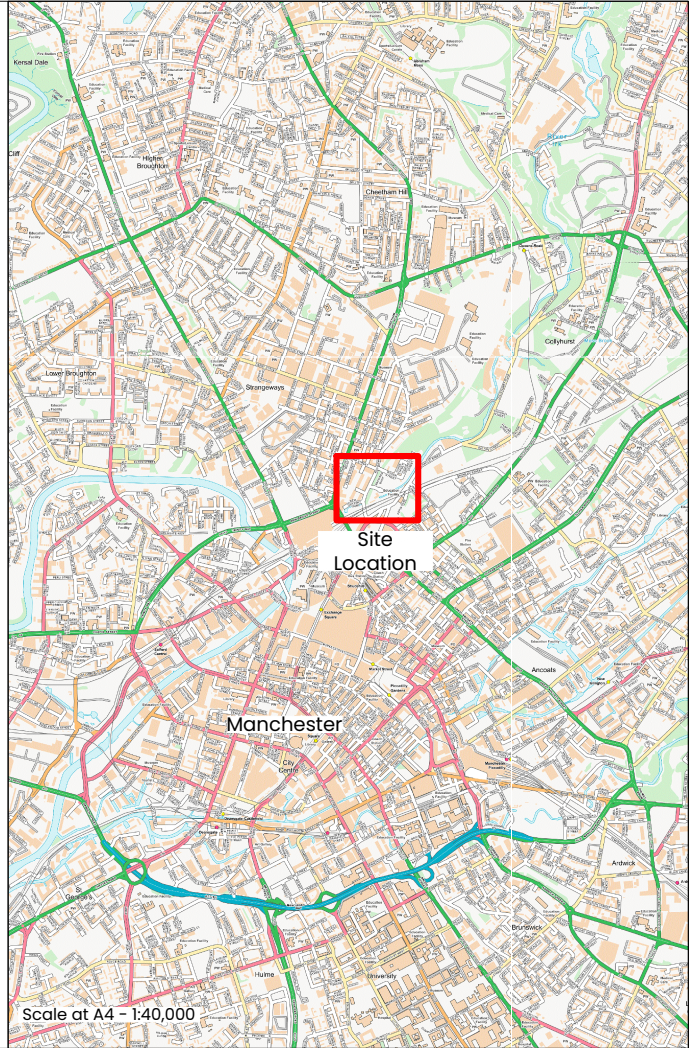
Troels-Smith, J. 1955. Karakterisering af løse jordarter (characterisation of unconsolidated sediments). *Denmarks Geologiske Undersøgelse*, Series IV/3, 10, 73.

Wentworth, P. 1892. *The History and Annals of Blackley and Neighbourhood*. John Bagot Limited.

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Kristina Krawiec (YA Geoarchaeology Project Manager).



Scale at A4 - 1:40,000



Viewport Scale at A4 - 1:5000



Figure 01 - Site Location Plan
VFD - Victoria North Flood Defence and Alleviation Scheme

Scale at A4 - Varies
Drawn by MH

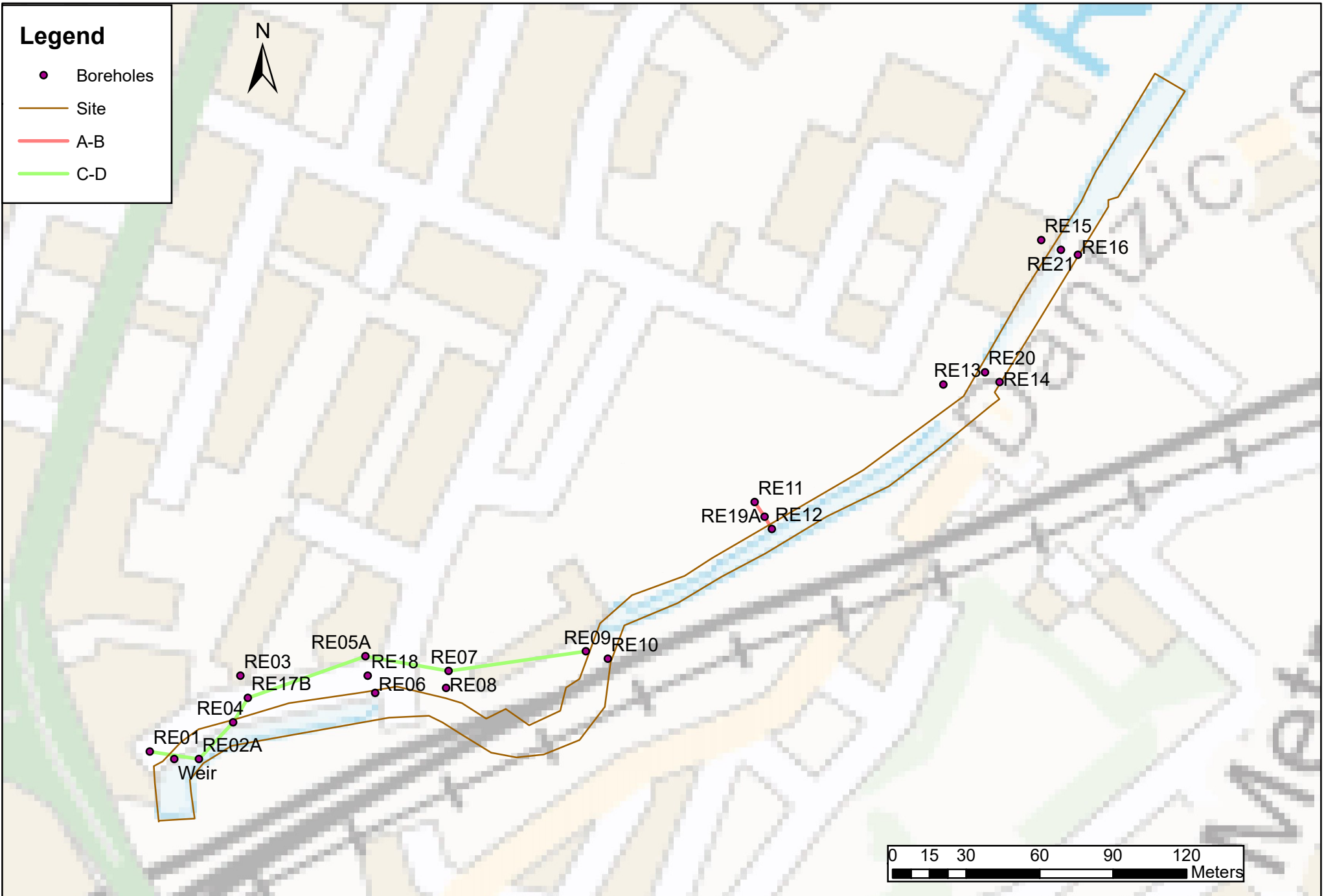


Figure 02- Borehole and transect locations

VFD- Victoria Flood Defences and Alleviation Scheme



Figure 03 - 1st edition OS map and borehole locations
 VFD- Victoria Flood Defences and Alleviation Scheme

Scale at A3 - 1:3000

Drawn by: kk

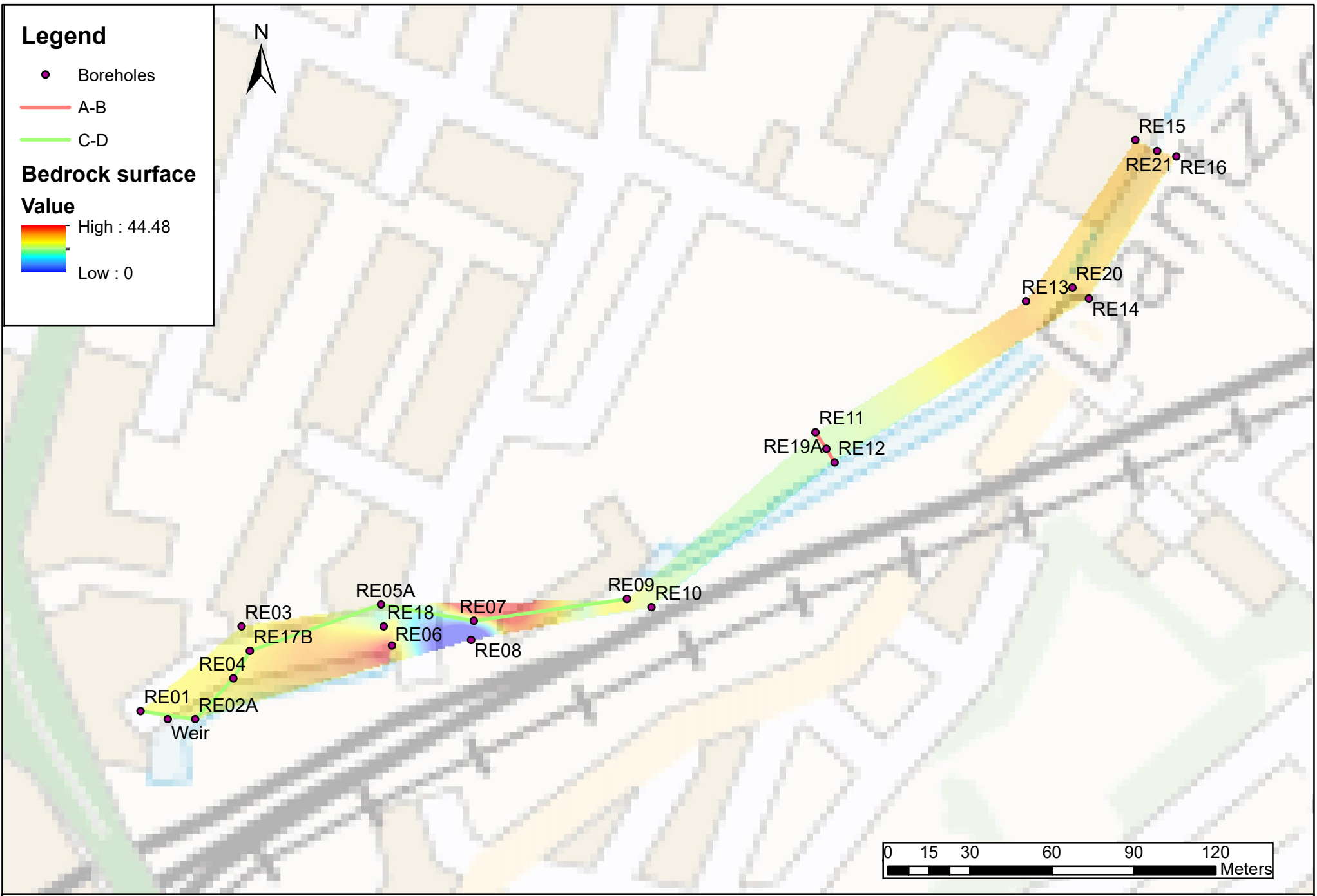


Figure 04 Transect locations and bedrock surface

VFD- Victoria Flood Defences and Alleviation Scheme

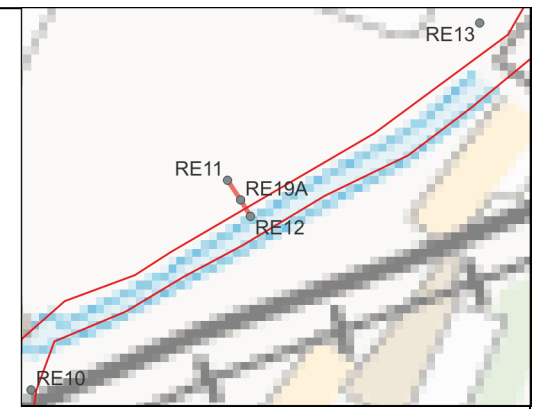
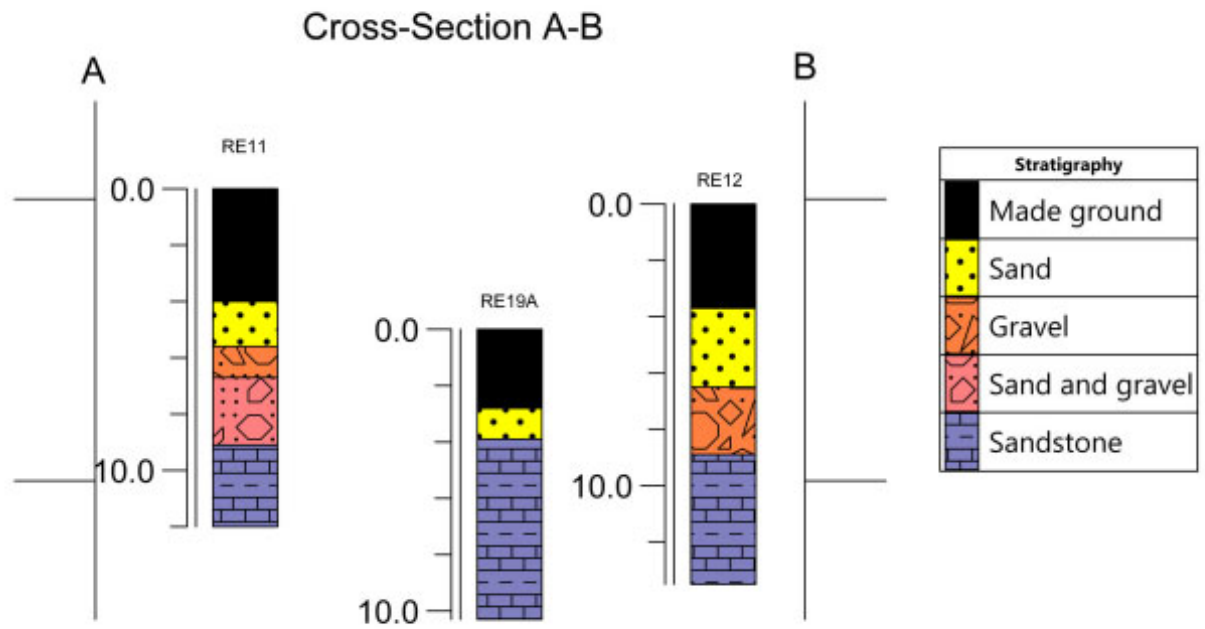


Figure 05 - Cross-section A to B
 VFD- Victoria Flood Defences and Alleviation Scheme

Drawn by: kk

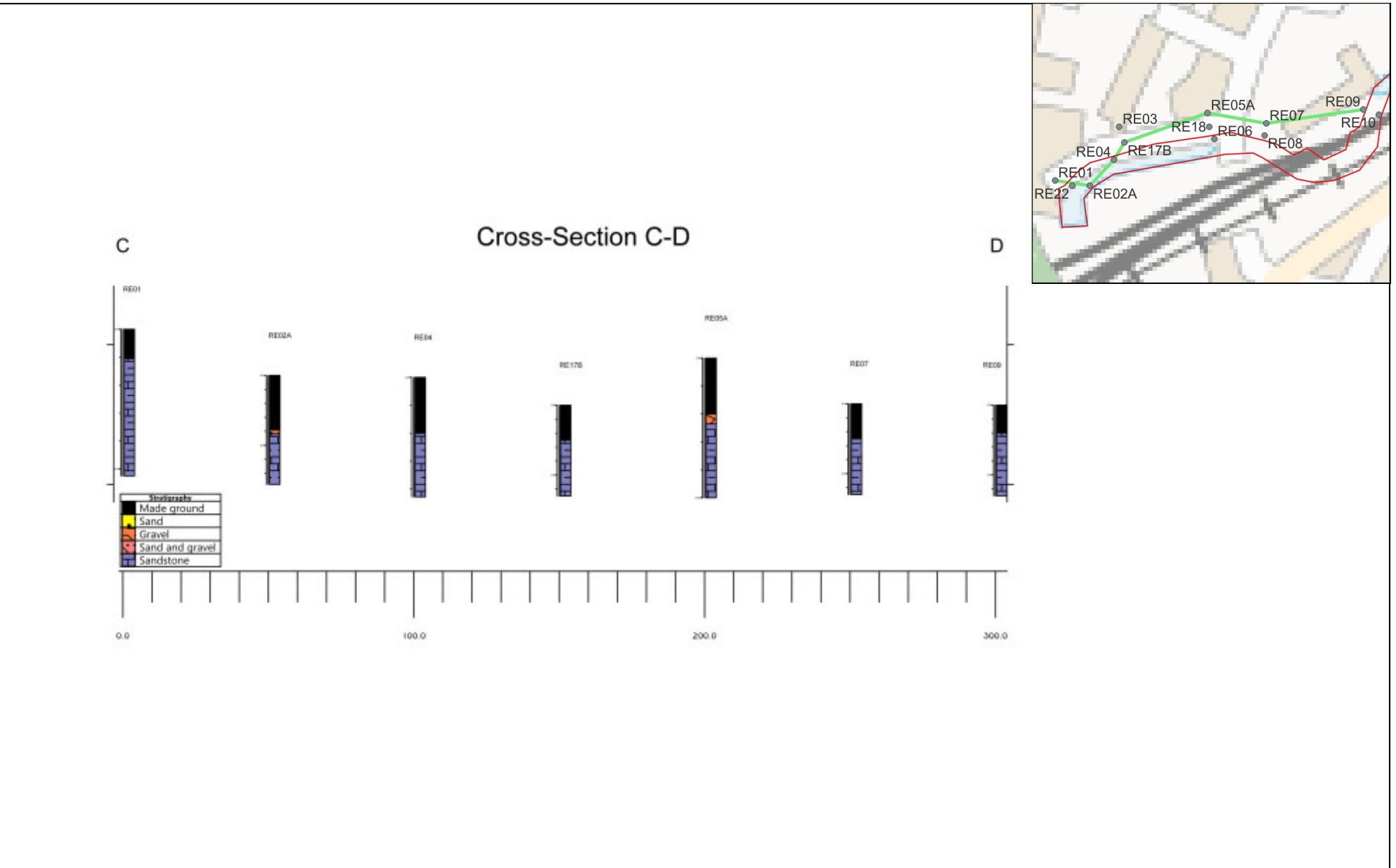


Figure 06 – Cross-section C to D
 VFD- Victoria Flood Defences and Alleviation Scheme

Drawn by: kk



Figure 07 - 1794 William Green map of Manchester and Salford
VFD- Victoria North Flood Defences and Alleviation Scheme

Drawn by: kk

Plates

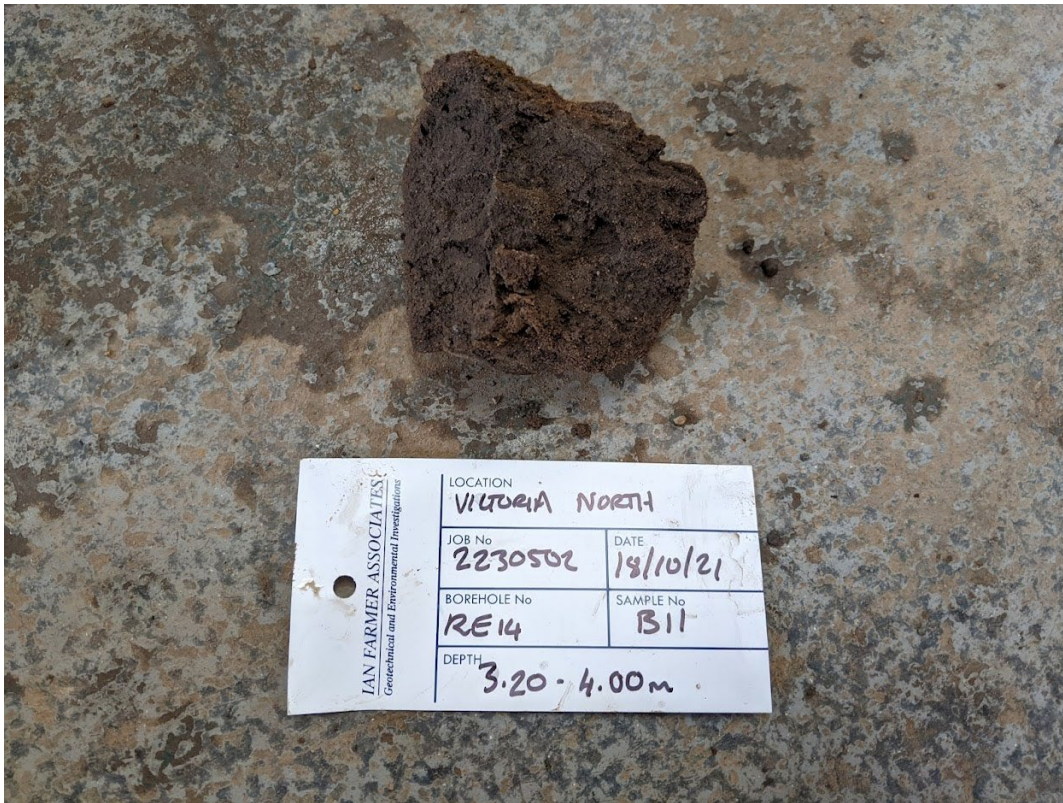


Plate 1: Example of sediment recovery RE14.



Plate 2: Coring undertaken through the Scotland Weir.



Plate 3: The sample retrieved from coring VC01 through the Scotland Weir. Note that the depth that the wood recovered from is unknown due to coring difficulties.



Plate 4: Additional parts of wood retrieved initially stuck within the barrel of the hand coring machine VC01.



Plate 5: Nails within the wood recovered from the Scotland Weir.

OASIS Form

OASIS ID (UID)	yorkarch3-506471
Project Name	Victoria North Flood Defence and Alleviation Scheme Manchester, Greater Manchester: Geoarchaeological Borehole Monitoring
Activity type	Assessment And Analysis
Project Identifier(s)	VFD
Planning Id	N/A
Reason For Investigation	Planning requirement
Organisation Responsible for work	York Archaeology
Project Dates	01-Nov-2021 - 01-Mar-2022
Location	Victoria North Flood Defence and Alleviation NGR : SJ 84300 99300 LL : 53.4901722004131, -2.23809339327504 12 Fig : 384300,399300
Administrative Areas	Country : England County : Greater Manchester District : Manchester Parish : Manchester, unparished area
Project Methodology	A GI survey was carried out at the site, which was subject to intermittent monitoring, including visits to the core storage facility at Ian Farmer Associates. Using this data, a deposit model was produced for the site to give a baseline understanding of the deposits.

Project Results	<p>The extensive post-medieval and modern development of the site is likely to have truncated the majority of the deposits associated with the River Irk, if any such deposits were ever present. The river, prior to its canalisation, was fast flowing and is likely to have eroded away the majority of deposits overlying the sandstone bedrock in this location.</p> <p>The presence of pockets of sand and gravel may relate to the reworking and redepositing of Devensian Till within remnants of the pre-19th century valley contour, which are shown as hacheurs on the 1st and 2nd Edition OS mapping. The difficulties in recovering this material, and its lack of cohesion, coupled with the lack of organic remains make the palaeoenvironmental potential of this site low. The lack of cultural material from these deposits would also suggest a low potential for pre- 19th century archaeological remains. The borehole carried out in the Scotland Weir structure recovered a plug of timber which was identified as <i>Pinus sylvestris</i> sp (Scots pine) making it unsuitable for dendrochronological dating due to the lack of a long-lived pine chronology for the region. The lack of sapwood also makes it of limited use for radiocarbon dating, in addition to likely late post-medieval date of the material which would return a generic late post-medieval to modern date. The timber also contained the remains of two nails, which were examined by a specialist as being undiagnostic in terms of date due to the lack of a head and are classed as broadly post-medieval.</p>
HER	Greater Manchester HER - noRev - LITE

Appendix 1

Darkness	Degree of Stratification	Degree of Elasticity	Degree of Dryness
nig.4 black	strf.4 well stratified	elas.4 very elastic	sicc.4 very dry
nig.3	strf.3	elas.3	sicc.3
nig.2	strf.2	elas.2	sicc.2
nig.1	strf.1	elas.1	sicc.1
nig.0 white	strf.0 no stratification	elas.0 no elasticity	sicc.0 water

Sharpness of Upper Boundary	
lim.4	< 0.5mm
lim.3	< 1.0 & > 0.5mm
lim.2	< 2.0 & > 1.0mm
lim.1	< 10.0 & > 2.0mm
lim.0	> 10.0mm

	<i>Sh</i>	<i>Substantia humosa</i>	Humous substance, homogeneous microscopic structure
<i>I Turfa</i>	<i>Tb</i>	<i>T. bryophytica</i>	Mosses +/- humous substance
	<i>Tl</i>	<i>T. lignosa</i>	Stumps, roots, intertwined rootlets, of ligneous plants
	<i>Th</i>	<i>T. herbacea</i>	Roots, intertwined rootlets, rhizomes of herbaceous plants
<i>II Detritus</i>	<i>Dl</i>	<i>D. lignosus</i>	Fragments of ligneous plants >2mm
	<i>Dh</i>	<i>D. herbosus</i>	Fragments of herbaceous plants >2mm
	<i>Dg</i>	<i>D. granosus</i>	Fragments of ligneous and herbaceous plants <2mm >0.1mm
<i>III Limus</i>	<i>Lf</i>	<i>L. ferrugineus</i>	Rust, non-hardened. Particles <0.1mm
<i>IV Argilla</i>	<i>As</i>	<i>A. steatodes</i>	Particles of clay
	<i>Ag</i>	<i>A. granosa</i>	Particles of silt
<i>V Grana</i>	<i>Ga</i>	<i>G. arenosa</i>	Mineral particles 0.6 to 0.2mm
	<i>Gs</i>	<i>G. saburralia</i>	Mineral particles 2.0 to 0.6mm
	<i>Gg(min)</i>	<i>G. glareosa minora</i>	Mineral particles 6.0 to 2.0mm
	<i>Gg(maj)</i>	<i>G. glareosa majora</i>	Mineral particles 20.0 to 6.0mm
	<i>Ptm</i>	<i>Particulaetestaemollosorum</i>	Fragments of calcareous shells

Physical and sedimentary properties of deposits according to Troels-Smith (1955)



Plant used: Comacchio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works	Location ID: RE01
Dates: 07/10/2021 - 11/10/2021	Client: Volker Stevin	Sheet 1 of 2
Dynamic Sampling and Rotary Boring Log	Location: 384112.63E 399181.90N	Ground level: 31.11mOD
	Logged by: /CG	Vertical scale: 1:50
		Project ID: 2230502

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
0.50	ES1	SPT(S) N=4 (1,1/1,1,1,1)	31.01	0.10	MADE GROUND: Tarmacadam.	1		
1.00	B3		30.81	0.30	MADE GROUND: Cemented type 1.			
1.00	ES2		30.66	0.45	MADE GROUND: SANDSTONE cobbles.			
1.20	D5		30.56	0.55	MADE GROUND: Black, very ashy, slightly gravelly, fine to coarse SAND. Gravel is subangular, fine to coarse including brick. <i>At 0.45m: Strong hydrocarbon odour.</i>			
1.20 - 1.65					MADE GROUND: Soft, reddish brown mottled black, gravelly, sandy, reworked CLAY. Gravel is subangular, fine to coarse including sandstone.			
2.00		SPT(S) 50 (25 for 60mm/50 for 295mm)	29.01	2.10	Weak, reddish brown, thickly to very thickly bedded, fine to coarse grained SANDSTONE. Discontinuities are 0-5°, very closely spaced, undulating rough clean. 5.00 to 5.40m: Weathered with soft reddish brown clay penetrating through fractures.	2		
2.00	B4	14	2.20m - C	2.00				
2.00 - 2.45	D6	NI						
2.00 - 3.50	100	2.70m - C	10	2.00				
	86							
	14							
3.50 - 5.00	95 90 27	AZCL	8	3.73m - C				
		2					4.30m - C	
							4.68m - C	
5.00 - 6.50	100 95 30	14	8	(5.90)				
		8						
6.50 - 8.00	97 90 60	AZCL	7	7				
8.00 - 9.50	100 100 85	5	5	(2.50)				
		8.05m - C						
		8.30m - C						
		8.86m - C						
		9.20m - C						
		9.68m - C						

Dynamic Sample Recovery					Remarks:									
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks										
					SPT Hammer: N/R, Energy Ratio: N/R									
					Water Strikes			Monitoring Installations						
					Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
											0.00	2.00	Plain	50
											2.00	8.50	Slotted	50
Checked by:	RC		IFA DS											
Log status:	PRELIM		v01.01											



Plant used: Comacchio 205 Dates: 07/10/2021 - 11/10/2021	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		Location ID: RE01		
	Client: Volker Stevin				
Rotary Boring Log	Location: 384112.63E 399181.90N	Ground level: 31.11mOD	Logged by: /CG	Vertical scale: 1:50	Sheet 2 of 2 Project ID: 2230502

Coring, Samples & In Situ Testing			Strata Details				Groundwater		
Depth	TCR/SCR/ROD	FI	Samples & Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
9.50 - 10.50	100 100 70		10.20m - C	20.61	10.50	Weak, reddish brown, fine to coarse grained SANDSTONE with rare subrounded, fine to coarse gravel including quartz and sandstone. Discontinuities are 0-5°, closely spaced, undulating rough clean. End of Borehole at 10.50m			
								11	
								12	
								13	
								14	
								15	
								16	
								17	
								18	
								19	
								20	

Flush Details				Borehole Diameter		Boring Progress				Remarks:			
Top (m)	Base (m)	Flush Type	Flush Return %	Depth (m)	Dia (mm)	Date	Time	Depth (m)	Cased (m)		Water (m)		
2.00	3.50	Water	100			07/10	16:30	2.00					
3.50	5.00	Water	100			08/10	08:00	2.00	2.00				
5.00	5.00	Water	80			08/10	16:30	10.50	2.00	6.30			
6.50	8.00	Water	80										
8.00	9.50	Water	80										
9.50	10.50	Water	80										
				Casing Diameter		Water Strikes				SPT Hammer: N/R, Energy Ratio: N/R			
				Depth (m)	Dia (mm)	Strike (m)	Cased (m)	Sealed (m)	Time (mins)		Rose to (m)		
										Monitoring Installations			
										Top (m)	Base (m)	Pipe Type	Dia (mm)
Checked by:		RC		IFA RC									
Log status:		PRELIM		v01.01									



Plant used: Comachio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works	Location ID: RE02
Dates: 12/01/2022	Client: Volker Stevin	Sheet 1 of 1
Dynamic Sample Borehole Log	Location: 384130.79E 399182.52N	Ground level: 27.80mOD
	Logged by: MD	Vertical scale: 1:50
		Project ID: 2230502

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/ Installation
0.00 - 0.20	ES1		27.40	(0.40)	MADE GROUND: Loose, dark grey and brown, silty, fine to coarse SAND with some cobble sized pockets of soft brown, sandy clay. With occasional coarse gravel size fragments including brick and clay pipe.			
0.00 - 0.40	B2							
0.20 - 0.40	D3							
0.40 - 0.80	B4							
0.40 - 0.80	ES5							
0.80 - 1.20	B6		25.20	(2.20)	MADE GROUND: Loose, brown and grey, slightly clayey, slightly gravelly, fine to coarse SAND. Gravel is subangular to rounded, fine to coarse including sandstone, clinker, bricks and clay pipe.			
1.00	ES7							
1.20 - 1.65	D8							
1.50	D9		23.80	(1.40)	MADE GROUND: Loose, black, very sandy GRAVEL. Gravel is subangular to rounded, fine and medium including sandstone, quartz, coal, clinker. With medium organic/river silt odour.			
2.00 - 2.30	ES10							
2.60 - 2.80	D11							
2.80 - 3.50	B12							
3.00 - 3.45	D13		23.80	4.00	End of Borehole at 4.00m			
3.50 - 3.80	ES14							

Dynamic Sample Recovery					Remarks:									
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks	Unable to progress casing through sand.									
1.20	2.00	117	90											
2.00	3.00	117	100											
3.00	4.00	117	80											
					Water Strikes			Monitoring Installations						
					Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
Checked by:		RC			IFA DS									
Log status:		PRELIM			v01.01									



Plant used: Comacchio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works	Location ID: RE02A
Dates: 08/02/2022	Client: Volker Stevin	Sheet 1 of 1
Location:	Ground level:	Project ID: 2230502
Dynamic Sampling and Rotary Boring Log	Logged by: MD	Vertical scale: 1:50

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
0.20	D2			0.10	MADE GROUND: Concrete.			
0.20	ES1			(0.30)	MADE GROUND: Loose, brown and grey, very gravelly, fine to coarse SAND with medium cobble content. Gravel is angular to subangular, fine to coarse including clinker, coal and brick. Cobbles are angular including brick.			
0.50 - 0.80	B3			0.40	MADE GROUND: Concrete.			
0.50 - 0.80	ES4			0.50	MADE GROUND: Loose, brown and grey, gravelly, fine to coarse SAND of ash, with medium cobble content. Gravel is angular to subangular, fine to coarse including coal, clinker and brick. Cobbles are angular including brick and concrete.			
1.00 - 1.20	ES5			(1.00)	MADE GROUND: 2 course of red brown brick.			
				1.50	MADE GROUND: SANDSTONE (no recovery).			
				1.70	MADE GROUND: Yellowish grey, coarse grained SANDSTONE.			
				1.80	MADE GROUND: Purplish brown, medium grained SANDSTONE.			
1.80 - 3.30				(0.38)	MADE GROUND: 5 courses, red brown BRICK cemented by 10-20mm, weak lime based mortar.			
				2.18	MADE GROUND: Purplish brown, medium grained SANDSTONE.			
				2.34	MADE GROUND: 35mm thick timber between weak lime based mortar.			
				(0.50)	MADE GROUND: 5 courses, red brown BRICK cemented by 10-20mm, weak, light grey, lime based mortar (10-30mm thick).			
				2.84	MADE GROUND: Purplish brown, medium grained SANDSTONE.			
				3.04	MADE GROUND: Purplish brown, medium grained SANDSTONE.			
3.30 - 4.80	100 38 31			(0.54)	MADE GROUND: Black, decayed timber.			
				3.64	MADE GROUND: Black, rounded, medium grained GRAVEL. Gravel includes sandstone and siltstone.			
				3.90	Very weak, medium grained, red brown SANDSTONE. <i>Between 4.15m and 6.30m: discontinuities are 0-5 degrees, closely spaced, undulating, rough clean.</i>			
4.80 - 6.30	100 100 67	7		(3.65)	<i>Between 6.30m and 6.50m: assumed zone of core loss.</i>			
					<i>Between 6.50m and 6.80m: discontinuities are 0-5 degrees, closely spaced, undulating, rough clean.</i>			
					<i>Between 6.80m and 7.10m: abundant fine and medium gravel sized clasts of sandstone and mudstone. Clasts are subangular to rounded.</i>			
					<i>Between 7.10m and 7.80m: non intact.</i>			
					<i>Between 7.80m and 7.80m: discontinuities are 0-5 degrees, closely spaced, undulating, rough clean.</i>			
6.30 - 7.80	87 57 44	AZCL 15 NI 6		7.80	End of Borehole at 7.80m			

Dynamic Sample Recovery					Remarks:				
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks	Inspection pit dug to 1.20m.				
1.20	1.70	117	100						
Water Strikes					Monitoring Installations				
Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
6.30	2.00		20	4.90					
Checked by:		IFA DS							
Log status:		PRELIM			v01.01				



Plant used:
Comacchio 205

Dates:
11/10/2021

Project:
Manchester Northern Gateway Flood Defence and Alleviation Works

Client:
Volker Stevin

Location ID:
RE03

Sheet 1 of 1

Dynamic Sampling and Rotary Boring Log

Location:
384142.39E 399216.74N

Ground level:
28.67mOD

Logged by:
OG/CG

Vertical scale:
1:50

Project ID:
2230502

Samples & In Situ Testing			Strata Details				Groundwater										
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation									
0.20 - 0.57	B1	SPT(S) 50 (4,4/50 for 275mm)	28.47	0.20	MADE GROUND: Black tarmacadam consisting of 3-25mm subangular to very angular, fine and medium diorite, granite and basalt.	1											
0.25	ES2		28.10	(0.37)	MADE GROUND: Light grey mottled dark grey GRAVEL. Gravel is very angular to angular, fine to coarse granite.												
0.40	D3			(0.93)					MADE GROUND: Dark grey mottled light grey, slightly sandy GRAVEL with frequent cobbles. Gravel is very angular to angular, fine to coarse including granite, limestone. Cobbles are very angular (>180mm) of fine grained igneous.								
0.57 - 1.50	B4																
0.60	ES5																
0.70	D6	SPT(S) N=0 (1,0/0,0,0,0)	27.17	1.50	Possible made ground: Very loose, orangish brown, fine and medium SAND.	2											
1.20	D7			(1.50)	Between 2.00m and 3.00m: No recovery. Possible sand band.												
1.20 - 1.65	D8																
2.00	100 95 65	7	25.67	3.00	Reddish brown, fine to coarse SAND. Weak, reddish brown, thickly to very thickly bedded, fine to coarse grained SANDSTONE. Discontinuities are 0-5°, very closely spaced, undulating rough clean.	3											
2.00 - 2.45				D9					(1.70)	3.10m - D10 3.34m - C 3.46m - C 3.62m - C 3.80m - C 4.10m - C 4.24m - C 4.36m - C							
3.10 - 4.60				AZCL							23.87	4.80	Weak, reddish brown, thickly to very thickly bedded, fine to coarse grained SANDSTONE. Discontinuities are 0-5°, very closely spaced, undulating rough clean.				
														87 67 40	8	(1.30)	Between 5.40m and 5.50m: recovered as non intact.
6.10 - 7.60	100 87 33	6	22.57	6.10	Very weak, reddish brown, fine to coarse SANDSTONE. Weathered to a soft, friable clayey sand.	6											
									22.47	(0.50)	Weak, reddish brown, thickly to very thickly bedded, fine to coarse grained SANDSTONE. Discontinuities are 0-5°, very closely spaced, undulating rough clean.						
												21.97	6.70	(0.60)	Very weak, reddish brown becoming light brown, thickly bedded, fine and medium grained SANDSTONE. Discontinuities are 0-60°, closely spaced, undulating rough both tight clean and wide with a soft reddish clay infill throughout.		
21.37	7.30	(0.70)	Between 7.10m and 7.30m: large 55-60 degree fracture jointed against reddish clay with visible striations.														
				7.60 - 9.00	73 73 40	6	20.67	8.00	Weak, reddish brown, thickly bedded, fine and medium grained SANDSTONE. Discontinuities are 0-40°, closely spaced, undulating rough, tight clean. A soft clayey sand penetrating trough fractures.	8							
19.67	9.00	End of Borehole at 9.00m															
			TCR/SCR/ROD		FI	Samples & Tests											

Dynamic Sample Recovery				
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks
1.20	1.50		100	
SPT Hammer: N/R, Energy Ratio: N/R				
Water Strikes				
Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)
Remarks				
Monitoring Installations				
Top (m)	Base (m)	Pipe Type	Dia (mm)	
Checked by:	RC	IFA DS v01.01		
Log status:	PRELIM			

Remarks:									
SPT Hammer: N/R, Energy Ratio: N/R									
Water Strikes					Monitoring Installations				
Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
Checked by:	RC	IFA DS v01.01							
Log status:	PRELIM								



Plant used: Commachio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works	Location ID: RE04
Dates: 03/12/2021	Client: Volker Stevin	Sheet 1 of 1
Dynamic Sampling and Rotary Boring Log	Location: 384145.83E 399196.20N	Ground level: 27.66mOD
	Logged by: CG	Vertical scale: 1:50
		Project ID: 2230502

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
0.25	B2	SPT(S) N=10 (1,2/2,4,3,1)	27.51	0.15	CONCRETE.	[Pattern]	1	[Pattern]
0.25	ES1		27.36	0.30	MADE GROUND: Greyish brown, gravelly, fine to coarse SAND with medium cobble content. Gravel is subangular, fine to coarse including brick, concrete, sandstone and coal. Cobbles are subangular including sandstone and brick.			
0.50	B4				MADE GROUND: Medium dense becoming dense, greyish brown, gravelly, clayey SAND with low cobble content and rare pockets of ash. Gravel is subangular, fine to coarse including brick, shells, coal and sandstone. Cobbles are subangular including sandstone.			
0.50	ES3							
1.00	B6	SPT(S) N=39 (4,3/4,4,10,21)		(2.20)			2	
1.00	ES5							
1.20								
2.00								
3.00		SPT(S) 50 (25 for 135mm/50 for 70mm)	25.16	2.50	No recovery. Advancing through dense coarse soil strata.		3	
				(1.50)				
4.00 - 5.50	80 80 35	NR 4.00m - SPT(S) 50 (25 for 25mm/50 for 30mm)	23.66	4.00	Weak, reddish brown, thickly bedded, fine and medium grained SANDSTONE. Discontinuities are 0-8°, closely spaced, wide, undulating rough. Some soft, sandy infilling throughout.	[Pattern]	4	
	8			(2.00)			5	
5.50 - 7.00	93 93 50	6	21.66	6.00	Weak, reddish brown, thickly bedded, fine and medium grained SANDSTONE. Discontinuities are 0-6°, tight clean, undulating rough, lightly weathered.	[Pattern]	6	
	6						7	
7.00 - 8.55	100 93 93	NI 3		(2.55)			8	
	3						9	
			19.11	8.55	End of Borehole at 8.55m		10	

Dynamic Sample Recovery					Remarks:									
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks	Inspection pit dug to 1.20m.									
1.20	2.00		100											
2.00	3.00		100											
					SPT Hammer: N/R, Energy Ratio: N/R									
					Water Strikes				Monitoring Installations					
					Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
											0.00	2.00	Plain	50
											2.00	4.00	Slotted	50
Checked by:	RC		IFA DS											
Log status:	PRELIM		v01.01											



Plant used: Commachio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		Location ID: RE05a
	Client: Volker Stevin		
Dates: 14/10/2021 - 15/10/2021		Sheet 1 of 2	
Location: 384200.46E 399230.81N		Ground level: 29.04mOD	Project ID: 2230502
Dynamic Sampling and Rotary Boring Log		Logged by: CG	Vertical scale: 1:50

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
0.50 - 0.60	B1	SPT(S) N=34 (4,7/8,9,9,8)	28.54	(0.50)	MADE GROUND: Concrete core.	1		
0.55	ES2			0.50	MADE GROUND: Recovered as light grey, slightly sandy GRAVEL. Gravel is very angular to angular, fine to coarse including concrete (Broken out material).			
0.60	D3			(1.10)				
1.60 - 1.90	B4	SPT(S) N=13 (4,7/3,4,3,3)	27.44	1.60	MADE GROUND: Recovered as grey, very loose GRAVEL. Gravel is very angular to angular, medium and coarse including granite and brick.	2		
1.70	ES5			(0.30)				
1.80	D6			1.90	MADE GROUND: Black mottled red, slightly silty, sandy GRAVEL. Gravel is very angular, coarse brick (Ash fill).			
1.95	ES7			(0.90)				
2.85	ES8	SPT(S) N=27 (3,3/4,5,9,9)	26.24	2.80	MADE GROUND: Brown, slightly clayey, fine to coarse SAND.	3		
3.00	ES9			26.09	MADE GROUND: Dark greyish brown, fine to coarse SAND with occasional brick fragments (20-60mm). Medium to strong hydrocarbon odour.			
3.00 - 4.00	B10			(1.05)				
3.10	D11							
4.00 - 5.50	73 33 10	NI	25.04	4.00	No recovery.	4		
				4.40				
				4.70	Dense, greyish brown GRAVEL. Gravel is subangular to subrounded, fine to coarse including granite, sandstone and igneous lithologies.			
				4.70	Weak, reddish brown, fine and medium grained SANDSTONE, heavily weathered to a reddish clayey sand.			
				(0.80)	<i>Between 5.15 and 5.24m engineer notes: weathered to a soft clayey sand.</i>			
				5.50	No recovery. Possible sandstone.			
				(0.80)				
5.50 - 7.00	47 0 0	NR	22.74	6.30	Reddish brown, slightly gravelly, slightly clayey, fine to coarse SAND. Gravel is subrounded, fine to coarse including quartz.	7		
				(0.70)				
7.00 - 8.50	100 100 60	4	22.04	7.00	Weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE. Fractures are 0-10°, closely spaced tight clean, with rare sand infill.	8		
				(2.10)				
8.50 - 10.00	100 87 40	5	19.94	9.10	Weak, reddish brown, slightly clayey, fine to coarse grained SANDSTONE. Gravel is subrounded to rounded, fine to coarse including quartz and fine grained sandstone. Fractures are 0-6°, closely spaced, tight with rare sand infill.	9		
				9.50				
				(0.50)	Weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE. Fractures are 0-10°, closely spaced tight clean,			
				19.04	10.00			

Dynamic Sample Recovery					Remarks:				
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks	Inspection pit dug to 1.20m.				
					SPT Hammer: N/R, Energy Ratio: N/R				
					Water Strikes			Monitoring Installations	
Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
4.00	7.00		0	0.00		0.00	4.00	Plain	50
						4.00	10.00	Slotted	50
Checked by:	RC		IFA DS						
Log status:	PRELIM		v01.01						



Plant used: Commachio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		Location ID: RE05a			
	Dates: 14/10/2021 - 15/10/2021			Client: Volker Stevin		
Rotary Boring Log		Location: 384200.46E 399230.81N	Ground level: 29.04mOD	Logged by: CG	Vertical scale: 1:50	Sheet 2 of 2 Project ID: 2230502

Coring, Samples & In Situ Testing			Strata Details					Groundwater	
Depth	TCR/SCR/RD	FI	Samples & Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
						Weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE. Fractures are 0-10°, closely spaced tight clean, with rare sand infill. End of Borehole at 10.00m			

Flush Details				Borehole Diameter		Boring Progress				Remarks:	
Top (m)	Base (m)	Flush Type	Flush Return %	Depth (m)	Dia (mm)	Date	Time	Depth (m)	Cased (m)		Water (m)
0.00	10.00	Water				14/10	17:00	7.00	7.00		4.30
						15/10	15:00	10.00	7.00	4.10	
						SPT Hammer: N/R, Energy Ratio: N/R					
Casing Diameter		Water Strikes					Monitoring Installations				
Depth (m)	Dia (mm)	Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
Checked by:	RC	IFA RC									
Log status:	PRELIM	v01.01									



Plant used: Comacchio 205/Commachio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		Location ID: RE06
	Client: Volker Stevin		
Dates: 15/10/2021		Sheet 1 of 1	
Location: 384210.77E 399209.55N		Ground level: 29.91mOD	Project ID: 2230502
Dynamic Sampling and Rotary Boring Log		Logged by: OG/CG	Vertical scale: 1:50

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
0.40 - 1.20	B1 ES2 D3	SPT(S) N=6 (1,1/1,2,3,0)	29.76	0.15	MADE GROUND: Tarmacadam.	[Cross-hatched pattern]	1	[Vertical line]
0.45			29.56	0.35	MADE GROUND: Reddish brown COBBLES with concrete infill (old cobble road). Cobbles are very angular (120-300mm) including sandstone.			
0.50			(1.15)		MADE GROUND: Reddish brown, fine to coarse SAND and GRAVEL. Gravel is very angular to well rounded, fine to coarse including sandstone, tarmacadam and weak to moderate hydrocarbon odour.			
1.00	ES4				Driller notes void / possible drainage pipe.			
1.20			28.41	1.50			2	
				(0.60)				
			27.81	2.10	Extremely weak, reddish brown, fine to coarse grained SANDSTONE. Weathered and recovered as non intact.			
				(1.75)			3	
2.80		SPT(S) N=15 (4,5/3,4,3,5)						
2.85	ES5							
3.00	ES7							
			3.50m - SPT(S) 50 (25 for 30mm/50 for 30mm)					
3.50 - 5.00	100 50 27	NI	26.06	3.85	Weak, reddish brown, fine to coarse grained, thickly bedded SANDSTONE. Discontinuities are 0-8°, closely spaced, tight clean, undulating rough.		4	
		8		(0.80)				
		NI	25.26	4.65	Extremely weak, reddish brown, fine to coarse grained SANDSTONE. Weathered and recovered as mainly non intact with some sections weathered to a clayey sand.		5	
			24.76	5.15	Weak, reddish brown, fine to coarse grained, thickly bedded SANDSTONE. Discontinuities are 0-14°, closely spaced, tight, undulating rough.		6	
5.00 - 6.50	100 77 73	6		(1.20)				
		NI	23.56	6.35	Weak, reddish brown, fine to coarse grained SANDSTONE recovered as non intact.		7	
			23.26	6.65	Weak, reddish brown, fine to coarse grained, thickly bedded SANDSTONE. Discontinuities are 1) 0-10°, closely spaced, tight, undulating rough. 2) 40°, closely spaced, slightly open with a sandy infill.		8	
6.50 - 8.00	100 87 56	10		(2.85)				
		5					9	
8.00 - 9.50	100 94 73							
			20.41	9.50	End of Borehole at 9.50m		10	

Dynamic Sample Recovery					Remarks:				
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks	Inspection pit dug to 1.20m. Gas pipe encountered at 800mm from surface. Please see sketch for further details.				
SPT Hammer: N/R, Energy Ratio: N/R									
Water Strikes					Monitoring Installations				
Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
						0.00	0.50	Plain	
						0.50	3.00	Slotted	
Checked by:	RC		IFA DS						
Log status:	PRELIM		v01.01						



Plant used: Comacchio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works	Location ID: RE07
Dates: 16/12/2021	Client: Volker Stevin	Sheet 1 of 1
Dynamic Sampling and Rotary Boring Log	Location: 384233.14E 399219.30N	Ground level: 25.77mOD
	Logged by: CG	Vertical scale: 1:50
		Project ID: 2230502

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
0.00 - 0.50	ES1			(1.00)	Dark, blackish brown, sandy GRAVEL with common cobbles. Gravel is subangular to subrounded, fine to coarse including sandstone, brick, coal and slag. Cobbles are subangular including sandstone and bricks. Engineer notes strong hydrocarbon odour.			
		1.00m - SPT(S) N=36 (5,7/7,8,11,10)	24.77	1.00	No recovery. Advancing through dense coarse soil strata.		1	
				(1.50)			2	
		2.50m - SPT(S) 50 (25 for 125mm/50 for 130mm)	23.27	2.50	Weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE. Discontinuities are 0-10 degrees, closely spaced, wide, clean, undulating rough.			
-2.50 - 3.50	60 55 40	10		(0.60)	No recovery. Probable SANDSTONE.		3	
		NR		(0.80)				
		21.87		3.90	Moderately weathered, weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE. Discontinuities are 0-8 degrees, closely spaced, tight and wide, clean, undulating rough.		4	
3.50 - 5.00	73 67 10	12		(1.10)				
		NR		5.00	No recovery. Probable SANDSTONE.		5	
		20.77		5.10	Moderately weathered, weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE. Discontinuities are 0-10 degrees, closely spaced, tight, clean, undulating rough.			
5.00 - 6.50	80 65 40	8		(1.20)			6	
		NR		19.47	No recovery. Probable SANDSTONE.			
		19.27		6.50	End of Borehole at 6.50m		7	
							8	
							9	
							10	

Dynamic Sample Recovery					Remarks:									
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks	Drilled from pontoon. Strata depths below river bed.									
					SPT Hammer: N/R, Energy Ratio: N/R									
					Water Strikes			Monitoring Installations						
					Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
Checked by:		TD		IFA DS										
Log status:		PRELIM		v01.01										



Plant used: Comacchio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works	Location ID: RE08
Dates: 16/12/2021	Client: Volker Stevin	Sheet 1 of 1
Dynamic Sample Borehole Log	Location: 384233.18E 399213.09N	Ground level: 25.22mOD
	Logged by: CG	Vertical scale: 1:50
		Project ID: 2230502

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/ Installation
0.60 - 1.00	ES1		24.62	(0.60)	No recovery. Advancing through dense coarse soil strata.			
				0.60	Dark, blackish brown, sandy GRAVEL with frequent cobble content. Gravel is subangular to rounded, fine to coarse including sandstone, brick, slag, glass, pottery and material and plastic bag. Cobbles are subrounded including brick and sandstone. Strong hydrocarbon odour.			
			24.22	(0.40)				
				1.00	End of Borehole at 1.00m			
							1	
							2	
							3	
							4	
							5	
							6	
							7	
							8	
							9	
							10	

Dynamic Sample Recovery					Remarks:									
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks	Drilled from pontoon. Strata depths below river bed. Obstructed on possible concrete at 1.00m. Relocated to RE08A.									
					Water Strikes			Monitoring Installations						
					Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
Checked by:	TD		IFA DS											
Log status:	PRELIM		v01.01											



Plant used: Comacchio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works			Location ID: RE08A			
	Dates: 16/12/2021		Client: Volker Stevin				
Dynamic Sample Borehole Log		Location: 384233.62E 399214.20N	Ground level: 25.42mOD	Logged by: CG	Vertical scale: 1:50	Sheet 1 of 1	Project ID: 2230502

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/ Installation
				(1.60)	No recovery. Advancing through dense coarse soil strata.			
			23.82	1.60	End of Borehole at 1.60m			
							1	
							2	
							3	
							4	
							5	
							6	
							7	
							8	
							9	
							10	

Dynamic Sample Recovery					Remarks:									
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks	Drilled from pontoon. Strata depths below river bed. Obstructed on possible concrete at 1.1.60m. Borehole abandoned.									
					Water Strikes			Monitoring Installations						
					Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
Checked by:	TD		IFA DS											
Log status:	PRELIM		v01.01											



Plant used: Comacchio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		Location ID: RE09
	Client: Volker Stevin		
Dates: 15/12/2021		Sheet 1 of 1	
Location: 384292.27E 399227.78N		Ground level: 25.68mOD	Vertical scale: 1:50
Dynamic Sampling and Rotary Boring Log		Logged by: CG	Project ID: 2230502

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
				(1.00)	No recovery. Driller notes sampler on suspected cobble at 0.20m.			
1.00 - 2.00	0 0 0	NR	24.68	1.00	No recovery. Driller notes cobble stuck in shoe.		1	
				(1.00)				
2.00 - 3.50	93 93 60	6	23.68	2.00	Weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE. Discontinuities are 1) 0-10 degrees, closely spaced, tight and wide, clean. 2) 0 - 10 degrees, closely spaced, wide with a soft sandy infill, undulating rough.		2	
		NI		22.78				
		8	22.68	2.90 3.00	Extremely weak, reddish brown weathered SANDSTONE with coarse rounded gravel of sandstone and quartz.		3	
		NI		(0.55)	Weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE. Discontinuities are 1) 0-5 degrees, closely spaced, tight clean, undulating rough.			
3.50 - 5.00	100 83 50	8	22.13	3.55	Extremely weak, reddish brown, thickly bedded, fine to coarse grained weathered SANDSTONE. Discontinuities are 1) 0-10 degrees, closely spaced, tight and wide, clean. 2) 0 - 10 degrees, closely spaced, wide with a soft sandy infill, undulating rough.		4	
		5	21.93	3.75	Weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE. Discontinuities are 1) 0 - 5 degrees, closely spaced, tight and clean. 2) 0 - 5 degrees, wide with a soft sandy infill, undulating rough.		5	
5.00 - 6.50	100 100 90			(2.75)			6	
			19.18	6.50	End of Borehole at 6.50m		7	
							8	
							9	
							10	

Dynamic Sample Recovery					Remarks:									
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks	Drilled from pontoon. Strata depths below river bed.									
					SPT Hammer: N/R, Energy Ratio: N/R									
					Water Strikes			Monitoring Installations						
					Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
Checked by:	TD		IFA DS											
Log status:	PRELIM		v01.01											



Rotary Borehole Log	Plant used: Comacchio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		RE10A
	Dates: 17/12/2021	Client: Volker Stevin		
	Location: 384299.20E 399224.99N	Ground level: 25.80mOD	Logged by: CG	Vertical scale: 1:50

Sheet 1 of 1
Project ID:
2230502

Coring, Samples & In Situ Testing				Strata Details				Groundwater	
Depth	TCR/SCR/ROD	FI	Samples & Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
1.00 - 1.30		OH			(2.00)	Pushing cobbles. No recovery.			
1.30 - 2.00		NR							
2.00 - 3.50	87 83 40	NI		23.80	2.00	Moderately strong, greenish grey, fine and medium grained SANDSTONE cobble. Weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE. Discontinuities are 0 - 5 degrees, closely spaced, tight and wide, clean.	.....	
		8		23.60	2.20				
		8			(2.80)				
3.50 - 5.00	100 100 57	4							
				20.80	5.00	End of Borehole at 5.00m			

Flush Details				Borehole Diameter		Boring Progress			Remarks:				
Top (m)	Base (m)	Flush Type	Flush Return %	Depth (m)	Dia (mm)	Date	Time	Depth (m)	Cased (m)	Water (m)	Drilled from pontoon. Strata depths below river bed.		
1.00	5.00	Air mist											
Casing Diameter				Water Strikes						Monitoring Installations			
Depth (m)		Dia (mm)		Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
Checked by:		TD	IFA RC										
Log status:		PRELIM	v01.01										



Plant used: Dando 2000/Commachio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works	Location ID: RE11
Dates: 12/10/2021 - 13/10/2021	Client: Volker Stevin	Sheet 1 of 2
Cable Percussion and Rotary Boring Log	Location: 384372.07E 399297.25N	Ground level: 30.37mOD
	Logged by: OG/CG	Vertical scale: 1:50
		Project ID: 2230502

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
0.20	ES1	SPT(S) N=43 (5,7/6,7,15,15)	30.27	0.10	MADE GROUND: Loose, dark grey mottled black and red, sandy GRAVEL. Gravel is very angular to angular, fine to coarse including concrete, tarmacadam, brick, dolerite fill.			
0.20 - 0.50	B2			(0.45)				
0.50	ES3			29.82				
0.90 - 1.20	B4		29.47	0.90	MADE GROUND: Concrete slab recovered as grey gravel/cobbles. Gravel is very angular to angular, fine to coarse. Cobbles are very angular (63-150mm) concrete (break out of concrete slab).			
1.00	ES5			(1.50)		MADE GROUND: Black mottled red, slightly gravelly, silty SAND. Gravel is very angular, fine to coarse including concrete and clinker (black ash).		
1.20	B6			27.97	2.40		MADE GROUND: Black mottled red, gravelly, silty SAND. Gravel is very angular, fine to coarse including red brick.	
1.20 - 1.70	B6			(0.80)	MADE GROUND: Reddish brown mottled grey GRAVEL. Gravel is very angular to angular, fine to coarse including brick and mortar.			
1.85	D7	SPT(S) N=18 (2,4/5,6,5,2)		26.87		3.50	MADE GROUND: Dark brown, sandy, silty GRAVEL. Gravel is very angular to angular, fine to coarse including brick.	
2.00	ES8			(0.50)	Loose, brown, slightly gravelly, silty SAND. Gravel is subangular to subrounded, fine and medium of mixed lithologies.			
2.00 - 2.45	D10			26.37		4.00	Loose, brownish grey, sandy GRAVEL. Gravel is angular to well rounded, fine to coarse of mixed lithologies.	
2.00 - 2.50	B9			(1.60)	Stiff, brown, slightly gravelly, slightly sandy CLAY with slight organic odour. Gravel is subangular to subrounded of mixed lithologies.			
2.75	D11	SPT(S) N=8 (3,5/3,1,2,2)		23.27		7.10	Medium dense, reddish brown, fine to coarse SAND.	
3.00	ES12			(0.70)	Reddish brown GRAVEL. Gravel is very angular to angular, medium and coarse including weak sandstone.			
3.00	D14			21.37		9.00	Very dense, light grey to dark grey GRAVEL. Gravel is subrounded, coarse to very coarse including schist and igneous lithologies.	
3.00 - 3.45	B13			21.27	9.10	Weak, reddish brown fine to medium grained SANDSTONE. Fractures are 0-70°, very closely spaced, tight with rare sand infill. Between 9.10 and 10.70m: occasional weathering to very weak		
3.00 - 3.50	B13			(1.60)	Continued next sheet			
3.75	D15	SPT(S) N=6 (1,1/2,1,2,1)					Continued next sheet	
4.00	ES16					Continued next sheet		
4.00	D18						Continued next sheet	
4.00 - 4.45	B17					Continued next sheet		
4.00 - 4.50	B17						Continued next sheet	
4.75	D19	SPT(S) N=4 (1,1/1,1,1,1)				Continued next sheet		
5.00	D21						Continued next sheet	
5.00 - 5.45	B20					Continued next sheet		
5.00 - 5.50	B20						Continued next sheet	
5.75	D22	SPT(S) N=17 (4,5/7,6,2,2)				Continued next sheet		
6.00	D24						Continued next sheet	
6.00 - 6.45	B23					Continued next sheet		
6.00 - 6.50	B23						Continued next sheet	
6.75	D25	SPT(S) N=18 (2,2/2,5,5,6)				Continued next sheet		
7.00	D27						Continued next sheet	
7.00 - 7.45	B26					Continued next sheet		
7.00 - 7.50	B26						Continued next sheet	
7.80	D28	SPT(S) N=33 (4,7/7,8,9,9)				Continued next sheet		
8.00	D29						Continued next sheet	
8.00 - 8.45	B30					Continued next sheet		
8.00 - 8.50	B30						Continued next sheet	
8.75	D31					Continued next sheet		
8.90	D32						Continued next sheet	
9.00 - 10.50	100 90 40	7				Continued next sheet		
							Continued next sheet	

Chiselling			Borehole Diameter		Boring Progress				Remarks:		
From (m)	To (m)	Time (mins)	Depth (m)	Dia (mm)	Date	Time	Depth (m)	Cased (m)	Water (m)		
8.90	9.00	60	9.00	150	12/10	17:00	9.00	9.00		Inspection pit dug to 1.20m. SPT Hammer: N/R, Energy Ratio: N/R	
			12.00	122	13/10	08:00	9.00	9.00	6.30		
					13/10	14:00	12.00	9.00	5.10		
Casing Diameter			Water Strikes				Monitoring Installations				
Depth (m)	Dia (mm)	Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
9.00	150	5.00	4.30		20	4.50					
Checked by:		RC	IFA CP								
Log status:		PRELIM	v01.01								



Plant used:
Dando 2000/Commachio 205

Project:
Manchester Northern Gateway Flood Defence and Alleviation Works

Location ID:
RE11

Dates:
12/10/2021 - 13/10/2021

Client:
Volker Stevin

Sheet 2 of 2

Rotary Boring Log

Location:
384372.07E 399297.25N

Ground level:
30.37mOD

Logged by:
OG/CG

Vertical scale:
1:50

Project ID:
2230502

Coring, Samples & In Situ Testing			Strata Details				Groundwater		
Depth	TCR/SCR/ ROD	FI	Samples & Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/ Installation
10.50 - 12.00	100 95 47	7	10.14m - C	19.67	10.70 (1.30)	Weak, reddish brown fine to medium grained SANDSTONE. Fractures are 0-70°, very closely spaced, tight with rare sand infill.		11	
			10.56m - C			Weak, reddish brown, slightly gravelly SANDSTONE. Gravel is subangular to subrounded, fine to coarse including quartz, sandstone and igneous. Fractures are 0-10°, very closely spaced, tight and locally wide with a soft, sand infill.			
			10.84m - C						
			11.12m - C						
			11.68m - C 11.79m - C						
			18.37	12.00	End of Borehole at 12.00m		12		
								13	
								14	
								15	
								16	
								17	
								18	
								19	
								20	

Flush Details				Borehole Diameter		Boring Progress				Remarks:			
Top (m)	Base (m)	Flush Type	Flush Return %	Depth (m)	Dia (mm)	Date	Time	Depth (m)	Cased (m)	Water (m)			
12.00	9.00	Water									SPT Hammer: N/R, Energy Ratio: N/R		
Casing Diameter				Water Strikes				Monitoring Installations					
Depth (m)	Dia (mm)	Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)		
Checked by:	RC	IFA RC											
Log status:	PRELIM	v01.01											



Plant used: Commachio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works	Location ID: RE12
Dates: 29/11/2021 - 30/11/2021	Client: Volker Stevin	Sheet 1 of 2
Dynamic Sampling and Rotary Boring Log	Location: 384367.29E 399277.56N	Ground level: 29.83mOD
	Logged by: CG	Vertical scale: 1:50
		Project ID: 2230502

Samples & In Situ Testing				Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation	
0.35	B2		29.76	0.07	MADE GROUND: Block paving.				
0.35	ES1		29.68	0.15 (0.35)	MADE GROUND: Yellowish brown, slightly gravelly, fine to coarse bedding SAND. Gravel is subangular to subrounded, fine to coarse including sandstone.				
0.80	B4		29.33	0.50	MADE GROUND: Yellowish brown, gravelly, fine to coarse SAND. Gravel is angular, fine to coarse including bricks and sandstone.				
0.80	ES3		29.18	0.65	MADE GROUND: Concrete slab.				
1.20		SPT(S) N=10 (2,2/2,2,3,3)			MADE GROUND: Loose, dark brown, very silty, fine and medium SAND.				
1.20	B6								
1.20	ES5								
2.00		SPT(S) N=14 (2,1/2,3,6,3)		(3.05)					
3.00		SPT(S) 2 (1 for 75mm/2 for 150mm)							
4.00		SPT(S) N=7 (2,1/2,1,2,2)	26.13	3.70 (0.30)	Loose, brownish black, very silty, fine and medium SAND.				
4.00			25.83	4.00 (0.50)	No recovery. Advancing through dense coarse soil strata.				
5.50		SPT(S) N=27 (3,5/5,7,7,8)	25.33	4.50 (1.00)	Medium dense, brownish grey, slightly silty, fine and medium SAND.				
6.50		SPT(S) N=36 (6,8/10,9,7,10)	24.33	5.50 (1.00)	Medium dense, reddish brown, slightly clayey, fine and medium SAND. Gravel is rare subrounded, fine grained igneous noted.				
7.50		SPT(S) N=49 (9,11/10,12,12,15)	23.33	6.50 (1.50)	No recovery. Advancing through dense coarse soil strata. Becoming very dark brown with depth.				
8.00 - 9.00	7 7 7	NR NI 0	21.83	8.00 (0.90)	Dense, greyish brown, subangular to subrounded, fine to coarse GRAVEL with rare subangular to subrounded cobbles. Gravel and cobbles are grey, fine grained igneous lithologies.				
9.00 - 10.50	66 40 17	NR NI	20.93 20.83	8.90 9.00 (0.85)	Weak, reddish brown, thickly bedded, fine and medium grained SANDSTONE. Weathered and coated in reddish clayey sand. Extremely weak, reddish brown, fine and medium grained weathered SANDSTONE.				
		FI	19.98	9.85	Weak, reddish brown, thickly bedded, fine and medium grained				

Dynamic Sample Recovery					Remarks:				
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks	Inspection pit dug to 1.20m.				
1.20	2.00		60						
2.00	3.00		100						
3.00	4.00		100						
SPT Hammer: N/R, Energy Ratio: N/R									
Water Strikes					Monitoring Installations				
Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
4.00			20	4.00		0.00	0.50	Plain	50
						0.50	3.50	Slotted	50
Checked by:	RC		IFA DS						
Log status:	PRELIM		v01.01						



Plant used: Commachio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		Location ID: RE12
	Client: Volker Stevin		
Dates: 29/11/2021 - 30/11/2021		Sheet 2 of 2	
Rotary Boring Log	Location: 384367.29E 399277.56N	Ground level: 29.83mOD	Logged by: CG
	Vertical scale: 1:50		Project ID: 2230502

Coring, Samples & In Situ Testing			Strata Details				Groundwater		
Depth	TCR/SCR/RQD	FI	Samples & Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
10.50 - 11.50	100 43 26	8		18.98	10.85 (0.35)	Weak, reddish brown, thickly bedded, fine and medium grained weathered SANDSTONE. Discontinuities are 0-10°, closely spaced, undulating rough, tight. A soft sandy infill penetrating through.	.....	11	
		NI		18.63	11.20 (0.30)	Extremely weak, reddish brown, fine and medium grained weathered SANDSTONE. Bound by a soft, slightly clayey sand.	.....	
		6		18.33	11.50 (0.30)	Extremely weak, reddish brown, thickly bedded, fine and medium grained SANDSTONE. Discontinuities are 0-8°, closely spaced, tight, undulating rough, soft sandy infill.	.....	
11.50 - 12.50	100 47 0	NI		18.03	11.80	Extremely weak, reddish brown, fine and medium grained weathered SANDSTONE.	.....	12	
		10			(1.15)	Weak, reddish brown, thickly bedded, fine and medium grained SANDSTONE. Discontinuities are 0-10°, tight, undulating rough, soft, sandy infill.	.....	
12.50 - 13.50	100 30 0	NI		16.88	12.95 (0.55)	Extremely weak, reddish brown, fine and medium grained weathered SANDSTONE. Bound by a soft, slightly clayey sand.	.....	13	
				16.33	13.50	End of Borehole at 13.50m		14	
								15	
								16	
								17	
								18	
								19	
								20	

Flush Details				Borehole Diameter		Boring Progress				Remarks: SPT Hammer: N/R, Energy Ratio: N/R	
Top (m)	Base (m)	Flush Type	Flush Return %	Depth (m)	Dia (mm)	Date	Time	Depth (m)	Cased (m)		Water (m)
0.00	6.50	Air mist				29/11	17:00	6.50	6.50		4.00
13.50	6.50	Water				30/11	08:00	6.50	6.50	3.15	
						30/11	17:00	13.50	10.50		

Casing Diameter		Water Strikes				Monitoring Installations					
Depth (m)	Dia (mm)	Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)

Checked by:	RC	IFA RC
Log status:	PRELIM	v01.01



Plant used: Comacchio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		Location ID: RE13A
	Client: Volker Stevin		
Dates: 11/10/2021 - 12/10/2021		Sheet 1 of 1	
Location: 384445.89E 399351.58N		Ground level: 29.97mOD	Vertical scale: 1:50
Rotary Borehole Log		Logged by:	Project ID: 2230502

Coring, Samples & In Situ Testing				Strata Details				Groundwater	
Depth	TCR/SCR/RDD	FI	Samples & Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
		OH	0.00m - B2	29.77	0.20	MADE GROUND: Dark grey mottled black, sandy GRAVEL. Gravel is subangular to angular fine to coarse including concrete, dolerite and tarmacadam.	[Pattern]		
			0.10m - ES1	29.57	0.40				
			0.15m - D3			MADE GROUND: Recovered as light grey COBBLES. Cobbles are subangular to angular concrete. (Concrete slab)	[Pattern]		
			0.40m - B5		(0.80)				
			0.60m - ES4			MADE GROUND: Reddish brown, sandy GRAVEL with frequent cobbles. Gravels are very angular to angular including brick and concrete. Cobbles are subangular including concrete.	[Pattern]		
			1.10m - D6	28.77	1.20				
						MADE GROUND: Black sand / ash fill (drillers description). Possible backfilled basement / void.	[Pattern]		
				28.07	1.90				
						MADE GROUND: Grey, slightly sandy GRAVEL. Gravel is subangular fine to coarse including concrete. Possible concrete slab / basement floor.	[Pattern]		
				27.77	2.20				
			2.20m - B8			MADE GROUND: Reddish brown sandy GRAVEL with medium cobble content. Gravel is angular to subangular including brick and cement. Cobbles are subangular including brick.	[Pattern]		
			2.30m - ES7		(0.90)				
			3.00m - D9	26.87	3.10	MADE GROUND: Dark grey, gravelly, slightly clayey, fine to coarse SAND with frequent pockets of light greyish clay with black organic specks. Gravel is angular to subangular including concrete. <i>3.10 to 4.50m: organic odour</i> <i>At 3.50m: very loose</i>	[Pattern]		
			3.50m - SPT(S) N=3 (1,1/0,1,1,1)		(1.40)				
			4.00m - B11			Weak, reddish brown, fine to coarse grained, massive SANDSTONE. Discontinuities are 0-45°, closely spaced, undulating rough, tight clean. A clayey sand penetrating through fractures throughout.	[Pattern]		
			4.00m - ES10						
			4.40m - D12			Weak, reddish brown, fine to coarse grained, massive SANDSTONE. Discontinuities are 0-6°, medium spaced, undulating rough, tight clean.	[Pattern]		
			4.50m - SPT(S) 50 (25 for 40mm/50 for 50mm)	25.47	4.50				
4.50 - 5.50	75 75 30	AZCL 12				Weak, reddish brown, fine to coarse grained, massive SANDSTONE. Discontinuities are 0-6°, medium spaced, undulating rough, tight clean.	[Pattern]		
		NI			(2.60)				
			5.93m - C			Weak, reddish brown, fine to coarse grained, massive SANDSTONE. Discontinuities are 0-6°, medium spaced, undulating rough, tight clean.	[Pattern]		
			6.29m - C						
5.50 - 7.00	100 93 40	6 NI				Weak, reddish brown, fine to coarse grained, massive SANDSTONE. Discontinuities are 0-6°, medium spaced, undulating rough, tight clean.	[Pattern]		
		NI			7.10				
			7.20m - C	22.87	7.10	Weak, reddish brown, fine to coarse grained, massive SANDSTONE. Discontinuities are 0-6°, medium spaced, undulating rough, tight clean.	[Pattern]		
			7.40m - C						
			7.67m - C			Weak, reddish brown, fine to coarse grained, massive SANDSTONE. Discontinuities are 0-6°, medium spaced, undulating rough, tight clean.	[Pattern]		
			7.77m - C						
			7.98m - C			Weak, reddish brown, fine to coarse grained, massive SANDSTONE. Discontinuities are 0-6°, medium spaced, undulating rough, tight clean.	[Pattern]		
			8.50m - C		(2.90)				
			8.72m - C			Weak, reddish brown, fine to coarse grained, massive SANDSTONE. Discontinuities are 0-6°, medium spaced, undulating rough, tight clean.	[Pattern]		
			9.50m - C						
8.50 - 10.00	100 93 93	4	9.67m - C	19.97	10.00	End of Borehole at 10.00m			

Flush Details				Borehole Diameter		Boring Progress				Remarks:	
Top (m)	Base (m)	Flush Type	Flush Return %	Depth (m)	Dia (mm)	Date	Time	Depth (m)	Cased (m)	Water (m)	
4.50	10.00	Air mist				11/10	00:00	2.20		1.60	Inspection pit dug to 1.20m.
						12/10	00:00	10.00	5.50	5.30	
SPT Hammer: N/R, Energy Ratio: N/R											
Casing Diameter				Water Strikes				Monitoring Installations			
Depth (m)	Dia (mm)	Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
					0	0.00		0.00	0.50	Plain	50
									0.50	Slotted	50
Checked by:		RC	IFA RC								
Log status:		PRELIM	v01.01								



Plant used:
Commachio 205

Project:
Manchester Northern Gateway Flood Defence and Alleviation Works

Location ID:
RE14

Dates:
18/10/2021 - 19/10/2021

Client:
Volker Stevin

Sheet 1 of 1

Dynamic Sampling and Rotary Boring Log

Location:
384460.32E 399338.83N

Ground level:
29.69mOD

Logged by:
MD/CG

Vertical scale:
1:50

Project ID:
2230502

Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation	
0.60	ES1	SPT(S) N=1 (2,1/0,1,0,0)	29.55	0.14	MADE GROUND: Black tarmacadam (Road surface).	1	▼	▼	
0.60 - 1.20	B2		29.19	0.36	MADE GROUND: Recovered as dark grey GRAVEL with frequent cobbles. Gravel is very angular, fine to coarse including concrete. Cobbles are very angular (63-150mm) including concrete.				
0.70	D3				MADE GROUND: Dark grey, silty, sandy GRAVEL with occasional cobbles. Gravel is very angular to angular, fine to coarse including tarmacadam, brick, concrete and sandstone.				
1.00	ES4			(0.80)					
1.20	B5								
1.30 - 2.30	ES6	SPT(S) N=5 (1,1/0,0,2,3)	28.39	1.30	MADE GROUND: Very loose and loose dark brown mottled black, slightly gravelly, clayey, fine to coarse SAND. Gravel is very angular to well rounded, fine and medium including quartz, sandstone and other mixed lithologies. Medium to strong hydrocarbon odour.	2	▼	▼	
1.40	D7			(1.00)					
2.00	ES8	SPT(S) N=16 (3,4/4,3,4,5)	27.39	2.30	MADE GROUND: Dark brownish grey mottled red, silty, gravelly, fine to coarse SAND with occasional shell fragments and moderate hydrocarbon odour. Gravel is very angular, medium and coarse including brick.	3	▼	▼	
2.40	B9								
3.00	ES10			(0.90)					
3.20 - 4.00	D11	SPT(S) N=37 (4,3/4,5,11,17)	26.49	3.20	Medium dense, dark yellowish brown SAND with occasional shell fragments.	4	▼	▼	
3.40	ES12								
3.50				(0.90)					
4.00									
4.20			25.59	4.10	Dense, reddish brown, fine to coarse SAND (weathered sandstone).	5	▼	▼	
				4.50	Weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE. Fractures are 0-8°, closely spaced, tight clean with sand infill. <i>Between 4.50 and 9.00m: frequent weathering to a soft sand.</i>				
4.50 - 6.00	100 95 20	15	25.19	4.50					
6.00 - 7.50	100 84 20	NI		(4.50)		6	▼	▼	
		8			6.62m - C				
					7.06m - C				
					7.38m - C				
7.50 - 9.00	100 95 54	6			7.79m - C	7	▼	▼	
					8.10m - C				
					8.60m - C				
			20.69	9.00	End of Borehole at 9.00m	9	▼	▼	
TCR/SCR/ROD		FI	Samples & Tests			10	▼	▼	


Dynamic Sample Recovery				
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks
1.20	2.00		90	
2.00	3.00		90	
3.00	4.00		90	
4.00	4.50		80	

Water Strikes			Monitoring Installations						
Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
3.80	3.00		20	3.50		0.00	4.50	Plain	50
						4.50	9.00	Slotted	50

Checked by:	RC	IFA DS v01.01
Log status:	PRELIM	

Remarks:
Inspection pit dug to 1.20m.

SPT Hammer: N/R, Energy Ratio: N/R

	Plant used: Dando 2000/Commachio 205		Project: Manchester Northern Gateway Flood Defence and Alleviation Works			Location ID: RE15								
	Dates: 11/10/2021		Client: Volker Stevin			Sheet 1 of 1								
Cable Percussion and Rotary Boring Log		Location: 384476.01E 399396.98N		Ground level: 30.17mOD	Logged by: OG/CG	Vertical scale: 1:50	Project ID: 2230502							
Samples & In Situ Testing			Strata Details				Groundwater							
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation						
0.10 - 0.50 0.20	B1 ES2			(0.40)	MADE GROUND: Dark grey mottled black and reddish, sandy GRAVEL. Gravel is subangular to angular, fine to coarse concrete, tarmacadam, brick and dolerite.									
0.70 - 1.20	B3		29.77	0.40 (0.30)	MADE GROUND: Concrete slab <i>Very dense</i>									
1.00 1.20	ES4	SPT(S) N=36 (21,19/7,18,7,4)		0.70	MADE GROUND: Reddish brown, sandy GRAVEL with medium cobble content. Gravel is very angular to angular including red brick. Cobbles are subangular including red brick.	1								
1.20 - 1.65 1.20 - 1.70	D6 B5			(2.30)										
1.85 2.00	D7	SPT(S) N=14 (5,4/3,2,4,5)				2								
2.00 - 2.45 2.00 - 2.50	ES8 D10 B9													
2.75	D11													
3.00		SPT(S) 0 (1 for 450mm/0 for 0mm)	27.17	3.00	MADE GROUND: Dark grey mottled reddish brown, slightly gravelly, fine to coarse SAND. Gravel is subangular to angular including brick.	3								
3.00 - 3.45 3.00 - 3.50	D13 B12 ES21			(0.70)										
3.75 3.80	D14 ES22	SPT(S) N=7 (1,2/1,3,1,2)	26.47	3.70	Loose, reddish brown clayey, fine to coarse SAND with occasional pockets of reddish sand.	4								
4.00 4.00 - 4.45 4.00 - 4.50	D16 B15			(1.50)										
4.75	D17													
5.00		SPT(S) 50 (8,9/50 for 95mm)	24.97	5.20		5								
5.00 - 5.40 5.00 - 5.45	B18 D19			5.40 5.50	Grey, slightly silty, sandy GRAVEL. Gravel is subangular to angular including brick.									
5.50 - 7.00	83 77 60	5	24.77	5.40	Red SANDSTONE (drillers description)									
			24.41	5.76	Assumed zone of core loss. Probable SANDSTONE.									
					Weak, reddish brown, thickly bedded to massive, fine to coarse grained SANDSTONE. Discontinuities are 0-17°, closely spaced, undulating rough, tight. Soft reddish sandy, clay penetrating through fractures. <i>Between 6.09m and 6.13m: Weathered to a soft, reddish, sandy clay.</i>	6								
					<i>Between 6.65m and 6.75m: Weathered, soft and infilled with sand.</i>									
7.00 - 8.50	87 80 60	4	23.17	7.00	Assumed zone of core loss. Probable SANDSTONE.	7								
			22.97	7.20	Weak, reddish brown, massive, fine to coarse grained SANDSTONE. Discontinuities are 0-8°, closely spaced, undulating rough, tight clean. <i>Between 7.27m and 7.30m: Weathered.</i>	8								
8.50 - 10.00	100 100 87	4												
			20.17	10.00	End of Borehole at 10.00m	10								
TCR/SCR/ROD		FI	Samples & Tests											
Chiselling			Borehole Diameter		Boring Progress			Remarks:						
From (m)	To (m)	Time (mins)	Depth (m)	Dia (mm)	Date	Time	Depth (m)	Cased (m)	Water (m)					
5.40		60			11/10	00:00	5.40	5.40	3.00					
					12/10	00:00	10.00	5.50	5.30					
			Casing Diameter		Water Strikes			Monitoring Installations						
			Depth (m)	Dia (mm)	Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
					3.80	3.00	3.00	20	3.50		0.00	5.50	Plain	50
											5.50	10.00	Slotted	50
Checked by:		RC	IFA CP											
Log status:		PRELIM	v01.01											



Plant used: Commachio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		Location ID: RE16		
	Client: Volker Stevin				
Dates: 21/10/2021			Sheet 1 of 1		
Dynamic Sampling and Rotary Boring Log	Location: 384493.84E 399383.03N	Ground level: 29.59mOD	Logged by: CG	Vertical scale: 1:50	Project ID: 2230502

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
0.65	ES1	SPT(S) N=33 (1,3/6,12,11,4)	29.39	0.20	MADE GROUND: Black tarmacadam	1		
			28.99	0.60	MADE GROUND: Recovered as grey GRAVELS/COBBLES with horizontal (6mm re-bar) grid. Gravel is very angular concrete and flint. Cobbles are very angular (63x150mm) concrete, aggregate and flint.			
1.10	ES4		28.59	1.00	MADE GROUND: Dark grey, sandy GRAVEL with occasional cobbles. Gravel is very angular to angular, fine to coarse including tarmacadam, brick, concrete and sandstone.			
1.20			(1.30)		MADE GROUND: Reddish brown, mottled black, slightly sandy, gravelly CLAY. Gravel is very angular to subrounded, fine to coarse including sandstone, quartz and concrete with a moderate hydrocarbon odour.			
2.00		SPT(S) N=22 (4,5/5,5,6,6)				2		
2.40	ES7	3.00m - SPT(S) 50 (5,12/50 for 60mm) 3.15m - SPT(S) 50 (25 for 75mm/50 for 35mm)	27.29	2.30	Medium dense, dark grey mottled yellowish grey, slightly gravelly SAND. Gravel is very angular to subangular of mixed lithologies.	3		
2.80	ES10		26.89	2.70	Soft, reddish brown slightly gravelly, sandy CLAY. Gravel is very angular to subangular of mixed lithologies.			
3.00 - 4.00	100 0 0		26.59	3.00	Very dense, reddish brown, slightly clayey, fine to coarse SAND.	4		
			26.29	3.30	Weak to very weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE, weathered to a soft clayey sand with rare competent sections.			
4.00 - 5.00	100 100 20	11	25.59	4.00	Weak, reddish brown, thickly bedded, fine to coarse SANDSTONE. Discontinuities are 0-8° with common sandy infilling. Some sections weathered.	5		
			(1.50)					
5.00 - 6.50	100 90 33	14	24.09 23.99	5.50	Weak, reddish brown, fine to coarse grained, gravelly SANDSTONE. Gravel is subangular to subrounded, fine to coarse including quartz and sandstone. Weak, reddish brown, thickly bedded, fine to coarse SANDSTONE. Discontinuities are 0-8° with common sandy infilling. Some sections weathered.	6		
		NI		5.60				
		5		(1.65)				
6.50 - 8.00	94 80 20	11	22.34 22.21 22.09 21.87 21.82 21.69 21.59	7.25	Very weak, reddish brown, fine to coarse grained SANDSTONE. Weathered to a soft, slightly clayey sand. Stiff, reddish brown, very sandy CLAY. Weak, reddish brown, thickly bedded, fine to coarse SANDSTONE. Discontinuities are 0-8° with common sandy infilling. Some secretions very weathered. Very weak, light yellowish brown, thinly bedded, fine to medium grained SANDSTONE. <i>Between 7.72 and 7.77m: weathered to sand</i> Weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE. Fractures are 0-8°, closely spaced tight, clean. Assumed zone of core loss. Probable SANDSTONE. Weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE. Fractures are 0-25°, closely spaced tight, clean. Assumed zone of core loss. Probable SANDSTONE. Weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE. Fractures are 0-8°, closely spaced tight and open. <i>Between 9.20 and 9.50m: weathering to a stiff clay</i> End of Borehole at 9.50m	7		
		NI		7.38				
		NI		7.50				
		9		7.72				
		AZCL		8.00				
8.00 - 9.50	87 87 67	4	20.59 20.39 20.09	(1.00)		8		
		AZCL		9.00				
		15		9.20				
				9.50		9		
						10		

Dynamic Sample Recovery					Remarks:				
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks	Inspection pit dug to 1.20m.				
					SPT Hammer: N/R, Energy Ratio: N/R				
					Water Strikes			Monitoring Installations	
Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
Checked by:	RC		IFA DS						
Log status:	PRELIM		v01.01						



Plant used: Commachio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		Location ID: RE17		
	Client: Volker Stevin				
Dates: 06/12/2021		Sheet 1 of 1			
Dynamic Sampling and Rotary Boring Log	Location: 384150.62E 399210.39N	Ground level: 25.67mOD	Logged by: CG	Vertical scale: 1:50	Project ID: 2230502

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
0.20 - 1.00	B4		25.47	0.20	No recovery.			
0.40 - 0.50	ES1			(0.80)	MADE GROUND: Medium dense, brownish black, gravelly, silty SAND with medium cobble content. Gravel is subangular to subrounded, fine to coarse including sandstone, quartz, brick and coal. Cobbles are subangular to subrounded including sandstone, quartz, fine grained igneous and brick.		1	
0.80 - 0.90	ES2		24.67	1.00	No recovery.			
				(0.70)				
1.80 - 1.90	ES3		23.97	1.70	MADE GROUND: Dense, greyish brown, gravelly, fine to coarse SAND with low cobble content. Gravel is subangular to subrounded, fine to coarse including sandstone, fine grained igneous and brick. Cobbles are subrounded of fine grained igneous.		2	
2.10		SPT() N=21 (4,5/7,5,5,4)	23.67	2.00				
				(0.50)				
			23.17	2.50	No recovery. Advancing through dense coarse soil strata. End of Borehole at 2.50m			
3.00		SPT() N=32 (5,7/7,8,8,9)					3	
							4	
							5	
							6	
							7	
							8	
							9	
							10	

Dynamic Sample Recovery					Remarks:									
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks	Drilled from pontoon. Strata depths below river bed. Borehole terminated at 2.50m due to gravels. SPT Hammer: N/R, Energy Ratio: N/R									
					Water Strikes				Monitoring Installations					
					Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
Checked by:	RC		IFA DS											
Log status:	PRELIM		v01.01											



Plant used: Commachio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		Location ID: RE17B
	Client: Volker Stevin		
Dates: 09/12/2021		Sheet 1 of 1	
Location: 384152.30E 399210.78N		Ground level: 25.66mOD	Project ID: 2230502
Dynamic Sampling and Rotary Boring Log		Logged by: CG	Vertical scale: 1:50

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
				(2.50)	No recovery. Advancing through coarse made ground or soil strata.			
2.50 - 3.50	81 75 55	NR 9	23.16	2.50 (1.00)	Weak, reddish brown, thickly bedded fine to medium grained SANDSTONE. Fractures are 0-8° closely spaced, wide with a sandy infill, undulating rough.			
3.50 - 5.00	87 77 47	NR 6 NI 12	22.16	3.50 (2.00)	Weak, reddish brown thickly bedded fine to medium grained SANDSTONE. Fractures are 0-70° closely spaced, wide with a soft sandy infill, undulating rough.			
5.00 - 6.50	80 77 40	NR 7	20.16	5.50 (1.00)	Weak, reddish brown thickly bedded fine to medium grained SANDSTONE. Fractures are 0-8° closely spaced, wide, clean undulating rough.			
			19.16	6.50	End of Borehole at 6.50m			

Dynamic Sample Recovery					Remarks:									
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks	Drilled from pontoon. Strata depths below river bed. Unable to drill RE17A due to movement of pontoon. Relocated to RE17B.									
					SPT Hammer: N/R, Energy Ratio: N/R									
					Water Strikes			Monitoring Installations						
					Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
Checked by:	RC		IFA DS											
Log status:	PRELIM		v01.01											



Plant used: Commachio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		Location ID: RE18
	Dates: 07/12/2021 - 09/12/2021		
Client: Volker Stevin		Sheet 1 of 1	
Location: 384195.98E 399218.86N		Ground level: 25.83mOD	Logged by: CG
Dynamic Sampling and Rotary Boring Log		Vertical scale: 1:50	Project ID: 2230502

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
0.60 - 1.00	ES1			(1.00)	MADE GROUND: Dark brown, gravelly, silty, fine to coarse SAND. Gravel is angular to rounded, fine to coarse including sandstone, brick, tile and slag.			
1.00		SPT() N=41 (6,9/9,10,9,13)	24.83	1.00	No recovery. Advancing casing through dense to very dense coarse made ground / soils.		1	
2.50		SPT() N=36 (4,8/11,9,8,8)		(2.50)			2	
							3	
							4	
3.50 - 4.50	70 70 40	NI 8	22.33 22.08	3.50 3.75 (0.85)	Grey, coarse GRAVEL with a high cobble content. Gravels and cobbles are subrounded to subangular including sandstone, granite and fine grained igneous. Weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE. Discontinuities are 0-6°, closely spaced, tight and wide (10mm) clean, undulating rough.			
							5	
4.50 - 6.00	100 87 74	NI 7	21.23 21.13	4.60 4.70 (1.14)	Extremely weak, reddish brown, fine to coarse grained SANDSTONE. Weathered. Inclusions of coarse, subangular gravel of coarse grained igneous lithology. Weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE. Discontinuities are 1) 0-8°, closely spaced, tight with sandy infill, undulating rough. 2) 1No. 60° tight undulating rough.			
							6	
6.00 - 7.50	100 94 60	NI 11	19.99 19.88	5.84 5.95 (1.50)	Weak, reddish brown, thickly bedded, fine to coarse grained SANDSTONE. Weak, locally very weak, reddish brown, tickly bedded, fine to coarse grained SANDSTONE. Discontinuities are 1) 0-8°, closely spaced, tight with sandy infill, undulating rough. 2) 0-90°, fractured, tight clean, undulating rough.			
							7	
							8	
							9	
							10	

Dynamic Sample Recovery Top (m) | Base (m) | Dia (mm) | Recovery % | Remarks 0.00 | 1.00 | | 40 |					Remarks: Drilled from pontoon. Strata depths below river bed.				
SPT Hammer: N/R, Energy Ratio: N/R									
Water Strikes Strike (m) | Cased (m) | Sealed (m) | Time (mins) | Rose to (m) | Remarks					Monitoring Installations Top (m) | Base (m) | Pipe Type | Dia (mm)				
Checked by: RC		IFA DS v01.01							
Log status: PRELIM									



Plant used: Commachio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		Location ID: RE19		
	Client: Volker Stevin				
Dates: 19/11/2021		Sheet 1 of 1			
Dynamic Sample Borehole Log	Location: 384383.54E 399294.82N	Ground level: 25.38mOD	Logged by: OG	Vertical scale: 1:50	Project ID: 2230502

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
0.10	ES1				MADE GROUND: Reddish brown, very sandy GRAVEL. Gravel is very angular to angular including sandstone, brick, coal, quartz and porcelain.			
0.40	D2			(0.80)				
0.90	D3	SPT(S) N=18 (9,9/5,5,4,4)	24.58	0.80	Recovered as slightly sandy GRAVEL. Gravel angular to subrounded, fine to coarse including granite, sandstone and mudstone.		1	
1.00				(1.30)			2	
1.60		SPT(S) N=16 (10,13/6,4,4,2)						
2.20	ES4		23.28	2.10	Reddish brown mottled black and brown, slightly gravelly SAND with weak organic odour. Gravel is subrounded to well rounded, fine and medium including mixed lithologies.			
2.40	D5			(0.40)				
2.40	D6		22.88	2.50	Recovered as very angular to subangular GRAVEL including granite and red brick.			
2.60				(0.40)			3	
			22.48	2.90	End of Borehole at 2.90m			
							4	
							5	
							6	
							7	
							8	
							9	
							10	

Dynamic Sample Recovery					Remarks: Drilled from pontoon. Strata depths below river bed.			
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks				
0.00	0.90		50					
0.90	1.50		34					
1.50	2.50		50					
2.50	2.90		20					
SPT Hammer: N/R, Energy Ratio: N/R								
Water Strikes					Monitoring Installations			
Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)				
				Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
Checked by:	RC	IFA DS v01.01						
Log status:	PRELIM							



Plant used: Commachio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		Location ID: RE19A
	Client: Volker Stevin		
Dates: 10/11/2021	Ground level: 25.31mOD		Vertical scale: 1:50
Rotary Borehole Log		Location: 384380.04E 399293.25N	Logged by: OG
		Project ID: 2230502	

Sheet 1 of 2

Coring, Samples & In Situ Testing				Strata Details				Groundwater	
Depth	TCR/SCR/RQD	FI	Samples & Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
			2.80m - SPT(S) 50 (25 for 135mm/50 for 70mm)	22.51	2.80	Debris and SAND and GRAVEL (Drillers description)			
					(2.80)				
						Orange SAND and GRAVEL (Drillers description)			
					(1.10)				
				21.41	3.90 (0.40)	SANDSTONE (Drillers description)			
				21.01	4.30	Assumed zone of core loss.			
4.30 - 5.80	17 17 17	AZCL	4.30m - SPT(S) 50 (25 for 40mm/50 for 65mm)		(1.24)				
		1		19.77	5.54	Thickly bedded, reddish brown, fine to coarse grained weathered SANDSTONE. Discontinuities are closely to closely spaced, planar rough, horizontal. Assumed zone off core loss.			
				19.51	5.80				
5.80 - 7.30	0 0 0	AZCL			(1.50)				
				18.01	7.30 (0.36)	Weak, reddish brown, fine to coarse grained SANDSTONE. Discontinuities are open, undulating rough infilled with reddish brown, fine to coarse sand, subangular to very angular, fine and medium sandstone gravel.			
				17.65	7.66 (0.53)	Thickly bedded, reddish brown, fine to coarse grained weathered SANDSTONE. Discontinuities are closely to closely spaced, planar rough, horizontal.			
7.30 - 8.05	100 46 13	NI		17.12	8.19	Reddish brown, fine to coarse grained weathered SANDSTONE. Discontinuities are extremely closely spaced, horizontal, planar rough (6mm) infilled with fine grained yellowish cream, fine sand.			
		5		17.08	8.29	Thickly bedded, reddish brown, fine to coarse grained weathered SANDSTONE. Discontinuities are closely to closely spaced, planar rough, horizontal.			
8.05 - 8.80	100 66 0	NI		16.79	8.52	Weak, reddish brown, fine to coarse grained SANDSTONE. Discontinuities are open, undulating rough infilled with reddish brown, fine to coarse sand, subangular to very angular, fine and medium sandstone gravel.			
		4		16.61	8.70				
		1		16.51	8.80				
		4		16.31	9.00				
8.80 - 10.30	93 49 27	AZCL		16.01	9.30 (0.56)	Thickly bedded, reddish brown, fine to coarse grained weathered SANDSTONE. Discontinuities are closely to closely spaced,			
		NI		15.45	9.86				

Continued next sheet

Flush Details				Borehole Diameter		Boring Progress			Remarks:	
Top (m)	Base (m)	Flush Type	Flush Return %	Depth (m)	Dia (mm)	Date	Time	Depth (m)	Cased (m)	Water (m)
						10/11	16:30	10.30	5.55	0.40
Drilled from pontoon. Strata depths below river bed.										
SPT Hammer: N/R, Energy Ratio: N/R										
				Casing Diameter		Water Strikes			Monitoring Installations	
Depth (m)		Dia (mm)		Strike (m)		Cased (m)		Sealed (m)		Time (mins)
										Rose to (m)
						Remarks			Top (m)	
									Base (m)	
									Pipe Type	
									Dia (mm)	
Checked by:		RC		IFA RC						
Log status:		PRELIM		v01.01						



Plant used: Commachio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		Location ID: RE19A
Dates: 10/11/2021	Client: Volker Stevin		Sheet 2 of 2
Rotary Borehole Log	Location: 384380.04E 399293.25N	Ground level: 25.31mOD	Logged by: OG
		Vertical scale: 1:50	Project ID: 2230502

Coring, Samples & In Situ Testing			Strata Details				Groundwater		
Depth	TCR/SCR/RQD	FI	Samples & Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
		4		15.01	(0.44) 10.30	Thickly bedded, reddish brown, fine to coarse grained weathered SANDSTONE. Discontinuities are closely to closely spaced, planar rough, horizontal. Assumed zone of core loss. Probable SANDSTONE. Thickly bedded, reddish brown, fine to coarse grained weathered SANDSTONE. Discontinuities are closely to closely spaced, planar rough, horizontal. Weak, reddish brown, fine to coarse grained SANDSTONE. Discontinuities are open, undulating rough infilled with reddish brown, fine to coarse sand, subangular to very angular, fine and medium sandstone gravel. Thickly bedded, reddish brown, fine to coarse grained weathered SANDSTONE. Discontinuities are closely to closely spaced, planar rough, horizontal. End of Borehole at 10.30m			
								11	
								12	
								13	
								14	
								15	
								16	
								17	
								18	
								19	
								20	

Flush Details				Borehole Diameter		Boring Progress				Remarks:					
Top (m)	Base (m)	Flush Type	Flush Return %	Depth (m)	Dia (mm)	Date	Time	Depth (m)	Cased (m)	Water (m)					
											SPT Hammer: N/R, Energy Ratio: N/R				
				Casing Diameter		Water Strikes				Monitoring Installations					
				Depth (m)	Dia (mm)	Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
Checked by:		RC	IFA RC												
Log status:		PRELIM	v01.01												



Plant used: Commachio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		Location ID: RE20		
	Dates: 05/11/2021 - 08/11/2021				
Client: Volker Stevin		Sheet 1 of 1 Project ID: 2230502			
Dynamic Sampling and Rotary Boring Log		Location: 384457.75E 399351.59N	Ground level: 26.18mOD	Logged by: CG	Vertical scale: 1:50

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
0.30 - 0.50	ES1		25.88	(0.30)	MADE GROUND: Light brown, fine to coarse SAND and GRAVEL. Gravel is subangular to subrounded, fine to coarse of various lithologies including sandstone, quartz, fine grained igneous lithologies and shards of glass.			
0.50 - 1.00	B2			(0.70)				
1.00 - 1.55	B3		25.18	1.00	Light grey, slightly sandy GRAVEL with low cobble content. Gravel is subangular to subrounded, fine to coarse of igneous lithologies including sandstone, quartz and fine grained igneous.			
			24.63	1.55				
1.55 - 3.05	100 90 70	6		(1.50)	Weak, locally very weak, fine to coarse grained, thickly bedded SANDSTONE with rare subrounded to rounded, fine and medium grained gravel of sandstone and quartz. Discontinuities are 0-8°, tight clean, undulating rough.			3
			23.13	3.05				
3.05 - 4.55	91 83 70	4		(1.50)	End of Borehole at 6.05m			5
			21.63	4.55				
4.55 - 6.05	AZCL	5.18m - C	20.13	6.05	End of Borehole at 6.05m			7
					End of Borehole at 6.05m			9

Dynamic Sample Recovery					Remarks: Drilled from pontoon. Strata depths below river bed.									
Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks										
SPT Hammer: N/R, Energy Ratio: N/R														
					Water Strikes			Monitoring Installations						
					Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Pipe Type	Dia (mm)
Checked by: RC		Log status: PRELIM			IFA DS v01.01									



Plant used: Commachio 205	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		Location ID: RE21			
	Dates: 04/11/2021			Client: Volker Stevin		
Rotary Borehole Log		Location: 384488.75E 399399.55N	Ground level: 26.20mOD	Logged by: CG	Vertical scale: 1:50	Sheet 1 of 1 Project ID: 2230502

Coring, Samples & In Situ Testing				Strata Details				Groundwater	
Depth	TCR/SCR/ROD	FI	Samples & Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
		OH		25.80	(0.40)	SILT and debris (Drillers description).			
					0.40	Granular material, probable SAND and GRAVEL. (Drillers description).			
		NR	1.40m - SPT(S) 50 (25 for 60mm/50 for 55mm)	24.80	(0.70)			1	
					1.10 (0.30)	SANDSTONE (Drillers description)			
1.40 - 2.90	87 83 60	8	1.70m - C 1.86m - C 1.96m - C	23.98	(0.82)	Weak, reddish brown, fine to coarse grained, thickly bedded SANDSTONE with rare subrounded, fine grained gravel of quart and sandstone. Discontinuities are 0-5°, closely spaced, tight clean, undulating rough.		2	
					2.27				
		6	2.40m - C 2.68m - C	23.93	(0.91)	Reddish brown, clayey, subangular to subrounded, fine to coarse GRAVEL including quartz and sandstone.		3	
					2.27	Weak, reddish brown, fine to coarse grained, thickly bedded SANDSTONE with rare subrounded, fine grained gravel of quart and sandstone. Discontinuities are 0-12°, closely spaced, tight clean, undulating rough.			
2.90 - 4.40	80 77 47	5	3.33m - C 3.93m - C	23.02	3.18	Weak, locally extremely weak, reddish brown, fine to coarse grained, thickly bedded SANDSTONE. Discontinuities are 0-12°, closely spaced, tight and open with a soft sandy clay penetrating through, undulating rough. Weathered in places.		4	
					(2.72)				
4.40 - 5.90	100 95 80	6	5.08m - C 5.60m - C	20.30	5.90	End of Borehole at 5.90m		6	
								7	
								8	
								9	
								10	

Flush Details Top (m) | Base (m) | Flush Type | Flush Return %				Borehole Diameter Depth (m) | Dia (mm)		Boring Progress Date | Time | Depth (m) | Cased (m) | Water (m)				Remarks: Drilled from pontoon. Strata depths below river bed. SPT Hammer: N/R, Energy Ratio: N/R	
						04/11 | 13:00 | 5.90 | 1.40					
				Casing Diameter Depth (m) | Dia (mm)		Water Strikes Strike (m) | Cased (m) | Sealed (m) | Time (mins) | Rose to (m)				Monitoring Installations Top (m) | Base (m) | Pipe Type | Dia (mm)	
Checked by: Log status:		RC PRELIM		IFA RC v01.01							



Plant used: Comacchio 205 Dates: 09/02/2022	Project: Manchester Northern Gateway Flood Defence and Alleviation Works		Location ID: RE22 Sheet 1 of 1 Project ID: 2230502
	Client: Volker Stevin		
Rotary Borehole Log	Location:	Ground level:	Logged by: MD Vertical scale: 1:50

Coring, Samples & In Situ Testing				Strata Details				Groundwater	
Depth	TCR/SCR/RQD	FI	Samples & Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/Installation
0.50 - 1.50	0 0 0	NR	0.00m - SPT(C) N=25 (1,3/4,4,3,14)		(0.50)	MADE GROUND: River bed materials, including textile, corroded metal, cobbles of sandstone, foam and timber. <i>Between 0.00m and 0.50m: dynamic sample. No recovery.</i>	[Cross-hatch pattern]		
			0.50m - SPT(C) 70 (11,14/70 for 236mm)		(1.15)	No recovery, assumed to be extremely weak, red brown, medium grained SANDSTONE. <i>No recovery, assumed zone of core loss.</i>			
1.50 - 2.50	85 62 34	AZCL	2.50m - SPT(C) 50 (25 for 30mm/50 for 40mm) 3.00m - SPT(C) 44 (25 for 20mm/44 for 85mm)		1.65	<i>Between 1.50m and 1.65m: assumed zone of core loss.</i>	[Dotted pattern]		
		10			(0.85)	Very weak, medium grained, red brown SANDSTONE with rare fine and medium gravel sized clasts of sandstone, mudstone and quartz. Clasts are subrounded to rounded. <i>Between 1.65m and 2.40m: discontinuities are 0-5 degrees, closely spaced, undulating clean.</i>			
2.50 - 4.00	0 0 0	NI			2.50	No recovery, assumed to be extremely weak, red brown, medium grained SANDSTONE. Driller notes sandstone breaking up to sand and jamming between inner and outer barrels. <i>Between 2.50m and 5.50m: no recovery.</i>	[Dotted pattern]		
		NR			(3.50)	<i>Between 5.50m and 6.00m: assumed zone of core loss.</i>			
4.00 - 5.50	0 0 0	NR					[Dotted pattern]		
5.50 - 7.00	66 33 27	AZCL					[Dotted pattern]		
		NI							
7.00 - 8.50	100 49 10	10					[Dotted pattern]		
		8							
					8.50	End of Borehole at 8.50m			

Flush Details Top (m) | Base (m) | Flush Type | Flush Return %				Borehole Diameter Depth (m) | Dia (mm)		Boring Progress Date | Time | Depth (m) | Cased (m) | Water (m)			Remarks: Drilled from pontoon. Strata depths below river bed. SPT Hammer: N/R, Energy Ratio: N/R	
						09/02 | 00:00 | 8.50 | 3.00				
				Casing Diameter Depth (m) | Dia (mm)		Water Strikes Strike (m) | Cased (m) | Sealed (m) | Time (mins) | Rose to (m)			Monitoring Installations Top (m) | Base (m) | Pipe Type | Dia (mm)	
Checked by: Log status:		PRELIM		IFA RC v01.01						

