
ID Manchester – Enabling Works Area and Plot C Proposed Site Investigation

Project Ref: 51019

Document Ref: 51019-CE-XX-XX-R-G-4001 P03

Site Investigation Key Objectives:

1. Investigation of shallow and deep ground model within Plot C to obtain information for the detailed geotechnical design of the new C1 and C2 buildings including ground gas and groundwater levels.
2. Investigation of the historical River Medlock channel to obtain geotechnical information on infill materials for enabling works and Plot C, geoenvironmental information for material re-use and disposal strategy, information of depth and construction of channel.
3. Investigation of shallow soils (above rockhead) across the site to obtain geotechnical and geoenvironmental information for the site-wide enabling works including geotechnical design parameters, material re-use strategy and ground gas and groundwater levels.
4. Investigation of level of rockhead in proximity to the BT tunnel and composition of bedrock at level of BT tunnel to obtain geotechnical information to assess the risk and define whether a ground movement assessment is required, and provide information for future ground movement assessment (if required) to demonstrate to asset holder and Halcrow Group Limited that proposed loadings and proposed foundation solutions are within the guidelines set out by Halcrow Group Limited. Investigation to include intersection of proposed new river channel and BT tunnel.
5. Investigation of Altrincham Street retaining wall/viaduct including thickness, construction/material composition and foundations, crown level of Altrincham Street below ground arches and construction of raised Network Rail viaduct foundations.
6. Investigation of existing foundations to obtain structural information for deconstruction and re-purposing of buildings.
7. Infiltration testing of shallow soils to obtain information on feasibility of SUDS / rain gardens at the site.

This specification should be read in conjunction with the Civic Earth Phase 1 Desk Study and Data Review¹. Of note, the following pertinent information is noted:

1. Existing ground level estimated to range from 39mOD to 33mOD at Plot C based on April 2022 topographical survey. Existing ground level estimated to range from 35mOD to 33mOD across wider site to south of Altrincham Street. Existing ground level estimated to range from 41mOD to 37mOD to north of Altrincham Street.
2. BT Tunnel is understood to be at approximately 6.5mOD (30mbgl)
3. NW-SE trending geological fault in the bedrock indicated to travel through the site, passing below Pariser Building.
4. Groundwater table within bedrock indicated to be at approximately 30mOD to 28mOD (5-7mbgl).

Proposed Site Investigation Location RationaleGeneral Site Investigation Principles:

Cable percussion / rotary boreholes are proposed to investigate the thickness and composition of Made Ground and superficial deposits, prove the depth to the bedrock and where rotary coring is specified, obtain information on the bedrock sandstone and allow the installation of groundwater monitoring wells within the bedrock. Window sample boreholes are proposed to investigate the shallow ground conditions including targeting identified potentially contaminative historical industries and facilitate the installation of ground gas and groundwater monitoring wells across the wider enabling works site. Boreholes are also positioned in proximity of the BT Tunnel to obtain information

¹ Civic Earth (2024) *Phase 2 (Plot C), ID Manchester. Phase 1 Desk Study and Data Review*. Reference 51019-CE-XX-XX-G-R-1001. Revision P01.

for future ground movement assessment / geotechnical modelling and on Altrincham Street to obtain information on the material being retained.

In-situ testing to be carried out within the boreholes to obtain information on the geotechnical properties of the underlying strata, installation of ground gas and groundwater monitoring wells and soil and groundwater sampling for geotechnical and geoenvironmental laboratory analysis.

Foundation inspection pits proposed to investigate existing construction details and founding strata of Barnes Wallis and Wright Robinson, Altrincham Street retaining wall and the Network Rail viaduct.

Infiltration testing in general accordance with BRE 365 is proposed within window sample boreholes to assess feasibility of SUDS / rain gardens across the site.

It is noted that additional investigation for example trial pits / window samples may be required post-deconstruction works in Plot C to confirm the shallow ground conditions as investigation below the building footprints is not possible at this time. In addition, investigation via trial pitting will be required to provide material classification testing for detailed earthworks design and SuDS design; it is assumed that this would be carried out post-deconstruction works.

Supplementary investigation within the remaining plots will likely be required at a later date to inform the detailed design for those plots.

Table 1. Exploratory Hole Rationale

Reference	Type	Proposed Depth (mbgl)	Rationale
BH1001 to BH1004	CP/RH	15.0 to 25.0	Cable percussion with follow on rotary drilling to obtain information on the shallow and deeper ground conditions within the footprint of the proposed C1 and C2 buildings. Cable percussion technique to be used until top of rockhead, rotary coring through sandstone bedrock. Installation of groundwater monitoring wells within deeper sandstone and combined ground gas/groundwater monitoring wells within shallow Made Ground/superficial deposits. In-situ testing (SPT and U100 sampling) to be carried out within cable section, rock core sampling and in-situ SPTs to be carried out within rotary section.
BH1005	CP/RH	20.0	Cable percussion with follow on rotary drilling to obtain information on the shallow and deeper ground conditions within the footprint of the proposed C1 and C2 buildings and historical River Medlock. Cable percussion technique to be used until top of rockhead, rotary coring through sandstone bedrock. Installation of groundwater monitoring wells within deeper sandstone. In-situ testing (SPT and U100 sampling) to be carried out within cable section, rock core sampling and in-situ SPTs to be carried out within rotary section.
BH1006 and BH1007	CP/RH	15.0	Cable percussion with follow on rotary drilling to obtain information on the shallow and deeper ground conditions, Positioned to target historical potentially contaminative industry (chemical works). In-situ testing and soil sampling for geotechnical and geoenvironmental laboratory analysis. Installation of groundwater monitoring wells within bedrock.
BH1008 and BH1009	CP/RH	10.0 to 15.0	Cable percussion with follow on rotary drilling to obtain information on the shallow and deeper ground conditions. Positioned to provide site wide information / triangulation on deeper ground and groundwater model. In-situ testing and soil sampling for geotechnical and geoenvironmental laboratory analysis. Installation of groundwater monitoring wells.
BH1010 and BH1011	CP/RH	40.0 to 45.0	Cable percussion with follow on rotary drilling in proximity to BT Tunnel to obtain information on ground conditions in proximity to tunnel location to inform future potential ground movement assessment. Borehole to extend to beneath the depth of BT Tunnel at approximately 6.5mOD. Cable percussion technique to be used until top of rockhead, rotary coring through sandstone bedrock. Installation of groundwater monitoring wells within deeper sandstone Principal aquifer. In-situ testing and soil sampling for geotechnical and geoenvironmental laboratory analysis. Installation of groundwater monitoring wells.
BH1012 to BH1014	CP	10.0	Cable percussion to obtain information on the shallow ground conditions and prove top of rockhead. Positioned to provide site wide information /

Reference	Type	Proposed Depth (mbgl)	Rationale
			triangulation on deeper ground and groundwater model. In-situ testing and soil sampling for geotechnical and geoenvironmental laboratory analysis to inform enabling works package and material re-use strategy. Installation of groundwater/ground gas monitoring wells.
BH1015	CP	15.0	Cable percussion borehole to obtain information on soils along route of proposed service tunnel and investigation potential presence/absence of spread viaduct foundations in proximity to retaining wall. To be positioned in proximity to viaduct pier.
WS1001 to WS1012	WS	5.0	Shallow window sample boreholes to obtain information for the enabling works on the shallow ground and groundwater conditions across the site. Installation of combined ground gas and groundwater monitoring wells in select locations. In-situ testing and soil sampling to provide information on geotechnical properties of underlying soils and to obtain soil samples for chemical analysis to inform material re-use strategy.
WS1013 to WS1016	WS	5.0	Shallow window sample boreholes to obtain up-to-date geochemical information on shallow soils around contamination hotspots previously identified by Arup. In-situ testing and soil sampling to provide information on geotechnical properties of underlying soils and to obtain soil samples for chemical analysis to inform material re-use strategy.
WS1017 and WS1019	WS	5.0	Shallow window sample boreholes to obtain up-to-date geochemical information within former chemical works. In-situ testing and soil sampling to provide information on geotechnical properties of underlying soils and to obtain soil samples for chemical analysis to inform material re-use strategy.
WS1020 and WS1021	WS	5.0	Shallow window sample boreholes to obtain geochemical information within infilled River Medlock channel. In-situ testing and soil sampling to provide information on geotechnical properties of underlying soils and to obtain soil samples for chemical analysis to inform material re-use strategy.
WS1022 to WS1026	WS	5.0	Shallow window sample boreholes to obtain geochemical information within footprints of potentially contaminative historical industries identified within the wider ID Manchester development boundary. In-situ testing and soil sampling to provide information on geotechnical properties of underlying soils and to obtain soil samples for chemical analysis to inform material re-use strategy.
FIP1001 to FIP1005	FIP	15	Foundation inspection trial pits positioned at Barnes Wallis / Wright Robinson to obtain information on existing foundation details including depth, construction and founding strata. Allowance for 5 locations, locations to be specified by Civic Engineers.
FIP1006 to FIP1025	FIP	15	Foundation inspection trial pits positioned at structures to be de-constructed (Moffat, Morton Laboratory, Manchester Meeting Place, MSS and the Mill) to obtain information on existing foundation details including depth, construction and founding strata. To inform contractor costs for grubbing out. Allowance for 4 locations per building, locations to be specified by Civic Engineers.
FIP1026 to FIP1029	FIP	1.5 to 3.0	Foundation inspection trial pits positioned at approximately 50m centres along the Service Road retaining wall/viaduct structure to investigate depths of foundation, founding stratum and construction details.
FIP1030 to FIP1032	FIP	15	Foundation inspection trial pits along the Network Rail viaduct at Altrincham Street level to investigate crown of the arch below street level.
FIP1033 to FIP1036	FIP	15	Foundation inspection trial pits along Holloway Wall to investigate depths of foundation, founding stratum and construction details.
HC1001 to HC1004	HC	2.0 to 4.0	Horizontal core holes at Altrincham Street retaining wall/viaduct to investigate thickness and composition of the structure.

Reference	Type	Proposed Depth (mbgl)	Rationale
TBC	TP	3.0 to 3.5	Machine excavated trial pits to enable sampling of shallow soils for material classification and earthworks design. Anticipated to be completed post-deconstruction works where access is readily available across the site.
TBC	SA	1.0 to 3.5	Soakaway test within machine excavated trial pit to carry out infiltration testing in accordance with BRE 365. Anticipated to be completed post-deconstruction works where access is readily available across the site and anticipated locations of SuDS/rain gardens has been determined as part of the design process.

Proposed exploratory hole locations plans are provided in Plate 1 and Plate 2.

Plate 1. Indicative Proposed Exploratory Hole Locations – Foundation Inspection Pits and Horizontal Cores



Note: Foundation inspection pits FIP1001 to FIP1025 are not illustrated on proposed location plan. Proposed locations are subject to location of structural features to be targeted, location of buried and above ground utilities and suitable access for the intended plant.

Indicative Phase 2 Zone Boundary
Indicative Enabling Works Boundary
Indicative Wider ID Manchester Development
Proposed Plot C Exploratory Holes
Proposed Site Wide - CP/RH Boreholes
Proposed Site Wide - CP Boreholes
Proposed Site Wide - WS Boreholes
Plot C Building Footprint
BT Tunnel
Historical Medlock Route

Geological Fault

Map showing the proposed Manchester Metrolink Light Rail system, including the Plot C Building Footprint, BT Tunnel, and Historical Medlock Route. The map also displays various borehole locations (BH1001, BH1002, BH1003, BH1004, BH1005, BH1006, BH1007, BH1008, BH1009, BH1010, BH1011, BH1012, BH1013, BH1014, BH1015, BH1016, BH1017, BH1018, BH1019, BH1020, BH1021, BH1022, BH1023, BH1024, BH1025, BH1026, BH1027, BH1028, BH1029, BH1030, BH1031, BH1032, BH1033, BH1034, BH1035, BH1036, BH1037, BH1038, BH1039, BH1040, BH1041, BH1042, BH1043, BH1044, BH1045, BH1046, BH1047, BH1048, BH1049, BH1050, BH1051, BH1052, BH1053, BH1054, BH1055, BH1056, BH1057, BH1058, BH1059, BH1060, BH1061, BH1062, BH1063, BH1064, BH1065, BH1066, BH1067, BH1068, BH1069, BH1070, BH1071, BH1072, BH1073, BH1074, BH1075, BH1076, BH1077, BH1078, BH1079, BH1080, BH1081, BH1082, BH1083, BH1084, BH1085, BH1086, BH1087, BH1088, BH1089, BH1090, BH1091, BH1092, BH1093, BH1094, BH1095, BH1096, BH1097, BH1098, BH1099, BH1100, BH1101, BH1102, BH1103, BH1104, BH1105, BH1106, BH1107, BH1108, BH1109, BH1110, BH1111, BH1112, BH1113, BH1114, BH1115, BH1116, BH1117, BH1118, BH1119, BH1120, BH1121, BH1122, BH1123, BH1124, BH1125, BH1126, BH1127, BH1128, BH1129, BH1130, BH1131, BH1132, BH1133, BH1134, BH1135, BH1136, BH1137, BH1138, BH1139, BH1140, BH1141, BH1142, BH1143, BH1144, BH1145, BH1146, BH1147, BH1148, BH1149, BH1150, BH1151, BH1152, BH1153, BH1154, BH1155, BH1156, BH1157, BH1158, BH1159, BH1160, BH1161, BH1162, BH1163, BH1164, BH1165, BH1166, BH1167, BH1168, BH1169, BH1170, BH1171, BH1172, BH1173, BH1174, BH1175, BH1176, BH1177, BH1178, BH1179, BH1180, BH1181, BH1182, BH1183, BH1184, BH1185, BH1186, BH1187, BH1188, BH1189, BH1190, BH1191, BH1192, BH1193, BH1194, BH1195, BH1196, BH1197, BH1198, BH1199, BH1200, BH1201, BH1202, BH1203, BH1204, BH1205, BH1206, BH1207, BH1208, BH1209, BH1210, BH1211, BH1212, BH1213, BH1214, BH1215, BH1216, BH1217, BH1218, BH1219, BH1220, BH1221, BH1222, BH1223, BH1224, BH1225, BH1226, BH1227, BH1228, BH1229, BH1230, BH1231, BH1232, BH1233, BH1234, BH1235, BH1236, BH1237, BH1238, BH1239, BH1240, BH1241, BH1242, BH1243, BH1244, BH1245, BH1246, BH1247, BH1248, BH1249, BH1250, BH1251, BH1252, BH1253, BH1254, BH1255, BH1256, BH1257, BH1258, BH1259, BH1260, BH1261, BH1262, BH1263, BH1264, BH1265, BH1266, BH1267, BH1268, BH1269, BH1270, BH1271, BH1272, BH1273, BH1274, BH1275, BH1276, BH1277, BH1278, BH1279, BH1280, BH1281, BH1282, BH1283, BH1284, BH1285, BH1286, BH1287, BH1288, BH1289, BH1290, BH1291, BH1292, BH1293, BH1294, BH1295, BH1296, BH1297, BH1298, BH1299, BH1300, BH1301, BH1302, BH1303, BH1304, BH1305, BH1306, BH1307, BH1308, BH1309, BH1310, BH1311, BH1312, BH1313, BH1314, BH1315, BH1316, BH1317, BH1318, BH1319, BH1320, BH1321, BH1322, BH1323, BH1324, BH1325, BH1326, BH1327, BH1328, BH1329, BH1330, BH1331, BH1332, BH1333, BH1334, BH1335, BH1336, BH1337, BH1338, BH1339, BH1340, BH1341, BH1342, BH1343, BH1344, BH1345, BH1346, BH1347, BH1348, BH1349, BH1350, BH1351, BH1352, BH1353, BH1354, BH1355, BH1356, BH1357, BH1358, BH1359, BH1360, BH1361, BH1362, BH1363, BH1364, BH1365, BH1366, BH1367, BH1368, BH1369, BH1370, BH1371, BH1372, BH1373, BH1374, BH1375, BH1376, BH1377, BH1378, BH1379, BH1380, BH1381, BH1382, BH1383, BH1384, BH1385, BH1386, BH1387, BH1388, BH1389, BH1390, BH1391, BH1392, BH1393, BH1394, BH1395, BH1396, BH1397, BH1398, BH1399, BH1400, BH1401, BH1402, BH1403, BH1404, BH1405, BH1406, BH1407, BH1408, BH1409, BH1410, BH1411, BH1412, BH1413, BH1414, BH1415, BH1416, BH1417, BH1418, BH1419, BH1420, BH1421, BH1422, BH1423, BH1424, BH1425, BH1426, BH1427, BH1428, BH1429, BH1430, BH1431, BH1432, BH1433, BH1434, BH1435, BH1436, BH1437, BH1438, BH1439, BH1440, BH1441, BH1442, BH1443, BH1444, BH1445, BH1446, BH1447, BH1448, BH1449, BH1450, BH1451, BH1452, BH1453, BH1454, BH1455, BH1456, BH1457, BH1458, BH1459, BH1460, BH1461, BH1462, BH1463, BH1464, BH1465, BH1466, BH1467, BH1468, BH1469, BH1470, BH1471, BH1472, BH1473, BH1474, BH1475, BH1476, BH1477, BH1478, BH1479, BH1480, BH1481, BH1482, BH1483, BH1484, BH1485, BH1486, BH1487, BH1488, BH1489, BH1490, BH1491, BH1492, BH1493, BH1494, BH1495, BH1496, BH1497, BH1498, BH1499, BH1500, BH1501, BH1502, BH1503, BH1504, BH1505, BH1506, BH1507, BH1508, BH1509, BH1510, BH1511, BH1512, BH1513, BH1514, BH1515, BH1516, BH1517, BH1518, BH1519, BH1520, BH1521, BH1522, BH1523, BH1524, BH1525, BH1526, BH1527, BH1528, BH1529, BH1530, BH1531, BH1532, BH1533, BH1534, BH1535, BH1536, BH1537, BH1538, BH1539, BH1540, BH1541, BH1542, BH1543, BH1544, BH1545, BH1546, BH1547, BH1548, BH1549, BH1550, BH1551, BH1552, BH1553, BH1554, BH1555, BH1556, BH1557, BH1558, BH1559, BH1560, BH1561, BH1562, BH1563, BH1564, BH1565, BH1566, BH1567, BH1568, BH1569, BH1570, BH1571, BH1572, BH1573, BH1574, BH1575, BH1576, BH1577, BH1578, BH1579, BH1580, BH1581, BH1582, BH1583, BH1584, BH1585, BH1586, BH1587, BH1588, BH1589, BH1590, BH1591, BH1592, BH1593, BH1594, BH1595, BH1596, BH1597, BH1598, BH1599, BH1600, BH1601, BH1602, BH1603, BH1604, BH1605, BH1606, BH1607, BH1608, BH1609, BH1610, BH1611, BH1612, BH1613, BH1614, BH1615, BH1616, BH1617, BH1618, BH1619, BH1620, BH1621, BH1622, BH1623, BH1624, BH1625, BH1626, BH1627, BH1628, BH1629, BH163

Chemical Total Soil Laboratory Analysis

Representative soil samples from the topsoil, Made Ground and shallow natural soils will be obtained and scheduled for chemical analysis as part of the site investigation. Soil samples will be analysed for a general suite of contaminants as summarised below including Waste Acceptance Criteria (WAC), semi-volatile and volatile organic compound (SVOC and VOC) and polychlorinated biphenyls (PCB) tests in selected locations.

Table 2. Summary of Soil Contaminant Analysis (Each Sample)

Contaminant	Laboratory Limit of Detection (mg/kg)	Contaminant	Laboratory Limit of Detection (mg/kg)
Arsenic (aqua regia extractable)	1.0	Selenium (aqua regia extractable)	1.0
Antimony (aqua regia extractable)	1.0	Vanadium (aqua regia extractable)	1.0
Barium (aqua regia extractable)	1.0	Zinc (aqua regia extractable)	1.0
Beryllium (aqua regia extractable)	0.06	pH (pH Units)	+ / - 0.1
Boron - Water Soluble	0.2	Organic Matter (%)	0.1
Cadmium (aqua regia extractable)	0.2	Sulphate (as SO ₄) - Total	50
Chromium (aqua regia extractable)	1.0	Phenols - Total (monohydric)	1.0
Chromium - Hexavalent (NaOH extract)	1.8	Cyanide - Total and Free	1.0
Chromium - III	1.0	PAH - Speciated (WAC 17) including total	0.05
Copper (aqua regia extractable)	1.0	TPH : CWG including BTEX & MTBE	0.01 to 10
Lead (aqua regia extractable)	0.3	TPH (C6-C10/C10-C25/C25-C40)	Various
Mercury (aqua regia extractable)	1.0	Asbestos Screen (Made Ground only)	Not Applicable
Nickel (aqua regia extractable)	1.0	Asbestos Quantification (if ID positive) (%)	0.001
Moisture Content (%)	Not Applicable	Waste Acceptance Criteria	Various
SVOC and VOC	Various	PCB (WHO)	0.001

Chemical Leachate and Groundwater Laboratory Analysis

Representative soil and water samples from will be obtained and scheduled for chemical analysis as part of the site investigation. The samples will be analysed for a general suite of contaminants as summarised.

Table 3. Summary of Soil Leachate / Groundwater Contaminant Analysis (Each Sample)

Contaminant	Laboratory Limit of Detection (µg/l)	Contaminant	Laboratory Limit of Detection (µg/l)
Arsenic (dissolved)	1.0	Selenium (dissolved)	4.0
Calcium (dissolved) (mg/l)	0.012	Vanadium (dissolved)	1.7
Dissolved Organic Carbon (mg/l)	0.1	Zinc (dissolved)	0.4
Antimony (dissolved)	1.7	pH (pH Units)	+ / - 0.1

Contaminant	Laboratory Limit of Detection (µg/l)	Contaminant	Laboratory Limit of Detection (µg/l)
Barium (dissolved)	0.05	Sulphate as SO ₄ (mg/l)	0.03
Beryllium (dissolved)	0.2	Phenols - Total (monohydric) - Low Level	1.0
Boron (dissolved)	10	Cyanide - Total and Free	1.0
Cadmium (dissolved)	0.1	PAH - Speciated (EPA 16) including total	0.01
Chromium (dissolved)	0.4	TPH : (C6-C10/C10-C25/C25-C40)	10
Copper (dissolved)	0.3	Chromium - Hexavalent (dissolved)	5.0
Lead (dissolved)	1.0	Chromium - III	1.0
Mercury (Low Level) Dissolved	0.007	Selenium (dissolved)	4.0
Nickel (dissolved)	0.3	Vanadium (dissolved)	1.7
Hardness – Total (as CaCO ₃) (mgCaCO ₃ /l)*	1.0	Ammoniacal Nitrogen as N	15

*Water analysis only.

Ground Gas and Groundwater Monitoring

Ground gas and groundwater monitoring wells will be installed within selected cable/rotary boreholes and window sample boreholes to facilitate ground gas and groundwater monitoring of the Made Ground (and Alluvium, if deposits with suspected organic content are encountered). In addition, groundwater monitoring wells will be installed within selected cable/rotary boreholes and window sample boreholes within the superficial deposits and sandstone bedrock.

Where monitoring wells are installed within the Made Ground, the depths of the installations will be restricted to above the base of the Made Ground to prevent a potential pathway being created between the Made Ground and underlying natural soils.

A total of six ground gas and groundwater level monitoring rounds are proposed over a three month period following completion of the site works. Groundwater sampling is proposed to be carried out on two of the six occasions. In addition, the installation of five continuous monitoring groundwater loggers is proposed within the Principal aquifer within the sandstone bedrock for a minimum period of six months.

Prepared by Kirsty Poore MSc MSci (Hons) CGeol FGS ARSM ROGEP

Reviewed by Dan Matthews BEng CSci CEnv MEnvSc

Report Ref. 51019-CE-XX-XX-R-G-4001

Issued 20/02/24

Status P03 – Third Issue

This report is the copyright of Civic Earth and is for the sole use of the person/organisation to whom it is addressed. It may not be used or referred to in whole or in part by anyone else without the express agreement of Civic Earth. Civic Earth do not accept liability for any loss or damage arising from any unauthorised use of this report. Civic Earth is a trading name of Civic Earth Ltd (registered number 14897633), which is a limited company registered in England, registered address Carver's Warehouse, 77 Dale Street, Manchester M1 2HG.

© Civic Earth 2024