



Radcliffe Civic Hub, Radcliffe

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY REPORT



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Radcliffe Civic Hub, Radcliffe

Flood Risk Assessment & Drainage Strategy Report

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PREPARED BY JOHN SPEERS



Radcliffe Civic Hub, Radcliffe

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VINCI Construction UK - Radcliffe Civic Hub, Radcliffe



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Alan Johnston Partnership Ltd.

Company No. 13204766

Radcliffe Civic Hub, Radcliffe

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1.0 INTRODUCTION

This Flood Risk Assessment (FRA) and Drainage Strategy Report has been prepared on behalf of Vinci Construction UK in connection with the construction of a new multipurpose Radcliffe Hub building and the internal refurbishment of the existing market hall and market chambers buildings. The site is situated on the existing Radcliffe Market Hall site, which is located to the south of Dale Street, Radcliffe. Even though the total area of the proposed development is less than 1.0ha, a very small area of the site is located in Flood Zone 2 and therefore an FRA is required.

This FRA has been prepared in accordance with the general requirements of the National Planning Policy Framework and the associated Planning Practice Guidance, both published by the Department for Communities and Local Government. This involves the identification of flood risk to new development(s) on the site, the possible effect of this development on flood risk elsewhere and the investigation of the impact on the development as a result of increased sea levels, fluvial flows and larger pluvial events due to increased impermeable areas and climate change.

The purpose of this report is to present a site-specific assessment of flood risk based on available information, to identify relevant flood levels affecting the site with respect to a particular probability of flooding. The flood levels identified are dependent on the correctness of the current conditions, as stated in this report and the prediction of future climatic conditions implicit in the National Planning Policy Framework.

For any size of storm event, the procedure will always yield a probability that the event will occur in any year, albeit the probability is smaller for larger events. The predicted storm event has a probability of occurrence in any year and the derived flood level has an associated probability of exceedance. This means that there is always a risk that property flooding could occur one or more times in any year.

Therefore, this report should not be interpreted or relied upon as providing a guarantee against flooding. There is always a residual risk that flooding will occur and it is not possible to predict a zero risk of flooding.

In accordance with National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance, flood risk must be assessed for all sources including tidal (from the sea), fluvial (from rivers), pluvial (from land), groundwater, sewer and artificial water bodies (e.g., reservoirs, canals, major water supply infrastructure etc.).

More specifically, the development of any site must be carried out in such a way as to mitigate any potential flood risk, both on and off site from all sources of flooding.

The other purpose of this report is to present the surface water and foul water outline drainage strategies for the site which have been developed by the Alan Johnston Partnership. To demonstrate how the specific drainage requirements are to be met, the report should be read in conjunction with the relevant drawings and supporting information, included within the appendices.

The drainage strategies outlined within this report, have been prepared in accordance with BS EN 752:2017 (Drain and sewer systems outside buildings), Sewers for Adoption, Building Regulations Approved Document H (Drainage and waste disposal), the National Planning Policy Framework document (Department for Communities and Local Government, July 2021) and associated Planning Practice Guidance.



2.0 SITE DESCRIPTION

The site is situated on the current Radcliffe Market Hall site, which is located to the south of Dale Street, Radcliffe, at National Grid reference SD 78542 06952. The site location is illustrated in Appendix A and the extent of the area to which the application relates is shown on the enclosed aerial photo, attached in Appendix B.

The existing site covers a total area of 0.701ha with the proposed development area covering 0.508ha. The site currently comprises of the existing Radcliffe Market Hall and Market Chambers buildings, another existing building with retail units, the Bridge Tavern pub and hardstanding public open space. The site is bounded by Dale Street to the north and west, an existing car park to the south and the River Irwell to the east.

The site generally falls from north-east to south, with levels falling from approximately 67.00mAOD in the north-east to approximately 63.58mAOD in the south. An aerial photo is included in Appendix B to illustrate the site at the present day and a topographic survey is attached in Appendix C.

2.1 Geology

An intrusive site investigation was completed in August 2022 by ID GeoEnvironmental Limited and is contained within the GeoEnvironmental appraisal of land at Radcliffe Hub, Radcliffe, Report No. 5238-G-R001.

The site investigation report indicates that the underlying strata consists of made ground to depths of up to 1.8mbgl, which is underlain by glaciofluvial sheet deposits comprising mainly of sandy gravelly clays to depths of up to 5.2mbgl. Pennine Middle Coal Measures Formation bedrock, comprising of mudstone was proven to depths of up to 18.0mbgl with a thin band of coal around 13.2mbgl.

This is supported by the information taken from the British Geological Survey (BGS) 1:50,000 Bedrock geology maps. These show that the site has superficial deposits comprising of glaciofluvial sheet deposits, with bedrock reported to be of the Pennine Middle Coal Measures Formation comprising of mudstone, sandstone and siltstone.

2.2 Hydrogeology

The Environment Agency groundwater maps show that both the superficial deposits and the bedrock is classified as a Secondary A Aquifer, defined as permeable layers that can support local water supplies, and may form an important source of base flow to rivers.

The Environment Agency groundwater maps also indicate that the development site is not situated within a groundwater Source Protection Zone (SPZ).

The ID GeoEnvironmental Limited, Geoenvironmental Appraisal Report indicates that groundwater strikes were recorded as shallow as 1.33mbgl and these are recorded within the superficial deposits. However, there is also a second groundwater body recorded within the bedrock at depths of around 3.20mbgl. As such, the shallow groundwater body within the superficial deposits may be perched water, with the actual groundwater level found within the bedrock at depths of around 3.20mbgl but this should be confirmed by further investigations.

2.3 Hydrology

Adjacent to the development site runs the River Irwell. Despite this, the majority of the site is located within Flood Zone 1 which is categorized by the Environment Agency as land assessed as having less than a 1 in 1,000 annual probability of river flooding (1% - 0.1%). Therefore, the majority of the site is an area identified by the Environment Agency as at low risk of flooding from rivers and streams.

3.0 PROPOSED DEVELOPMENT

The entire site covers a total area of 0.701ha but some areas of the site will remain as per the existing scenario. These include the Radcliffe Market Hall and Market Chambers buildings, which covers a total area of 0.161ha and the Bridge Tavern Pub which covers a total area of 0.032ha.

As such, the Radcliffe Market Hall and Market Chambers buildings and the Bridge Tavern Pub areas will drain as per the existing scenario and therefore only the remaining 0.508ha area will be considered within the drainage strategy sections of this report.

The proposed development is to demolish the existing retail units building to the north of the site and replace it with the new Radcliffe Hub building and associated public open space areas. The development will also include the refurbishment of the existing Radcliffe Market Hall and Market Chambers buildings.

To enable a viable scheme, the proposed site levels are constrained by the existing developments and highways surrounding the site, therefore the site levels may be amended but are likely to remain similar to the existing in order to tie into the surrounding developments and highways. A proposed site plan is attached in Appendix D.

4.0 PLANNING POLICY

The National Planning Policy Framework (NPPF) sets out the Government's policy on meeting the challenges of climate change, flooding and coastal change. The NPPF states that:

"Planning plays a key role in helping shape places to secure radical reductions in greenhouse gas emissions, minimising vulnerability and providing resilience to the impact of climate change, and supporting the delivery of renewable and low carbon energy and associated infrastructure. This is central to the economic, social and environmental dimensions of sustainable development. Local planning authorities should adopt proactive strategies to mitigate and adapt to climate change taking full account of flood risk, coastal change and water supply and demand consideration."

This Flood Risk Assessment proposes recommendations to facilitate the proposed development so that it takes into account flood risk at all stages of the development.

4.1 Sequential and Exception Test

Based on the sites location which is mainly within Flood Zone 1 and only a very small area to the east located within Flood Zone 2, the development is deemed appropriate according to NPPF therefore the development is appropriately situated and the Sequential Test is not required.

4.2 Exception Test

NPPF classifies the development (leisure/shops) as a 'Less Vulnerable' development and as the site is located within Flood Zones 1 and 2, the development is deemed appropriate according to NPPF and therefore the Exception Test is not required.



5.0 FORMS OF FLOODING

The National Planning Policy Framework requires all forms of flooding to be considered.

5.1 Flooding from Rivers

The Flood Risk map is included as Appendix E.

As can be seen from the Flood Risk map, the majority of the site is located within Flood Zone 1 with a chance of flooding of less than 0.1% (or 1 in 1000) with only a very small area to the east of the site located within Flood Zone 2. Therefore, the Product 4 flood level data has been obtained from the Environment Agency and is also attached in Appendix E.

The Product 4 flood information provided by the Environment Agency indicates that the nearest flood node to the site is Node 3 and the highest flood level at Node 3 is the 1 in 1000 year undefended flood level of 62.70m AOD. Assessing the topographic survey, attached in Appendix C, it can be seen that the lowest level of the site is 63.58m AOD which is located adjacent to the north-west corner of the existing Market Chambers building.

As such, the lowest level of the site is 880mm above the highest flood level adjacent to the site. Therefore, it is concluded that the entire site is located above the highest flood level and as such, the risk of flooding from rivers is considered to be low.

This is further strengthened by the fact that the areas indicated as being located within Flood Zone 2 are outside the existing and proposed building areas, with only the existing highway, Blackburn Street and associated pedestrian areas located within Flood Zone 2.

Despite this, the existing basement areas of the proposed development are located below the flood levels. However, as this is an existing basement area which is to be refurbished, flood mitigation measures in the form of suitable waterproofing of the existing basement area would be satisfactory.

Therefore, the development team have employed a CSSW accredited waterproofing designer, Phil Hewitt Associates (PHA). They are involved with the design team to determine the requirements along with the existing building basement waterproofing strategy. The waterproofing system will be internal of the existing boundary wall and will be a combination of Type A & C systems. Please refer to PHA's waterproofing risk assessment, attached within Appendix K of this report.

The nearest designated main river is the River Irwell, which is located immediately east of the site boundary. Despite this, the risk of flooding to the new development from rivers is considered to be low.

5.2 Flooding from Sea

The site is not at risk of flooding from the sea. The lowest level of the site is approximately 63.58mAOD, i.e., well above tidal flood levels.

5.3 Flooding from Land

Intense rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems can run quickly off land and result in local flooding. The Surface Water Flooding map is included in Appendix E. It can be seen from the map that most of the site is classified as having a low or very low risk of surface water flooding.

A small section of land between the existing market hall building and retail building is classified as having high flood risk. Assessing the topo survey attached in Appendix C, it can be seen that this area is actually a low point when compared to the surrounding site levels.

However, these areas are to be reworked during the construction of the new Radcliffe Hub building and surrounding hard landscaping and therefore the levels within these areas will likely be amended to suit the new drainage network. These areas will also have sufficient new positive drainage to collect any surface water runoff.

Therefore, due to the likely amended levels and sufficient drainage systems (channel drains and gullies) these areas can be considered to be at low risk from flooding. Therefore,

the risk of flooding from overland flows due to surface water flooding is considered to be low and as such the overall site is considered to be at low risk of flooding from surface water/surrounding land.

5.4 Flooding from Groundwater

As outlined in Section 2.2, the GeoEnvironmental appraisal of land at Radcliffe Hub, Radcliffe, Report No. 5238-G-R001 showed a shallow groundwater body present between depths of 1.33mbgl and 4.15mbgl. However, as previously indicated this may actually be perched water.

From the groundwater vulnerability maps we can see that the site is located within an area with a low risk of groundwater flooding but due to the relatively shallow groundwater encountered during the site investigation it is envisaged that any existing or proposed basements should have suitable forms of waterproofing.

As outlined in Section 5.1, the development team have employed, CSSW accredited waterproofing designer, PHA. They are involved with the design team to determine the requirements along with the existing building basement waterproofing strategy. The waterproofing system will be internal of the existing boundary wall and will be a combination of Type A & C systems. Please refer to PHA's waterproofing risk assessment, attached within Appendix K of this report.

Given the overall low risk over the site area and the mitigation measure of waterproofing any basements, the site is considered to be at low risk of flooding from groundwater.

5.5 Flooding from Sewers

A record of Public Sewers surrounding and serving the development site has been obtained from United Utilities and this is included in Appendix F. As can be seen from the United Utilities sewer map, there are a number of public sewers located within the site.

The site also contains a series of private surface and foul water sewers which discharge into the aforementioned public sewers. These are indicated within the Utility Survey plans, which are attached within Appendix F.

However, as the public sewers are maintained by United Utilities and also the fact that the proposed drainage for the site will be suitably designed, leads to the conclusion that the site itself is considered to have a low risk of flooding from sewers.

5.6 Flooding from Reservoirs, Canals and Other Artificial Sources

The Reservoir Flood Risk map is included in Appendix E and the closest artificial waterbody is the Manchester, Bury and Bolton canal which is located approximately 600m north-west of the site. The nearest reservoir is Elton Reservoir which is located approximately 1.90km north of the site. As such, it can be seen from the map that the site is not at risk of flooding from reservoirs, canals or other artificial sources.

6.0 PROPOSED DEVELOPMENT

6.1 Effect of Proposed Development

As previously outlined in Section 3.0, the existing site covers a total area of 0.701ha but a total area of 0.193ha of the site will remain as per the existing scenario and will therefore drain as per the existing scenario.

Therefore, the 0.193ha areas to remain as per the existing scenario will be excluded from the remainder of this report, with only the 0.508ha development area being used to calculate the existing brownfield runoff rates and proposed surface water discharge rates.

The pre and post development impermeable areas for the 0.508ha development area have been assessed and are indicated on the attached drawing in Appendix G. The comparison between the pre and post development impermeable areas is also summarised below;

Total Development Site Area (ha)	Existing Impermeable Area (ha)	Proposed Impermeable Area (ha)
0.508	0.508	0.471

Given that there is a slight decrease in the total impermeable area, the proposed development will result in a slight reduction in the volume of impermeable areas and as such, the proposed development will lead to a small decrease in the

- ◆ Volume of surface water ponding on the site
- ◆ Volume of surface water runoff leaving the site or discharging into surrounding areas
- ◆ Peak discharge rate from the site

Accordingly, drainage systems are needed to drain the foul and surface water flows arising from the proposed development. Where possible, any existing drainage networks should be utilised. Appropriate design and construction of these systems as set out in Section 6.3 should ensure that there is no increase in offsite flood risk that would otherwise impact downstream areas.

6.2 Existing Drainage Systems

As can be seen from the United Utilities sewer maps attached in Appendix F, there are a number of public sewers located within the site boundary.

To the south-west of the proposed development there is a 450mm surface water sewer running underneath the existing car park towards the River Irwell. From the maps it appears to be draining the surrounding buildings including the highways and the existing market hall before being discharged via a headwall to the river Irwell. To the North is another surface water sewer also discharging in the River Irwell and draining the surrounding highways with a diameter of 1800mm running through the pedestrian area.

Running somewhat perpendicular to the surface water sewers are 2 combined water sewers. On the north side is a 750x1150mm concrete sewer travelling east to west picking up smaller combined sewers serving the minor roads off Dale street and Church Street

West. To the south of the development is a 375mm vitrified clay sewer passing through the proposed development and Radcliffe Market Hall which from the UU sewer maps appears to take the discharge west of site. A 300mm overflow pipe connects the 2 sewers running next to the 1800mm eventually discharging into the River Irwell during peak conditions.

As the 375mm combined sewer is running underneath the building footprint for the multi-unit building, it is proposed to redirect the public sewer around the new development. Further discussion with united utilities should be conducted to confirm the feasibility of the diversion.

As the area of proposed development is an active brownfield site there is the possibility of additional drainage on site not currently accounted for on an public sewer maps. As such a CCTV survey should be conducted on site prior to any detailed design or beginning of construction works. The exact details of the drainage and the possibility of utilising the existing drainage as an outfall should be explored throughout the detailed drainage design process.

6.3 Proposed Drainage Strategy

As outlined above in section 6.1, site-wide drainage systems are required to drain the foul and surface water flows arising from the proposed development. The proposed drainage systems must ensure that there is no increase in offsite flood risk that would otherwise impact downstream areas.

6.3.1 Surface Water Drainage

The Building Regulations - Approved Document H (2015) details a hierarchy of potential methods for disposing of surface water as shown below in order of preference:

- ◆ Discharge via infiltration
- ◆ Discharge to watercourse
- ◆ Discharge to sewer

Considering the hierarchy above, the surface water network for the retained area of the existing site should infiltrate where possible. As indicated in Section 2.1, an intrusive site investigation was completed in August 2022 by GRM and is contained within the GeoEnvironmental appraisal of land at Radcliffe Hub, Radcliffe, Report No. 5238-G-R001.

Although no soakaway testing was completed during the site investigation, it did indicate the presence of glaciofluvial sheet deposits. As these deposits are mostly clay, it can be concluded that infiltration is no possible.

As the possibility of infiltration has been ruled out by the site investigation, the intent for the development would be to discharge to a watercourse. As indicated in Section 5.1, the nearest watercourse is the River Irwell located immediately east of the site boundary.

Therefore, it is envisaged that the surface water runoff from the proposed development area will discharge into the watercourse to the east of site. As can be seen from the public sewer maps in Appendix F, a surface water sewer running north-west to south-east through

site discharges at a headwall beneath the bridge on Blackburn street. Public manhole UUMH5904 provides an optimal connection point for the proposed surface water network.

As the watercourse is a designated main river it is envisaged that discussions with the Environment Agency and Lead Local Flood Authority will be required to obtain the relevant permits to work near the watercourse and permits to discharge into the watercourse.

While every effort to use the existing systems should be made, the drainage systems should be designed to suit the proposed site layout and topography which aims to provide an efficient design.

In line with Sewers for Adoption (7th Edition), the requirements for the design of a new surface water drainage systems are as follows:

- ◆ Below ground piped drainage to be sized to accommodate the 1 in 2 year (50% AEP) design storm without surcharge.
- ◆ System to be designed not to flood any part of the site in a 1 in 30 year (3% AEP) design storm.
- ◆ For events in exceedance of the 1 in 30 year design storm and up to and including the 1 in 100 year event, site drainage and topography should be designed where practicable to route surface water run-off away from buildings to safe above-ground storage areas on site, thereby preventing this run-off from leaving the site and increasing flood risk elsewhere.

For each design case described above, the design storm is the critical storm duration for the site conditions. In the case of the 1 in 100 year design storm, a 40% increase in the peak rainfall intensity is applied to allow for the estimated worst case impacts of climate change. This is in accordance with advice, issued by the Environment Agency, which updates previous climate change allowances outlined in the National Planning Policy Framework.

Suitable systems of below ground drainage will be required to contain as a minimum requirement, the 1 in 30 year event. Additionally, any surface water run-off from events that exceed the design capacity of the new drainage system, up to and including the 1 in 100 year (+40%) event, will be retained on-site in safe storage areas.

In line with common practice, it is proposed the surface water discharge from the proposed development should mimic that from the existing site.

As the existing site is a brownfield site, Bury Metropolitan Borough Council will require the proposed water runoff to be restricted to at least a 50% betterment over the existing rates.

Using a pre development area of 6141m² as shown in Appendix G, an assessment of the existing surface water run-off from the brownfield site has been completed using a three pipe network within Micro Drainage. For the existing 0.614ha site, the existing brownfield run-off rates were calculated. The brownfield runoff assessment is attached in Appendix H and the results are summarized within the table below.

Rainfall Return Period (years)	Existing Brownfield Runoff Rate (L/s)
2 Year	74.9
30 year	135.6
100 year	169.0

As such, applying a 50% reduction to comply with Bury Metropolitan Borough Council, the maximum surface water discharged rate for the entire site is 32.4 L/s.

As seen in from the Outline Drainage Strategy Drawing attached in Appendix J, it is anticipated that the attenuation storage will be provided in the form of a tubosider and the surface water drainage network itself with a vortex flow control device used to restrict the discharge rate to the required brownfield runoff rates indicated above. A tubosider has been chosen over an attenuation tank given the layout of the building and the frequency of pile caps amongst the foundations.

The surface water drainage calculations have also been included within Appendix J and as can be seen the proposed surface water drainage and attenuation storage prevent any flooding for all rainfall events up to and including the 1 in 100 year + 40% climate change event and also meet the brownfield discharge restrictions above. This is summarised in the table below.

Rainfall Return Period (years)	Existing Brownfield Runoff Rate (L/s)	Proposed Discharge Rate (L/s)	Percentage Betterment (%)
Qbar (2 Year)	74.9	32.1	51
30 year	135.6	42.3	70
100 year	169.0	52.6	70

As can be seen from the Outline Drainage Strategy Drawing attached in Appendix J, the surface water drainage collects the runoff from the site via rainwater downpipes, linear drainage channels and gullies to and conveys the surface water runoff to the public surface water manhole within the site boundary.

The runoff discharges into the public manhole then subsequently the River Irwell via a flow control chamber which restricts the runoff to the watercourse to the required brownfield 50% betterment discharge rates, for all rainfall events up to and including the 1 in 100 year +40% climate change event.

As well as drainage for the proposed building, the existing pub within the site boundary will still need to be drained. Proposed manhole SW14 has been located on the south side of the existing building as is to connect to the existing network. CCTV surveys will be required to determine exact outfall positions and SW14 is subject to relocation. The 100

year storage and hydrobrake have both been upsized to accommodate the increase in impermeable areas for the network to drain.

The surface water drainage strategy and discharge rate should be confirmed via more detailed discussions with Bury Metropolitan Borough Council and Environment Agency prior to the commencement of any works.

6.3.2 SuDS Summary

As outlined within the summary table below, all SuDS techniques have been considered for this development;

SuDS Technique	Suitable for This Development?	Reasoning
Green Roof	✗	Not suitable due to minimal roof area.
Rainwater Harvesting	✗	Impractical due to lack of demand for greywater.
Basins & Ponds	✗	Not suitable due to the location of the proposed development.
Filter Strips & Swales	✗	Not suitable due to the location of the proposed development.
Bio-retention Areas	✗	Unsuitable due to lack of available areas.
Infiltration Techniques	✗	Unsuitable due to impermeable strata.
Permeable Surfaces	✗	Unsuitable due to impermeable and limited space to put them.
Tanked/Piped Systems	✓	Suitable and incorporated.

Green roof areas have been considered but due to numerous reasons, such as; areas of plant, maintenance access and increased materials cost associated with heavier roof loads, the use of green roofs has been discounted.

Rainwater harvesting was also considered but due to a lack of greywater demand and the cost associated with tanks and pumping of the separate system, it has been deemed as impractical to include a rainwater harvesting system.

Due to the limited space available outside the footprint of the proposed building as well layout of the site and the presence of the existing pub on site, basins and ponds have been deemed unsuitable. For similar reasons filter strips and swales have been ruled out as a impractical.

Bio-retention areas have been discounted across the site, due to a lack of available areas to construct tree pits or rain gardens.

As previously discussed in Section 6.3.1 infiltration is not feasible across the site and therefore the use of infiltration SuDS techniques is not possible. The use of non-infiltration permeable surfaces such as permeable paving was considered within the car park areas but as these areas are to be drained via filter drains the use of permeable paving has been discounted.

Finally the use of oversized pipe and a below ground tubosider have been incorporated to store runoff during the 100 year +40% climate change storm event.

6.3.3 Water Quality Assessment

Managing the water quality of the surface water runoff from the proposed development is important to ensure that the receiving surface waters or groundwater are well protected. Generally, this can be achieved through the use of well-designed SuDS systems which provide treatment and pollution removal to the surface water runoff.

Standard S3 of the Statutory National Standards for Sustainable Drainage Systems (2018) details the water quality management and addresses the drainage design requirements to minimise the potential pollution risk.

As the proposed development does not consist of any areas of land classified as being a pollution hazard, mitigation indices are not required and as such complies with the water quality requirements of Standard S3 of the Statutory National Standards for Sustainable Drainage Systems (2018).

6.3.4 Foul Water Drainage

Foul water drainage disposal is set out in Part H of the Building Regulations in order of priority the preferred methods are;

1. Public sewer
2. Septic tank
3. Cesspool

The foul water system shall be designed in accordance with;

- ◆ BS EN 752:2017 (Drain and sewer systems outside buildings)
- ◆ Sewers for Adoption (7th Edition)
- ◆ Planning Practice Guidance and the National Planning Policy Framework document (Department for Communities and Local Government, July 2021).
- ◆ BS EN 12056-2:2000 (Drainage systems inside buildings)
- ◆ Building Regulations Approved Document H, Drainage and waste disposal. (Office of the Deputy Prime Minister, December 2015).

As can be seen from the Outline Drainage Strategy Drawing attached in Appendix J, the foul water drainage collects the runoff from the building and discharges at multiple points.

Foul drainage sourcing from changing rooms and toilets around the centre of the development discharge into public combined manhole UUMH5921 so the south of site. Here the foul water discharges into the proposed combined water drainage diversion as further discussed in Section 6.3.5.

Foul drainage sourcing from the east side of the proposed building is to discharge into proposed combined manhole CW01. This manhole is to be located on the existing combined sewer running southwards between the proposed building and Radcliffe Market Building. Similarly to the surface water drainage, foul water from existing pub will need to be taken into the proposed network. CCTV surveys will be required to determine exact outfall positions and proposed foul manhole FW15 is subject to relocation.

As the swimming pool undercroft is 4m lower than the FFL of the building, the foul drainage servicing that area is lower than the inlet levels of the combined sewer it is discharging into. As a result a pump chamber is required. Foul drainage is pumped from an invert level of 59.800mAOD in FW01 to 61.100mAOD FW02 before it discharges via gravity into the proposed combined water diversion.

The foul water drainage strategy and unrestricted discharge rate should be confirmed via more detailed discussions with Bury Metropolitan Borough Council and United Utilities prior to the commencement of any works.

6.3.5 Public Combined Water Drainage Diversion

As can be seen on the public sewer maps and the proposed drainage strategy, a combined sewer runs in between the site and the existing Radcliffe market building. Given the new layout of the proposed development, public combined manhole UUMH5909 and the pipes connected to it will be displaced by the new foundations. Complications may also arise at the FFL of the swimming pool undercroft is around 0.5m higher than the existing combined drainage.

Therefore, it is envisioned that the existing pipes and manhole underneath the new building are to be abandoned and a diversion running around the building be constructed. The new sewer will follow the outline of the proposed development; starting at public combined manhole UUMH5921 and finishing at proposed combined manhole CW05 before continuing the existing path. The location of the diversion can be seen on the outline drainage strategy in Appendix J.

In order for this diversion to be approved, a section 185 agreement as well as the necessary drawings will need to be filed. Further discussions with united utilities will need to be carried out prior to any works.

7.0 FUTURE MANAGEMENT & MAINTENANCE

The proposed drainage solution uses SUDS techniques in accordance with the CIRIA SUDS Manual C753. The surface water run-off from the proposed development is restricted using a vortex flow control device and the attenuated run-off is stored using a below ground cellular attenuation tank.

It is envisaged that the following components have been or will be included within the drainage strategy for the proposed development:

- ◆ Inspection chambers, manholes and catchpits.
- ◆ Pipes.
- ◆ Drainage channels and gullies.
- ◆ Vortex flow control device.
- ◆ Tubosider attenuation tank

A suitable maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented. It is assumed that the proposed drainage will remain private and therefore maintenance of the surface and foul water drainage systems will be the responsibility of Vinci Construction/ Bury Metropolitan Borough Council or an on-site facilities management team and therefore a copy of the final construction drainage layout should be provided in the final Operations and Maintenance Manual.

As such, the maintenance of the specified SuDS should be included within the developments Operation and Maintenance Manual and should be detailed in accordance with the CIRIA SuDS Manual C753, as per the operation and maintenance guidance outlined below.

7.1 General Maintenance & Inspection Requirements

- ◆ No work shall be carried out on the drainage system without permission from a nominated person who has access to information/a working knowledge of the system.
- ◆ Maintenance/inspection work shall be carried out in a safe/planned manner.
- ◆ All work is to be carried out by competent persons suitably trained and equipped in accordance with current statutory safe working policies.
- ◆ Entry into confined spaces shall be kept to a minimum and be restricted to suitably qualified/equipped persons working in accordance with current statutory safe working policies.
- ◆ Drainage systems shall be inspected on a regular basis or should any problems be suspected. Any debris/defects discovered shall be recorded and a programme of cleaning/ repair initiated. Urgent repairs/cleaning shall be actioned as soon as practicable.
- ◆ It is recommended that the drainage system is inspected as a minimum twice a year, with the system also being inspected after any major storm event.
- ◆ Clearing of the drainage system can be achieved by a number of methods depending on the nature of the work;
 - Rodding - Manual/Mechanical with flexible rods.
 - Jetting - High pressure water jetting.
 - Plunging.

7.2 Inspection Chambers, Manholes and Catchpits

The appropriate health and safety equipment must be used when accessing manholes/catchpits. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained from the Maintenance Manager prior to any access. The following operations should be carried out annually.

- ◆ Covers of inspection chambers and manholes shall be removed and the sides, benchings and channels cleared.
- ◆ Accumulated deposits of silt in inspection chambers, catchpits and manholes shall be removed. Any traps shall then be plunged and thoroughly flushed out with clean water. This should be completed in Autumn, after leaf fall.
- ◆ Main and branch drains shall be cleared as required and afterwards be flushed with clean water. Any obstructions found shall be removed and not flushed down the system.
- ◆ Covers of inspection chambers, manholes and catchpits shall be replaced, bedded in suitable grease or other sealing material as required and bolted/locked down as appropriate. Missing bolts and broken items shall be replaced in accordance with the manufacturer's details.

7.3 Pipes

Regular inspection and maintenance are important to identify areas which may have become obstructed/clogged and may not be draining correctly, as failure to do so would expose the development to a greater level of flood risk.

Pipes are proprietary products and therefore the materials used can vary across the site. As such, where used the manufacturer's recommendations should be followed. Access for maintenance of the pipes is provided through inspection chambers and manholes. The below table sets out the maintenance schedule for the pipe components of the proposed drainage systems.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect for evidence of poor operation via water levels. If required take remedial action.	Monthly for 3 months, then six-monthly intervals. Also, 48 hours after large storms.
	Check and remove large debris and/or vegetation growth near pipe runs.	Monthly or as required.
Remedial Actions	Rod through poorly performing runs as initial remediation.	As required.
	If continued poor performance jet and CCTV survey poorly performing runs.	As required.
	Seek advice as to remediation techniques suitable for the type of performance issue.	As required, if above actions do not improve performance.
Monitoring	Initial Inspection should be provided as post construction CCTV survey.	N/A
	Inspect/check all inlets, outlets and overflows to ensure they are in good condition and operating as designed.	Monthly for 3 months, then six-monthly intervals. Also, 48 hours after large storms.

7.4 Drainage Channels and Gullies

Channels and gullies should be inspected and cleaned in accordance with the manufacturer's details. Channel units can be cleaned through the use of a high-pressure hose; this can be fed into the channel system through access units strategically placed along the channel run. The throat section of channel units should be kept clear at all times to ensure uninterrupted flow of surface water into the drainage channel and any debris within the throat should be removed.

Locking bolts should be replaced and sufficiently tightened, taking care that the bolt heads do not stand above the top surface of the cover or grate. If covers are allowed to move within their frame, this may cause damage to the frame or seating. The below table sets out the maintenance schedule for the drainage channel and gullies components of the proposed drainage systems.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Litter and debris removal.	Monthly or as required.
	Check and remove large debris and/or vegetation growth near pipe runs.	Monthly or as required.
	Inspect for evidence of poor operation and/or weed growth. If required take remedial action. Inspect silt accumulation rates and establish appropriate brushing frequencies.	Monthly for 3 months, then six-monthly intervals. Also, 48 hours after large storms.
Remedial Actions	Inspect access/outlet boxes and rod through poorly performing channels and outlets as initial remediation.	As required.
	Seek advice as to remediation techniques suitable for the type of performance issue.	As required, if above actions do not improve performance.
Monitoring	Initial Inspection including channel outlet boxes and gully sumps.	Monthly for 3 months, then six-monthly intervals. Also, 48 hours after large storms.

7.5 Vortex Flow Control Device

Regular inspection and maintenance is important to identify if the vortex flow control device has become obstructed/clogged and may not be functioning correctly, as failure to do so would expose the development to a greater level of flood risk.

Vortex flow control devices are proprietary products and therefore can vary from manufacturer to manufacturer. As such, where used the manufacturer's recommendations should be followed.

- ◆ Normally, little maintenance is required as there are generally a vortex flow control device has no moving parts.
- ◆ If blockages occur, they tend to do so at the intake of the vortex flow control device.
- ◆ Vortex flow control devices are generally fitted with a pivoting by-pass door, which allows the manhole chamber to be drained down should blockages occur.
- ◆ The smaller type conical units, below the minimum recommended size, are also supplied with rodding facilities or vortex suppressor pipes as standard.

- Following installation of the vortex flow control device it is vitally important that any extraneous material i.e., Building materials are removed from the unit and the chamber.
- After the system is made live, it is recommended that each unit be inspected monthly for three months and thereafter at six monthly intervals with hose down if required. Units should also be inspected within 48 hours after large storms.

7.6 Tubosider Attenuation Tank

Although tubosiders are designed to require no maintenance, it's key to identify if the inlets/outlets have become obstructed/clogged and may not be functioning correctly, as failure to do so would expose the development to a greater level of flood risk.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required take remedial action	Monthly for 3 months, then annually.
Remedial Actions	Repair/rehabilitate inlet, outlet, access chamber and vent	As required.
Monitoring	Inspect inlet, outlet, access chamber and vent to ensure that they are in good condition and operating as designed.	Annually



8.0 CONCLUSIONS

- ◆ The site is located within Flood Zone 1 with a low probability of flooding from all sources.
- ◆ The existing basement areas of the proposed development are located below the flood levels. However, as this is an existing basement area which is to be refurbished, flood mitigation measures in the form of suitable waterproofing of the existing basement area would be satisfactory.
- ◆ The development team have employed a CSSW accredited waterproofing designer, Phil Hewitt Associates (PHA). They are involved with the design team to determine the requirements along with the existing building basement waterproofing strategy. The waterproofing system will be internal of the existing boundary wall and will be a combination of Type A & C systems.
- ◆ GeoEnvironmental appraisal of land at Radcliffe Hub, Radcliffe, Report No. 5238-G-R001 indicated that the ground composition contained predominantly clay and as such has been concluded that infiltration is not suitable.
- ◆ Therefore, it is envisaged that the surface water runoff from the proposed development area will discharge into the watercourse, River Irwell, immediately east of site.
- ◆ The surface water discharge is to be restricted to 50% betterment over the existing brownfield runoff rates, for all rainfall events up to and including the 100 year plus 40% climate change design storm, to comply with LLFA requirements. The proposed surface water drainage design meets this criteria and also ensures there is no flooding for all rainfall events up to and including the 100 year plus 40% climate change design storm.
- ◆ The foul water drainage is to discharge into the existing United Utilities public combined water sewers to the south of site via gravity. It is anticipated that the foul water can discharge into the public sewer at unrestricted rates.
- ◆ The surcharged runoff is to be restricted using a vortex flow control device and the surcharged runoff attenuated using the proposed surface water drainage network itself and also a tubosider located beneath the proposed building.
- ◆ The existing combined water sewer towards the south of site is to be diverted around the new proposed building. This will require a Section 185 agreement as well as further correspondence with United Utilities.
- ◆ The existing pub and beer garden is to drain as per the existing scenario with stub connections so that it can discharge into the new private proposed drainage network.

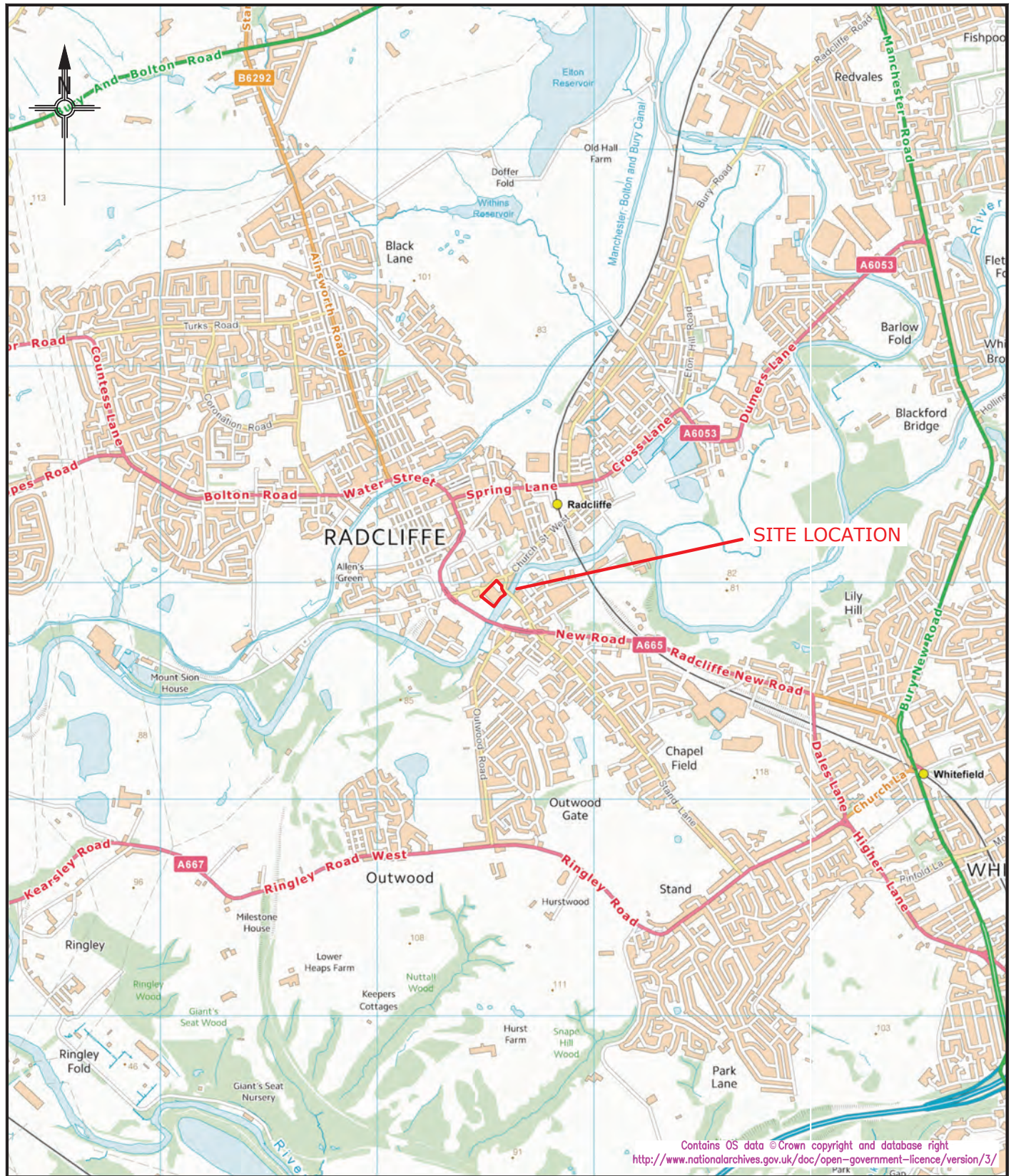
- ◆ The external ground levels around proposed buildings shall fall away from the proposed building with any new levels being designed to ensure any overland flood routes, for events in excess of the 100 Year + 40% CC, exit towards the surrounding highways, for use in exceptional circumstances.



9.0 RECOMMENDATIONS

- ◆ Further discussions with United Utilities should be conducted in regards to the diversion of the combined water sewer due south of site. A section 185 agreement as well as the accompanying drawings should be submitted and agreed prior to the commencement of any works.
- ◆ The surface water drainage strategy and discharge rate should be confirmed via more detailed discussions with Bury Metropolitan Borough Council and Environment Agency prior to the commencement of any works.
- ◆ The foul water drainage strategy and unrestricted discharge rate should be confirmed via more detailed discussions with Bury Metropolitan Borough Council and United Utilities prior to the commencement of any works.
- ◆ Flow rates for both foul and surface water sewers should be obtained from the existing pub to confirm capacity requirements. A CCTV survey should also be conducted to confirm the size and location of the outfalls.

Appendix A – Site Location Plan



iD GeoEnvironmental Limited

www.id-geo.co.uk
 Caledonian House, Tatton Street
 Knutsford, Cheshire, WA16 6AG

email: info@id-geo.co.uk
 Tel: 01565 755557
 Fax: 01565 740263

CLIENT

BURY COUNCIL

JOB TITLE

RADCLIFFE HUB

DRAWING TITLE

SITE LOCATION PLAN

DRAWN BY

MJ

SIGNATURE

DATE

26/11/21

STATUS

APPROVED

BRB

SIGNATURE

DATE

26/11/21

SCALE

1:25,000@A4

DRG No.

5238-G-D001

Appendix B – Aerial Photograph



Appendix C – Topographic Survey



Survey Notes

Grid: Local Plane Grid Fixed to National Grid at Survey Control Station SC2

Levels: OS Datum from GNSS positioning converted using the National Geoid Model OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS	GENERAL INFORMATION
Building	Petrol Pump
Open Area	Basement Light
Run	Footbridge
Passage	Dish Type Channel
Wall with Height	Spot Type Channel
Retaining Wall	Grate Type Channel
	Tactile Paving
	Crown Barrier
	Column
	Stanchion
	Car Vacuum
	Official Tilt
	Air Valve
	Trough
	Chimney
	Telephone Call Box

FENCE STYLES AND DESCRIPTIONS	OVERHEAD FEATURES
Close Boarded	Electricity Pylon
Corrugated Iron	Electricity
Chainlink Paving	Telephone
Chainlink	
Hemlock	
Miscellaneous	
Post & Chain	
Post & Roll	
Post & Wire	
Wire mesh	
Gate	
Fence Insetly	

ROADS	WATER FEATURES
Kerbs	Canal
Edge of Surfacing	Stream
Pedestrian Crossing	Ditch
Track	Weir
Footpath	Culvert
	Drain (Land Drain)
	Spring

STREET FURNITURE	RELIEF AND VEGETATION
Balustrade Beacon	Edge of wood/Bushes
Bus Stop	Stump
Cable Eye	Individual Tree
Cool Chute	Slopes with Height Greater than 1m
Closed Circuit TV	Cliff Face
Drain	Reeds
Electricity Pole	
Flood Light	
Flag Staff	
Lamp Post	
Letter Box	
Name Plate (street)	
Measuring Ring	
Mile Post or Mooring Post	
Service Marker	
Mile Stone	
Post	
Precision Meter	
Reflector Post	
Riding Eye	
Road Sign	
Speed Camera	
Information Sign	
Shop	
Traffic Light	
Telegraph Pole	
Traffic Light Push Button Post	
Traffic Light Control	
Control Box	
Eave Level	
British Telecom Box	
Electricity Box	
Gas Box	

INSPECTION CHAMBERS AND PIPES
Inspection Cover (Dew)
Manhole
British Telecom Cover
Inspection Cover (Comms)
Inspection Cover Traffic Signals
Gully
Kerbs Outlet
Vent Pipe
Down Pipe
Rain Water Pipe
Soil Pipe
Gas Pipe
Unable to lift cover
Stop Top
Stop Valve
Longhole
Hydrant
Cott's Hole
Gas Valve
Water Meter
Washout
Riding Eye

LEVEL AND HEIGHT INFORMATION

Standard Spot Height	+123.45
Precision Spot Height	+123.456
Bed Level	+BL23.92
Water Level	+WL24.92
Soft Level	+SL25.92
Threshold Level	+TH26.98
Cover Level	+CL28.45
Invert Level	+IL28.15
Pipe Soft Level	+PSL3.00
Floor Level	+FL6.00
Finished Floor Level	+FFL6.00
Top of Wall Level	+TWL7.00
Eave Level	+EL7.00
Ridge Level	+RL9.00
Roof Hip Level	+RH8.50
Flat Roof Level	+FR7.00
Top of Canopy Level	+TOP7.20
Window Sill Level	+WSF7.00
Underline of Canopy Level	+USL6.50
Window Head Level	+WH9.00
Spring Level	+SL8.50
Ash Level	+AL7.00
Cable Level	+CL8.55
Top of Wall Level	+TWL10.00
Underline of Beam Level	+UBL8.55
General Height	+H9.00

SURVEY INFORMATION SIGNS

Permanent Ground Marker	
O.S. Trig Station	
O.S. Bench Mark	

GEOTECHNICAL INFORMATION

Borehole	
Top Pin	
Monitor Pin	
Probe Hole	
Window Sample	

Rev.	Date	Description
A	25/02/22	Additional survey

MALCOLM HUGHES

CHARTERED LAND SURVEYORS

65 Cross Street, Sale, Manchester
M33 7HF, Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mh.co.uk

Accreditations

Client

VINCI CONSTRUCTION UK LTD

DITTON ROAD, WIDNES

CHESHIRE, WA8 0PG

Project

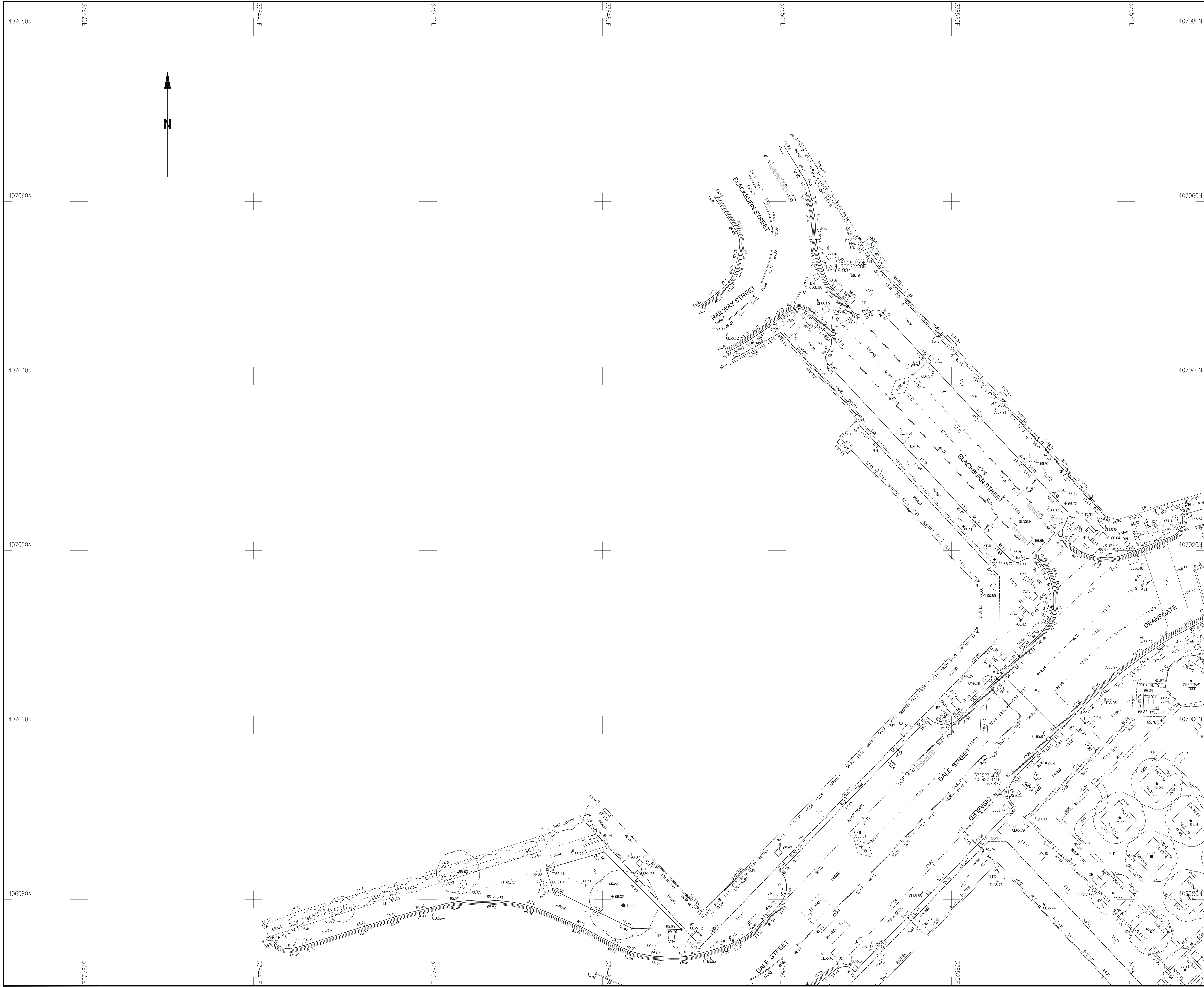
RADCLIFFE HUB

Drawing Title

TOPOGRAPHICAL SURVEY

Sheet 1 of 3

Drawn By	AW	24/12/21	Survey Date	December 2021
Checked by	EAD	23/12/21	Scale	A1@1:200
Drawing No	57969 / 1		Revision	A



Survey Notes

Grid: Local Plane Grid Fixed to National Grid at Survey Control Station SC2

Levels: OS Datum from GNSS positioning converted using the National Geoid Model OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS	GENERAL INFORMATION
Building Building Open Sided Ruin Passage Wall with Height Retaining Wall	Petrol Pump Basement Light Footbridge Dish Type Channel Slot Type Channel Grate Type Channel Tactile Paving Crown Barrier Column Car Vacuum Air Valve Trough Chimney Telephone Call Box
FENCE STYLES AND DESCRIPTIONS	OVERHEAD FEATURES
Close Boarded Corrugated Iron Chainlink Hendral Interwoven Iron Railings Lattice Miscellaneous Post & Chain Post & Rail Post & Wire Post & Barbed Wire Wire mesh Gate Fence Insetstyle	Electricity Pylon Electricity Telephone
ROADS	WATER FEATURES
Kerbs Edge of Surfacing Pedestrian Crossing Track Footpath	Canal Stream Ditch Weir Culvert Dip (Land Drain) Spring
STREET FURNITURE	RELIEF AND VEGETATION
Beltina Beacon Bus Stop Cable Eye Cool Chute Drain Electricity Pole Flag Staff Lamp Post Letter Box Name Plate (street) Mast Mile Post or Mooring Post Mile Stone Post Paving Meter Reflector Post Reading Eye Road Sign Speed Camera Information Sign Shop Traffic Light Telegraph Pole Traffic Light Push Button Post Traffic Light Control Control Box British Telecom Box Electricity Box Gas Box	Hedge Edge of wood/Bushes Stump Individual Tree Slopes with Height Greater than 1m Cliff Face Marsh Reeds
INSPECTION CHAMBERS AND PIPES	LEVEL AND HEIGHT INFORMATION
Inspection Cover (Dew) Manhole British Telecom Cover Inspection Cover (Comms) Inspection Cover Traffic Signals Kerbs Outlet Vent Pipe Down Pipe Rain Water Pipe Soil Pipe Gas Pipe Unstable to lift cover Stop Top Stop Valve Longhole Hydrant Cott's Hole Gas Valve Water Meter Washout Reading Eye	Standard Spot Height Precision Spot Height Bed Level Water Level Soft Level Threshold Level Cover Level Invert Level Pipe Soft Level Floor Level Finished Floor Level Ridge Level Eave Level Top of Tank Level Roof Hip Level Flat Roof Level Top of Canopy Level Underside of Canopy Level Window Sill Level Window Head Level Spring Level Arch Level Cable Level Top of Wall Level Under of Beam Level General Height
SURVEY INFORMATION SIGNS	GEOTECHNICAL INFORMATION
Permanent Ground Marker O.S. Trig Station O.S. Bench Mark	Borehole Trap Pit Monitor Pin Probe Hole Window Sample

Rev.	Date	Description
A	25/02/22	Additional survey

MALCOLM HUGHES

CHARTERED LAND SURVEYORS

65 Cross Street, Sale, Manchester
M33 7HF, Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mhhs.co.uk

Accreditations

RICS THE SURVEY ASSOCIATION ICES

Client

VINCI CONSTRUCTION UK LTD
DITTON ROAD, WIDNES
CHESHIRE, WA8 0PG

Project

RADCLIFFE HUB

Drawing Title

TOPOGRAPHICAL SURVEY
Sheet 2 of 3

Drawn By AW **24/12/21**

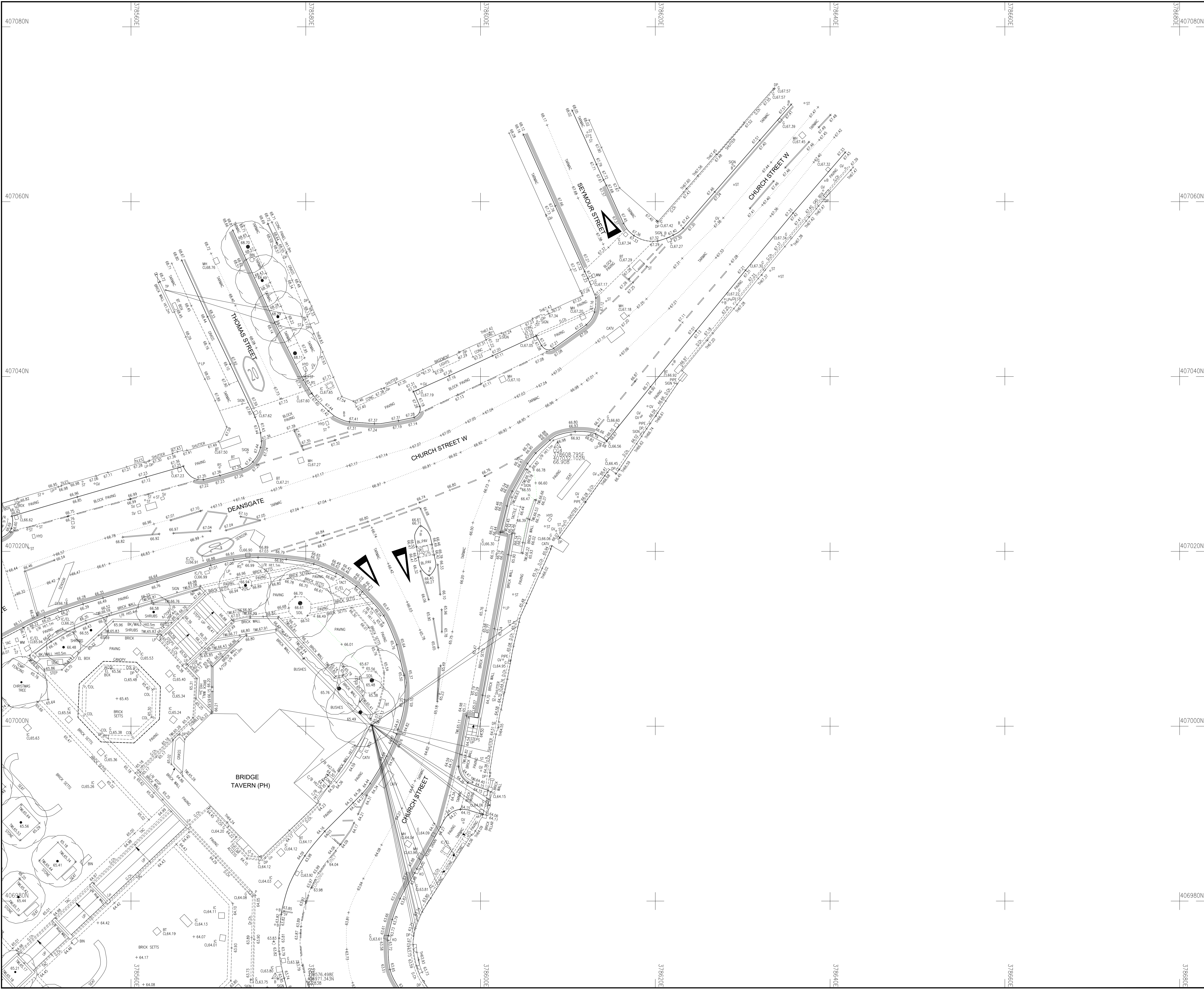
Checked by EAD **23/12/21**

Drawn No 57969 / 2

Survey Date December 2021

Scale A1@1:200

Revision A



Survey Notes

Grid: Local Plane Grid Fixed to National Grid at Survey Control Station SC2

Levels: OS Datum from GNSS positioning converted using the National Geoid Model OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS	GENERAL INFORMATION
Building	Petrol Pump
Open Space	Basement Light
Ruin	Footbridge
Passage	Drain Type Channel
Wall with Height	Stat Type Channel
Retaining Wall	Grate Type Channel
	Tactile Paving
	Cross Barrier
	Column
	Stanchion
	Car Vacuum
	Off-set
	Air Valve
	Trough
	Chimney
	Telephone Call Box

FENCE STYLES AND DESCRIPTIONS

Close Boarded	C/B
Corrugated Iron	C/I
Chainlink	C/P
Horizontal	H/R
Interweave	W/I
Iron Railings	I/R
Lattice	L/F
Miscellaneous	M/C
Post & Chain	P/C
Post & Rail	P/R
Post & Wire	P/W
Post & Barbed Wire	B/W
Wire mesh	W/M
Gate	
Fence Inset	

ROADS

Kerbs	
Edge of Surfacing	
Pedestrian Crossing	
Track	
Footpath	

STREET FURNITURE

Beltina Beacon	BB
Bus Stop	BS
Blind	BL
Call Eye	CE
Cool Chute	CC
Closed Circuit TV	CCTV
Drain	DR
Electricity Pole	EP
Flood Light	FL
Flag Staff	FS
Lamp Post	LP
Letter Box	LB
Name Plate (street)	NP
Mast	MA
Mile Post or Mooring Post	MP
Service Marker	MS
Mile Stone	MS
Post	P
Parking Meter	PM
Reflector Post	RP
Road Sign	RS
Speed Camera	SC
Information Sign	SIGN
Stop	ST
Traffic Light	TL
Telegraph Pole	TP
Traffic Light Push Button Post	TLP
Traffic Light Control	TLCP
Control Box	CB
British Telecom Box	BT BOX
Electricity Box	EL BOX
Gas Box	GAS BOX

INSPECTION CHAMBERS AND PIPES

Inspection Cover (Duc)	IC
Manhole	MH
British Telecom (Comms)	BT/COM
Cable TV	CATV
Inspection Cover Traffic Signals	IC/TL
Gully	G
Kerbs Outlet	KO
Vent Pipe	VP
Down Pipe	DP
Rain Water Pipe	RWP
Soil Pipe	SP
Gas Pipe	G-PIPE
Unusable to lift cover	UTL
Stop Tap	ST
Stop Valve	SV
Longhole	LH
Hydrant	HD
Catch Rod	CR
Gas Valve	GV
Water Meter	WM
Washout	WO
Road Sign	RS

OVERHEAD FEATURES

Electricity Pylon	LP1, ON
Electricity	EL
Telephone	OTL

WATER FEATURES

Canal	Canal
Stream	Stream
Ditch	Ditch
Weir	Weir
Culvert	Culvert
Gip (Land Drain)	Gip
Spring	Spring

RELIEF AND VEGETATION

Hedge	Hedge
Edge of wood/Bushes	Edge of wood/Bushes
Stump	Stump
Individual Tree	Individual Tree
Slopes with Height Greater than 1m	Slopes with Height Greater than 1m
Cliff Face	Cliff Face
Marsh	Marsh
Reeds	Reeds

LEVEL AND HEIGHT INFORMATION

Standard Spot Height	+123.45
Precision Spot Height	+123.456
Bed Level	+BL23.92
Water Level	+WL24.92
Soft Level	+SL25.92
Threshold Level	+TH26.98
Cover Level	+CL28.45
Invert Level	+IL28.15
Pipe Soft Level	+PSL5.00
Floor Level	+FL6.00
Finished Floor Level	+FFL6.00
Top of Trench	+TT7.00
Eave Level	+EL7.00
Ridge Level	+RL8.00
Roof Hip Level	+RH8.50
Flat Roof Level	+FRL7.00
Top of Canopy Level	+TOP/CT.00
Underside of Canopy Level	+SOF/CO.50
Window Sill Level	+WSL8.00
Window Head Level	+WHL9.00
Spring Level	+SPL8.50
Arch Level	+AL7.00
Cable Level	+CL8.55
Top of Wall Level	+TWL10.00
Underside of Beam Level	+UBL5.55
General Height	+H9.00

SURVEY INFORMATION SIGNS

Permanent Ground Marker	PGM
O.S. Trig Station	OS
O.S. Bench Mark	BM

GEOTECHNICAL INFORMATION

Borehole	BH
Test Pit	TP
Monitor Pin	MP
Probe Hole	PH
Window Sample	WS

Rev.	Date	Description
A	25/02/22	Additional survey

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ISO 9001 **ISO 14001**

Client

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CHESHIRE, WA8 0PG

Project

RADCLIFFE HUB

Drawing Title

TOPOGRAPHICAL SURVEY
Sheet 3 of 3

Drawn By

AW

24/12/21

Checked by

EAD

23/12/21

Survey Date

December 2021

Scale

A1@1:200

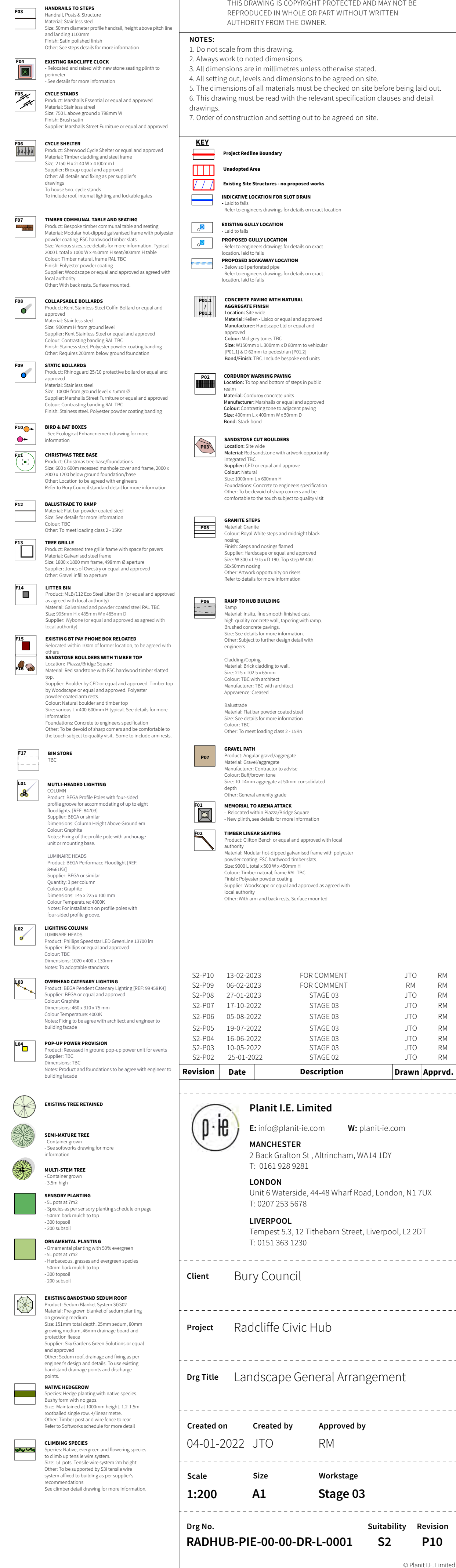
Drawing No

57969 / 3

Revision

A

Appendix D – Proposed Site Plan



Appendix E – Flood Maps

Flood map for planning

Your reference
221-145

Location (easting/northing)
378573/406948

Created
5 Nov 2021 14:10

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

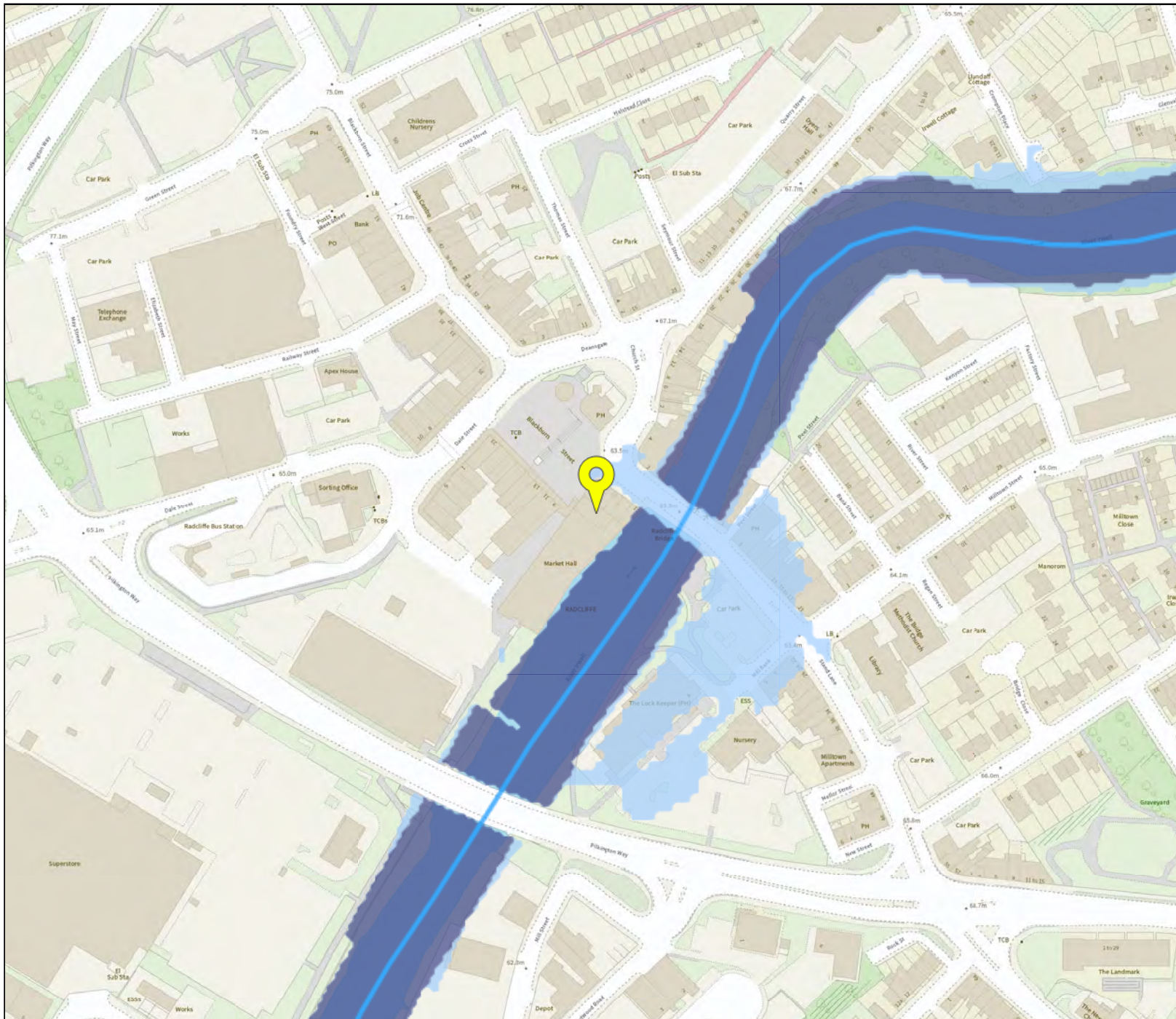
Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2021 OS 100024198. <https://flood-map-for-planning.service.gov.uk/os-terms>



Flood map for planning

Your reference
221-145

Location (easting/northing)
378573/406948

Scale
1:2500

Created
5 Nov 2021 14:10

-  Selected point
-  Flood zone 3
-  Flood zone 3: areas benefitting from flood defences
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Flood storage area

0 20 40 60m

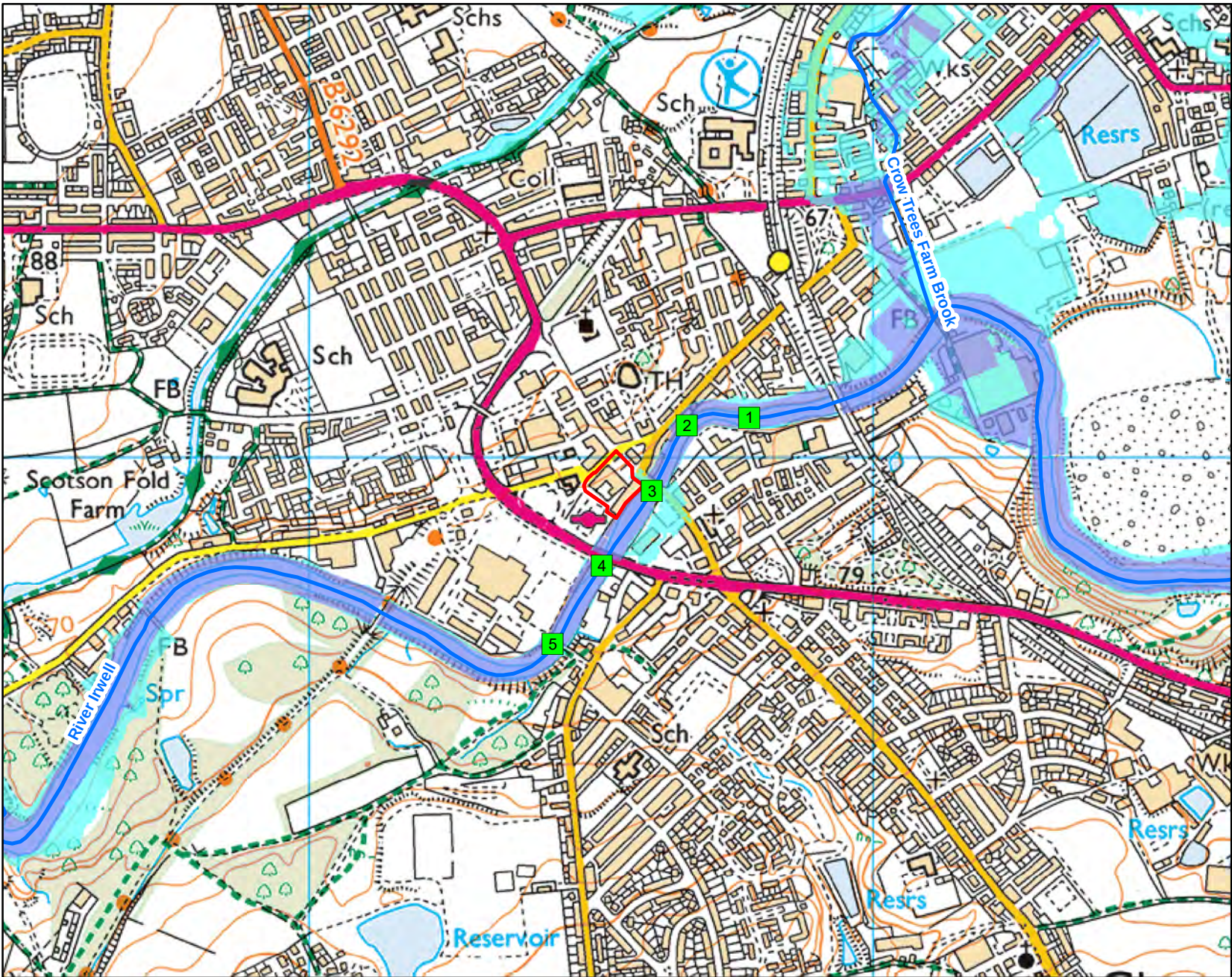
Extent of flooding

Enter a place or postcode



Extent of flooding from rivers or the sea

High Medium Low Very low Location you selected



1:10,001

N

Legend

- Site Location
- Model Measurements
- Main River
- Flood Zone 3
- Flood Zone 2

Map Reference	Model Node Reference	Easting	Northing	Data	Undefended										Defended									
					10 % AEP (1 in 10 year)	5 % AEP (1 in 20 year)	4 % AEP (1 in 25 year)	2 % AEP (1 in 50 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	0.5 % AEP (1 in 200 year)	0.1 % AEP (1 in 1000 year)	10 % AEP (1 in 10 year)	5 % AEP (1 in 20 year)	4 % AEP (1 in 25 year)	2 % AEP (1 in 50 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	0.5 % AEP (1 in 200 year)	0.1 % AEP (1 in 1000 year)				
1	ea013_0185_IRWE03_5646	378783	407070	Modelled Water Level (m aodN)	61.26	61.69	61.82	62.19	62.45	62.63	63.09	64.23	61.27	61.72	61.83	62.22	62.47	62.66	63.12	64.11				
				Modelled Flow (cumecs)	282.13	331.30	346.21	390.76	422.22	444.05	500.55	623.16	282.93	334.14	347.83	393.85	424.33	448.27	504.63	614.72				
2	ea013_0185_IRWE03_5529	378672	407056	Modelled Water Level (m aodN)	61.04	61.47	61.60	61.97	62.23	62.41	62.88	64.04	61.05	61.49	61.61	62.00	62.25	62.45	62.91	63.92				
				Modelled Flow (cumecs)	282.12	331.29	346.21	390.75	422.22	444.03	500.54	623.14	282.93	334.13	347.82	393.84	424.33	448.25	504.62	613.90				
3	ea013_0185_IRWE03_53934	378610	406940	Modelled Water Level (m aodN)	60.75	61.09	61.18	61.46	61.64	61.77	62.08	62.70	60.75	61.10	61.19	61.48	61.68	61.79	62.10	62.63				
				Modelled Flow (cumecs)	282.12	331.29	346.20	390.74	422.22	444.03	500.53	621.13	282.93	334.12	347.81	393.84	424.33	448.24	504.61	612.08				
4	ea013_0185_IRWE03_52274	378521	406807	Modelled Water Level (m aodN)	60.38	60.72	60.82	61.10	61.29	61.42	61.72	62.36	60.39	60.74	60.83	61.12	61.30	61.44	61.75	62.29				
				Modelled Flow (cumecs)	282.11	331.28	346.19	390.72	422.21	444.02	500.52	623.12	282.92	334.11	347.80	393.82	424.32	448.24	504.60	611.46				
5	ea013_0185_IRWE03_50644	378434	406668	Modelled Water Level (m aodN)	59.87	60.18	60.27	60.52	60.68	60.78	61.04	61.58	59.88	60.20	60.28	60.53	60.69	60.80	61.06	61.51				
				Modelled Flow (cumecs)	282.10	331.27	346.17	390.70	422.20	444.01	500.51	623.10	282.92	334.09	347.78	393.81	424.31	448.22	504.59	610.74				

Model data taken from Radcliffe and Redvales 2016 Study
AEP - Annual Exceedence Probability
m aodN - metres above ordnance datum Newlyn
cumecs - cubic metres per second

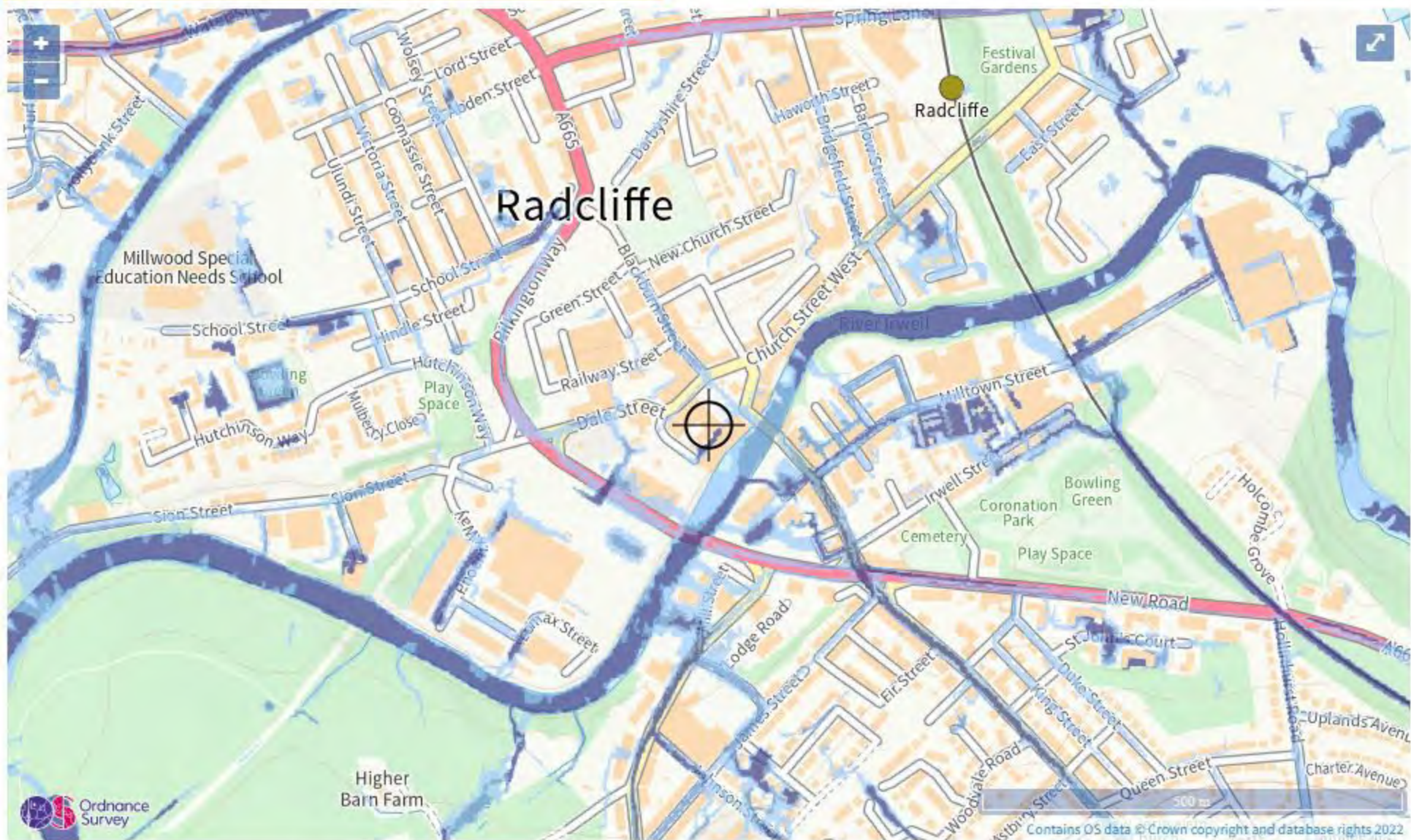
Notes: Climate Change Scenario - We do not hold climate change measurements at this location. For further guidance on climate change within the GMMC area please see the attachment 'Flood risk assessments: Climate change allowances'. Particularly section 3, table B which shows the Local precautionary allowances for potential climate change impacts.

Flood risk

Location

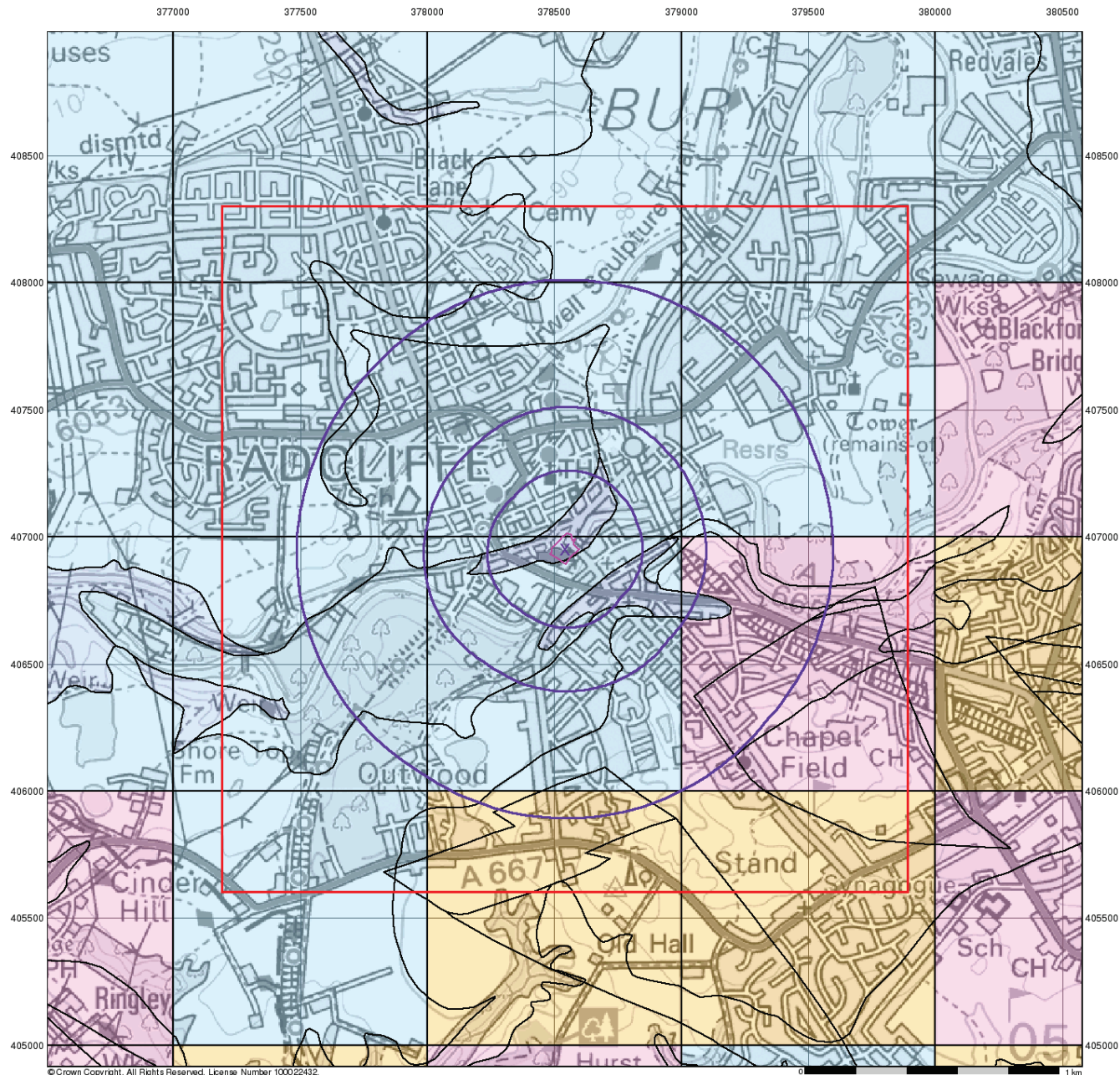
Extent of flooding

Enter a place or postcode



Extent of flooding from surface water

High Medium Low Very low Location you selected



Groundwater Vulnerability

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

Agency and Hydrological

Bedrock Aquifers

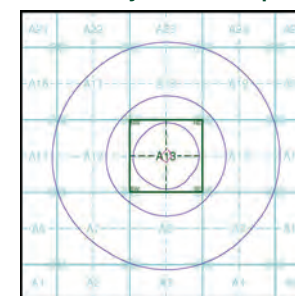
- High Vulnerability, Principal Aquifer
- High Vulnerability, Secondary Aquifer
- Medium Vulnerability, Principal Aquifer
- Medium Vulnerability, Secondary Aquifer
- Low Vulnerability, Principal Aquifer
- Low Vulnerability, Secondary Aquifer

Superficial Aquifers

- High Vulnerability, Principal Aquifer
- High Vulnerability, Secondary Aquifer
- Medium Vulnerability, Principal Aquifer
- Medium Vulnerability, Secondary Aquifer
- Low Vulnerability, Principal Aquifer
- Low Vulnerability, Secondary Aquifer

- Unproductive Aquifer
- Soluble Rock

Site Sensitivity Context Map - Slice A



Order Details

Order Number: 287964086_1_1
 Customer Ref: 5238
 National Grid Reference: 378540, 406950
 Slice: A
 Site Area (Ha): 0.73
 Search Buffer (m): 1000

Site Details

Radcliffe Hub, Radcliffe, MANCHESTER



Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk

Flood risk

Location

Extent of flooding

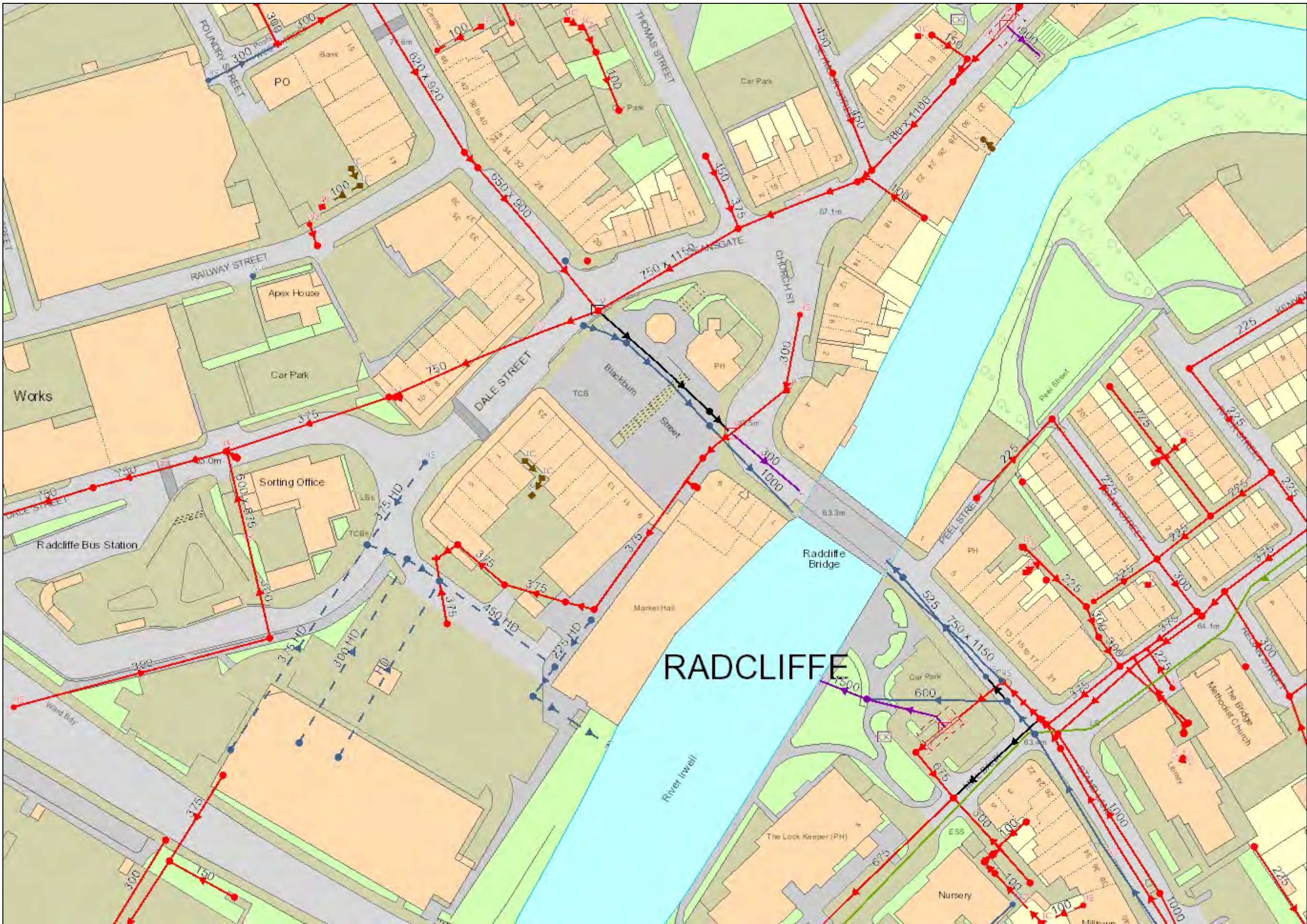
Enter a place or postcode



Maximum extent of flooding from reservoirs:

when river levels are normal when there is also flooding from rivers Location you selected

Appendix F – United Utilities Sewer Maps



United Utilities Maps
for SafeDig

Date :	25/04/2022 16:45:40
Centre X:	378556
Centre Y:	406965
Scale :	1000
UserName:	4MY37

Extract from maps of United Utilities'
Underground Assets

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private service pipes may be shown by a blue broken line. United Utilities Water will not accept liability for any damage caused by the actual position being different from those shown.

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John Speers

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Sent: 16 May 2022 11:13
To: John Speers
Cc: Wastewater Developer Services
Subject: PDE 4200049361 Dale Street M26 1AB

Follow Up Flag: Follow up
Flag Status: Completed

Good morning John,

Pre Development Enquiry for: Dale Street M26 1AB UU Reference Number : 4200049361

<https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/wastewater-pre-dev/>

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 6723 723 or refer to the link below:

<https://www.unitedutilities.com/builders-developers/working-near-our-assets/>

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Our preferred point of discharge would be to the 375mm diameter public combined sewer within the your proposed development site at an unrestricted rate.

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

In accordance with our infrastructure plans we may ask you to change your point of connection. Therefore please contact us when you are ready to formalise your drainage proposals, we would suggest before you submit for Full Planning.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.

This is outlined as follows, in order of priority:

- 1. into the ground (infiltration);**

2. to a surface waterbody;
3. to a surface water sewer or highway drain;
4. to a combined sewer.

For guidance, The [North West SuDS Pro-Forma](#) provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible.

A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.

Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:

<https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs>

If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below:

<https://www.gov.uk/government/publications/groundwater-protection-position-statements>

Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.

Waterbody

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you contact the Lead Local Flood Authority and/or Environment Agency to discuss a point of discharge to the main river located southeast of the proposed site.

We would encourage you to identify and engage with any third party landowner and riparian owner to agree access and discharge rights to the water body if this is not in your ownership.

Highway Drainage

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain located to the south of the site where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

Public Sewer

In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging

surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.

Once evidence is provided as outlined above, United Utilities will consider a connection to the 900mm diameter public surface water sewer located to the north of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 50% betterment of the existing 1 in 2 year flow rate. We would require evidence of there being positive connectivity for surface water drainage of all existing impermeable areas communicating with the public sewer to determine the existing flow rates accurately. Please provide a existing drainage survey plan showing the existing drainage, collection points and connection to the public sewer in order to agree brownfield surface water discharge rate.

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage

United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the public sewerage network under any circumstances

SuDS

If your development proposal incorporates any SuDS component(s) which interact with a sewer network you plan on offering for adoption to United Utilities; contact should be made with our technical team at your earliest convenience, please complete the 'Section 104 pre-application form : ' and include as much relevant detail as you can. These discussions can help prevent delays later in the development process.

Section 104 Pre application form (1b)

As per the sewerage sector guidance, all SuDS should be designed in accordance with the standards within the Design & construction guidance & the CIRIA SuDS manual (C753)

Codes For Adoption

The new Codes for Adoption are outlined on the Water UK Website. The link below takes you to their webpage:

<https://www.water.org.uk/technical-guidance/developers-services/codes-for-adoption/>

A free copy of the new Design & Construction Guidance can be downloaded via the link below:

<https://www.water.org.uk/sewerage-sector-guidance-approved-documents/>

Existing Wastewater Assets Crossing the Site

In response to your query regarding the downstream section of the 375mm combined sewer within your site – this is not currently shown on our records.

According to our public sewer records there are public sewers located within your site boundary. We will require unrestricted access to the sewer for maintenance purposes, we would ask that you maintain a minimum clearance of 6m which is measured 3m from the centre line of the pipe unless there happens to be a formal easement agreement in place, in which case the specified easement width would apply. If you cannot achieve this then you may wish to consider diverting and or abandoning the public sewer.

Please be aware that any proposed diversion may require modelling. This process may take up to 6 months in order to reach an acceptable design.

Please refer to the link below to obtain full details of the processes involved with sewer diversions:

<https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-diversions/>

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address: DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:

<https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/>

Connection Application

Although we may discuss and agree discharge points and rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below:

<https://www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/sewer-connection/>

We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.

If we can be of any further assistance please don't hesitate to contact us further.

Kind regards,

Shoaib.



Shoaib Tauqeer
Developer Engineer
Developer Services & Metering
M: 07876745601
[unitedutilities.com](https://www.unitedutilities.com)

If you have received a great service today why not tell us?

Visit: [unitedutilities.com/wow](https://www.unitedutilities.com/wow)

Did you know we now have a live chat facility available to you Mon to Friday 8 -5pm. You just click on the orange live chat box on our webpage and one of our advisors will be ready to chat to you and help you

with your enquiry <https://www.unitedutilities.com/builders-developers/> or you can email us at developerserviceswater@uuplc.co.uk

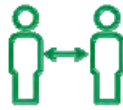
Coronavirus | Prevent the spread



Wash your
hands



Disinfect
common surfaces



Practise social
distancing



FEVER +
COUGH

Stay home if you
have symptoms

[Click for our message to customers](#)

From: John Speers [mailto:johnspeers@ajpltd.co.uk]

Sent: 04 May 2022 11:19

To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>

Subject: 221-145 - Radcliffe Civic Hub - Pre Dev Enquiry

EXTERNAL EMAIL This email originated outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Please find attached a pre-development form and associated information for your consideration.

The total site covers an area of approximately 0.614ha and is currently a brownfield site. The overall site planning boundary (red boundary on attached drainage strategy drawing) is larger but all areas outside of the development site planning boundary are to be completed by others as part of the Section 278 works and therefore have not been included within the proposed development boundary (blue boundary on attached drainage strategy drawing). The existing site currently consists of an existing building and surrounding hard landscaping areas. The site location plan and existing topo survey are attached to indicate the existing site and the proposed development is indicated on the attached drainage strategy drawing.

Only a partial site investigation has been completed to date but this indicates that infiltration is not suitable due to the high water table (approx. 4mbgl) which is likely to fluctuate with the adjacent River Irwell. As such, discharge to watercourse has been considered. The nearest watercourse is the River Irwell, which is located adjacent to the south-east of the site and as such it is envisaged that the surface water runoff from the site will discharge into this watercourse via the existing surface water drainage network which currently serves the existing site.

Therefore, the surface water runoff from the proposed development will be collected and conveyed to the south-east of the site, where it will discharge into the existing public surface water sewer which then discharges into the River Irwell. The foul water runoff will discharge into the existing 375mm diameter public combined water sewer which is to be diverted, to the south-west of the site. It is envisaged that the surface water discharge will be restricted to a maximum discharge rate which provides a 50% betterment on the existing 1-year brownfield runoff rate, in line with LLFA requirements, while the foul water runoff will discharge at unrestricted rates.

Can you please confirm that United Utilities are happy with this drainage arrangement and as such have no objections to the drainage strategy or discharge restrictions proposed?

Also, the existing UU sewer map is not clear on where the existing 375mm diameter public combined water sewer discharges into. It looks as though the existing public combined water sewer discharges into the existing 450mm diameter highway drain located to the south-west of the site. Is this information correct or do United Utilities have

any further information regarding the existing public sewers in this area? Any further information you could provide would be extremely helpful.

Please contact me immediately to discuss any matters further.

Kind Regards

John



John Speers

Associate

☎ 0151 227 1462

☎ 07841 832 409

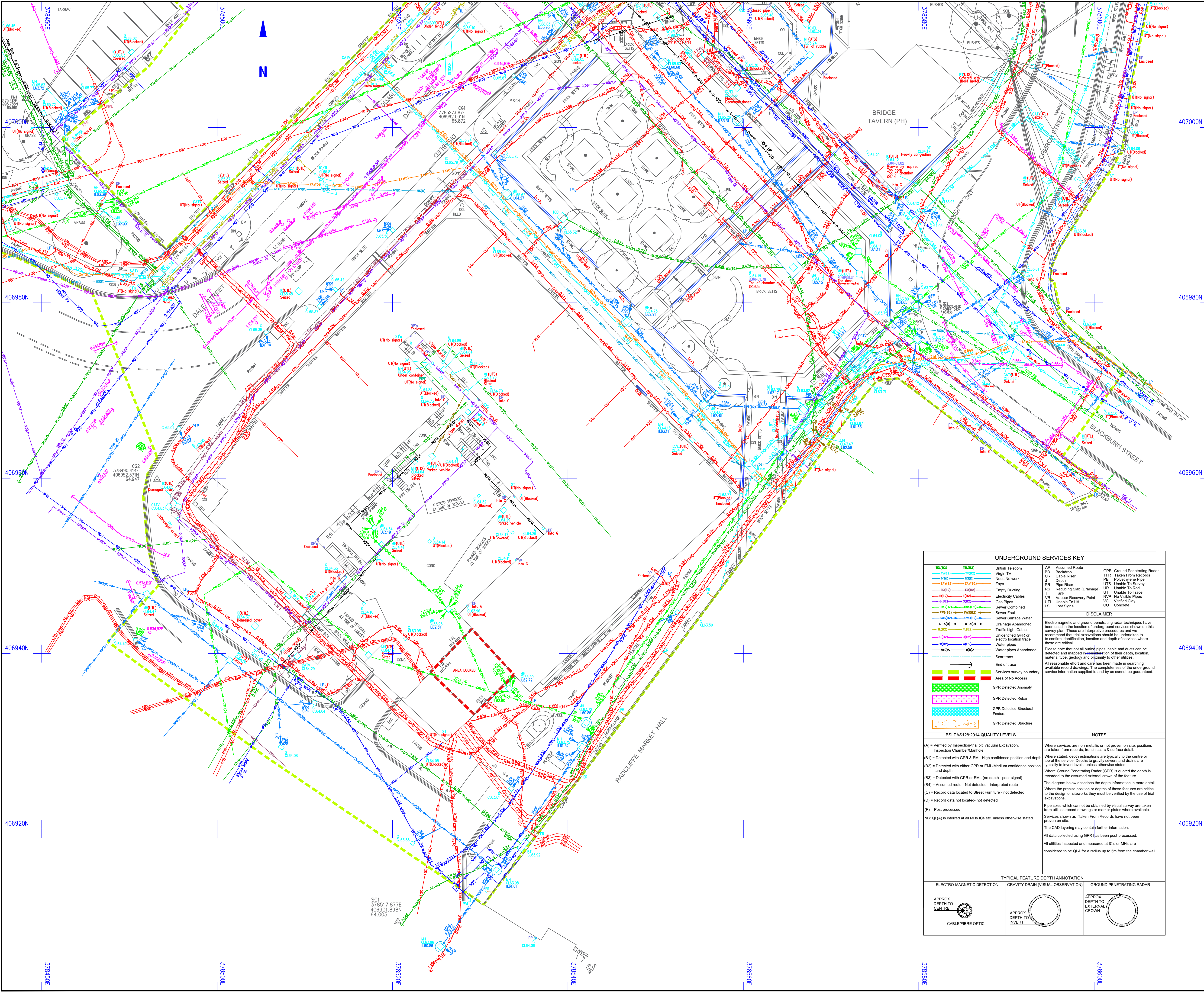
✉ johnspeers@ajpltd.co.uk

📍 1 Dale St, Liverpool, L2 2ET

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Survey Notes
Grid: Local Plane Grid Fixed to National Grid at Survey Control Station SC2
Levels: OS Datum from GNSS positioning converted using the National Geoid Model OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

- Building
- Open Road
- Ruin
- Passage
- Wall with height
- Retaining Wall

FENCE STYLES AND DESCRIPTIONS

- Close Boarded
- Corrugated Iron
- Chainlink
- Handrail
- Intervenor
- Iron Railings
- Lattice
- Miscellaneous
- Post & Chain
- Post & Rail
- Post & Wire
- Post & Bored Wire
- Wire mesh
- Site
- Gates
- Fence Inset

ROADS

- Kerbs
- Edge of Surfacing
- Pedestrian Crossing
- Trunk
- Footpath

STREET FURNITURE

- Ballistic Beacon
- Bus Stop
- Barbed
- Car Eye
- Cold Chute
- Closed Circuit TV
- Drain
- Electricity Pole
- Fog Staff
- Lamp Post
- Letter Box
- Name Plate (street)
- Moving Ring
- Mail Post or Mooring Post
- Service Marker
- Mail Stone
- Post
- Parking Meter
- Reflector Post
- Road Sign
- Speed Camera
- Information Sign
- Shop
- Traffic Light
- Telegraph Pole
- Traffic Light Push Button Post
- Traffic Light Control
- Control Box
- British Telecom Box
- Electricity Box
- Gas Box

INSPECTION CHAMBERS AND PIPES

- Inspection Cover (Dial)
- Manhole
- British Telecom Cover
- Inspection Cover (Comms)
- Inspection Cover Traffic Signals
- Gully
- Kerbs
- Vent Pipe
- Down Pipe
- Rain Water Pipe
- Soil Pipe
- Gas Pipe
- Unable to lift cover
- Stop Top
- Stop View
- Longhole
- Hydrant
- Earth Pit
- Gas Valve
- Water Meter
- Washout
- Roadside Eye

GENERAL INFORMATION

- Petrol Pump
- Basement Light
- Footbridge
- Dish Type Channel
- Spot Type Channel
- Grate Type Channel
- Tactile Paving
- Cross Barrier
- Column
- Streetlight
- Car Vacuum
- Car
- AV
- Chimney
- Telephone Call Box

OVERHEAD FEATURES

- Electricity Pylon
- Electricity
- Telephone

WATER FEATURES

- Canal
- Stream
- Ditch
- Wall
- Culvert
- Slip (Land Drain)
- Spring

RELIEF AND VEGETATION

- Hedge
- Edge of wood/Bushes
- Shrub
- Individual Tree
- Slopes with height
- Greater than 1m
- Cliff Face
- Marsh
- Reeds

LEVEL AND HEIGHT INFORMATION

- Standard Spot Height
- Precision Spot Height
- Bed Level
- Water Level
- Soft Level
- Threshold Level
- Cover Level
- Top of Trench Level
- Pipe Surface Level
- Floor Level
- Finished Floor Level
- Top of Wall Level
- Eave Level
- Ridge Level
- Roof Hip Level
- Flat Roof Level
- Top of Canopy Level
- Underline of Canopy Level
- Window Sill Level
- Window Head Level
- Springing Level
- Arch Level
- Cable Level
- Top of Wall Level
- Underline of Beam Level
- General Height

SURVEY INFORMATION SIGNS

- Permanent Ground Marker
- O.S. Trig Station
- O.S. Bench Mark

GEOTECHNICAL INFORMATION

- Borehole
- Trial Pit
- Monitor Pit
- Probe Hole
- Mud Sample

UNDERGROUND SERVICES KEY

TEL (B2)	British Telecom	AR	Assumed Route	GPR	Ground Penetrating Radar
TEL (B1)	Virgin TV	BD	Backdrop	TFR	Taken From Records
TEL (B0)	News Network	GR	Cable Riser	PE	Polyethylene Pipe
TEL (B3)	Depth	UTS	Unable To Survey	UR	Unable To Rod
TEL (B4)	Empty Ducting	RS	Residual Risk (Drainage)	UT	Unable To Trace
TEL (B5)	Electricity Cables	VR	Vapour Recovery Point	VC	Verified Clay
TEL (B6)	Gas Pipes	US	Unable To Lift	CO	Concrete
TEL (B7)	Sewer Combined	LS	Last Signal		
TEL (B8)	Sewer Foul				
TEL (B9)	Sewer Surface Water				
TEL (B10)	Drainage Abandoned				
TEL (B11)	Traffic Light Cables				
TEL (B12)	Undetected GPR or EML				
TEL (B13)	Water pipes				
TEL (B14)	Water pipes Abandoned				
TEL (B15)	Scar trace				
TEL (B16)	End of trace				
TEL (B17)	Services survey boundary				
TEL (B18)	Area of No Access				
TEL (B19)	GPR Detected Anomaly				
TEL (B20)	GPR Detected Rebar				
TEL (B21)	GPR Detected Structural Feature				
TEL (B22)	GPR Detected Structure				

BSI PAS128:2014 QUALITY LEVELS

(A) = Verified by Inspection-trial pit, vacuum Excavation, Inspection Chamber/Manhole
(B1) = Detected with GPR & EML-High confidence position and depth
(B2) = Detected with either GPR or EML-Medium confidence position and depth
(B3) = Detected with GPR or EML (no depth - poor signal)
(B4) = Assumed route - Not detected - interpreted route
(C) = Record data located to Street Furniture - not detected
(D) = Record data not located - not detected
(P) = Post processed
NB: QL(A) is inferred at all MHS ICs etc. unless otherwise stated.

NOTES

Where services are non-metallic or not proven on site, positions are taken from records, trench scars & surface detail. Where stated, depth estimations are typically to the centre or top of the service. Depths to gravity sewers and drains are typically to invert levels, unless otherwise stated.

Where Ground Penetrating Radar (GPR) is quoted the depth is recorded to the assumed external crown of the feature.

The diagram below describes the depth information in more detail. Where the precise position or depths of these features are critical to the design or otherwise they must be verified by the use of trial excavations.

Pipe sizes which cannot be obtained by visual survey are taken from utilities record drawings or market plates where available. Services shown as Taken From Records have not been proven on site.

The CAD layering may contain further information.

All data collected using GPR has been post-processed. All utilities inspected and measured at ICs or MHS are considered to be QA for a radius up to 5m from the chamber wall.

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION	GRAVITY DRAIN (VISUAL OBSERVATION)	GROUND PENETRATING RADAR
APPROX DEPTH TO CENTRE	APPROX DEPTH TO INVERT	APPROX DEPTH TO EXTERNAL CROWN
CABLE/FIBRE OPTIC		

Rev.	Date	Description
A	13/04/22	Underground services survey extended
B	29/08/22	Underground services survey extended
C	11/11/22	Underground services survey extended

MALCOLM HUGHES
CHARTERED LAND SURVEYORS
65 Cross Street, Sale, Manchester
M33 7HF, Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mh.co.uk

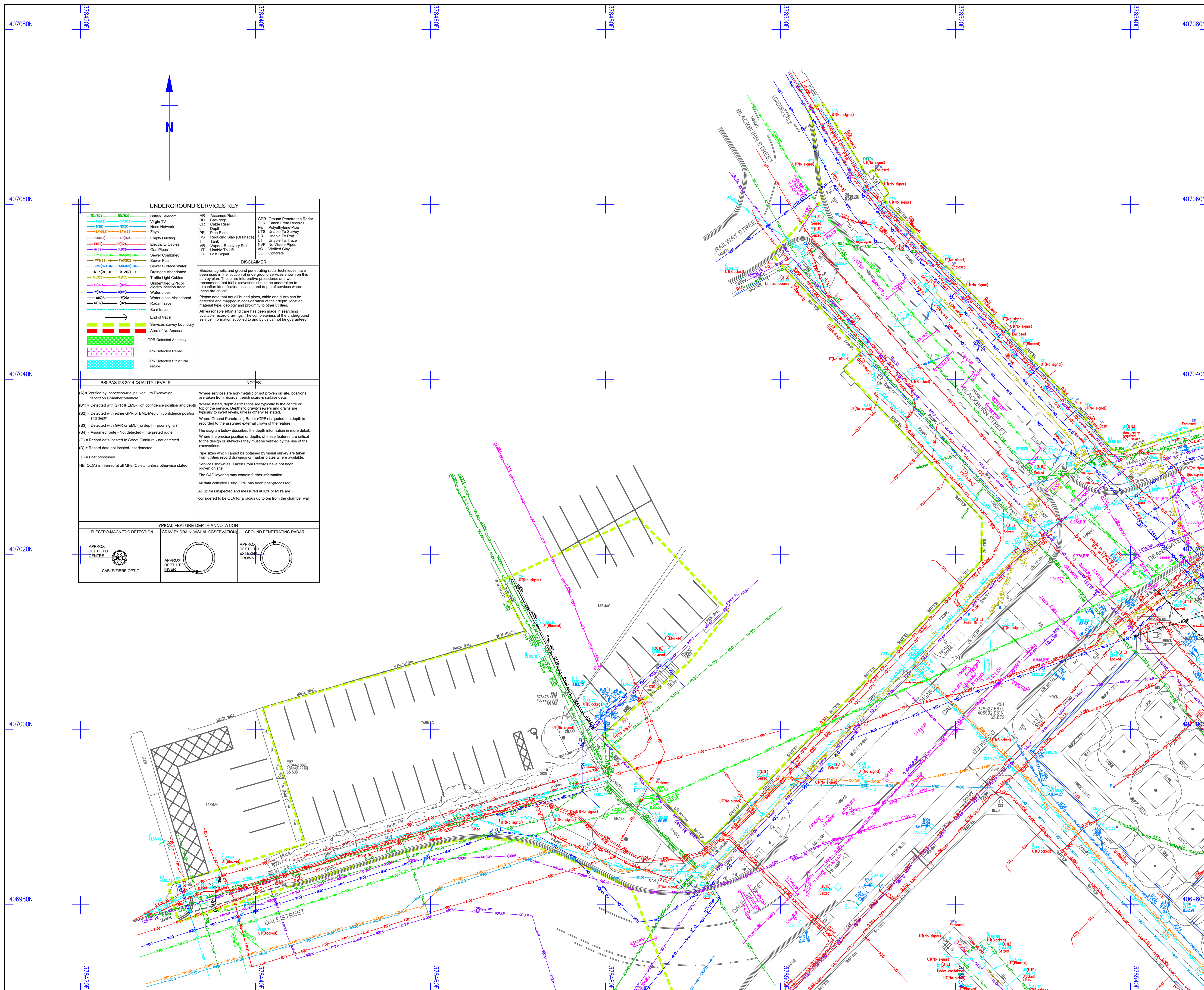
Accreditations

Client
VINCI CONSTRUCTION UK LTD
DITTON ROAD, WIDNES
CHESHIRE, WA8 0PG

Project
RADCLIFFE HUB

Drawing Title
UNDERGROUND SERVICES
SURVEY

Drawn By	JM	09/02/22	Survey Date	JANUARY 2022
Checked by	DJ	09/02/22	Scale	A1@1:200
Drawing No	57969/UG1		Revision	C



Survey Notes

Grid: Local Plane Grid Fixed to National Grid at Survey Control Station SC2

Levels: OS Datum from GNSS positioning converted using the National Geoid Model OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building	
Open Sided	
Roof	
Passage	
Wall with Height	
Retaining Wall	

FENCE STYLES AND DESCRIPTIONS

Close Boarded	C/B
Concreted	C/C
Chestnut Paling	C/P
Chain Link	C/L
Handrail	H/R
Interwoven	W/I
Iron Rollings	I/R
Lattice	L/A
Miscellaneous	M/A
Post & Chain	P/C
P/W R/R	P/W
Post & Wire	P/W
Post & Barbed Wire	B/W
Wire mesh	W/M
Site	
Gate	
Fence Instyle	

ROADS

Kerbs	
Edge of Surfacing	
Paved/Crossing	
Track	
Footpath	

STREET FURNITURE

Bellman Beacon	BB
Bus Stop	BS
Ballast	BS
Cote Eye	CE
Cot Chute	CC
Closed Gully	CG
Drain	D
Electricity Pole	EP
Flower Pole	FL
Flag Staff	F/S
Lamp Post	L/P
Letter Box	L/B
Name Plate (Street)	N/P
Moorling Ring	MR
Mail Box	MB
Service Marker	MS
Sign	S
Post	P
Parking Meter	PM
Reflector Post	RP
Reflector	RE
Road Signs	RS
Speed Camera	SC/AM
Information Sign	IS/A
Splay	S/Y
Traffic Light	T/L
Telephone Pole	TP
Traffic Light Blue Button Post	T/LBP
Traffic Light Control	T/LC
Control Box	CB
British Telecom Box	BTB
Electricity Box	EB
Gas Box	GB

INSPECTION CHAMBERS AND PIPES

Inspection Chamber	IC
Inspection Chamber (Eloc)	IC/EL
Manhole	MT
British Telecom Cover	BT/C
Cable TV	CA/TV
Inspection Cover Traffic Signals	CA/TS
Gully	G
Kerbs Outlet	K/O
Vent Pipe	V/P
Down Pipe	D/P
Rain Water Pipe	RWP
Sell Pipe	S/P
Gas Pipe	G/P
Underdrain Lift cover	UL/C
Stop Tap	ST
Stop Valve	SV
Lampshade	L/H
Earth Rod	ER
Ground Wire	GW
Water Meter	WM
Water Valve	WV
Rodding Eye	RE

GENERAL INFORMATION

Petrol Pump	PP
Basement Light	BL
Footbridge	
Dish Type Channel	DTC
Grate Type Channel	GTC
Toilette Paving	TAC
Grass Marker	GM
Column	C
Cap Vacuum	CV
STAN	STAN
AP	AP
Alt Valve	AV
Trough	T
Quarry	Q
Communication Call Box	CCB
CHY	CHY
QTY	QTY

OVERHEAD FEATURES

Electricity Pylon	
Electricity	EL
Telephone	TEL

WATER FEATURES

Canal	
Stream	
Ditch	
Water	
Can	
Grip (Land Drain)	
Spring	

RELIEF AND VEGETATION

Hedge	
Edge of wood/Bushes	
Stump	
Individual Tree	
Slopes with Height Greater than 1m	
Cliff Face	
Morsh	
Reeds	

LEVEL AND HEIGHT INFORMATION

Standard Spot Height	+123.45
Precision Spot Height	+123.456
Bed Level	+B3.92
W/L	+W3.00
Softs Level	+S3.25
Finished Floor Level	+F3.00
Cover Level	+C3.45
Invert Level	+I3.15
Flow	+F3.00
Flow Surface Level	+F3.00
Top of Tank Level	+T3.00
Flow Level	+F3.00
Ridge Level	+R3.00
Roof H/L Level	+R3.00
Flat Roof Level	+F3.00
Underdrain of Canopy Level	+U3.00
Window Sill Level	+W3.00
Window Head Level	+W3.00
Arch Level	+A3.00

Rev.	Date	Description
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**MALCOLM
HUGHES**
**CHARTERED
LAND SURVEYORS**

65 Cross Street, Sale, Manchester
M33 7HF. Tel: 0161 955 1265
www.malcolmhughes.co.uk
survey@mhs.co.uk

Accreditations







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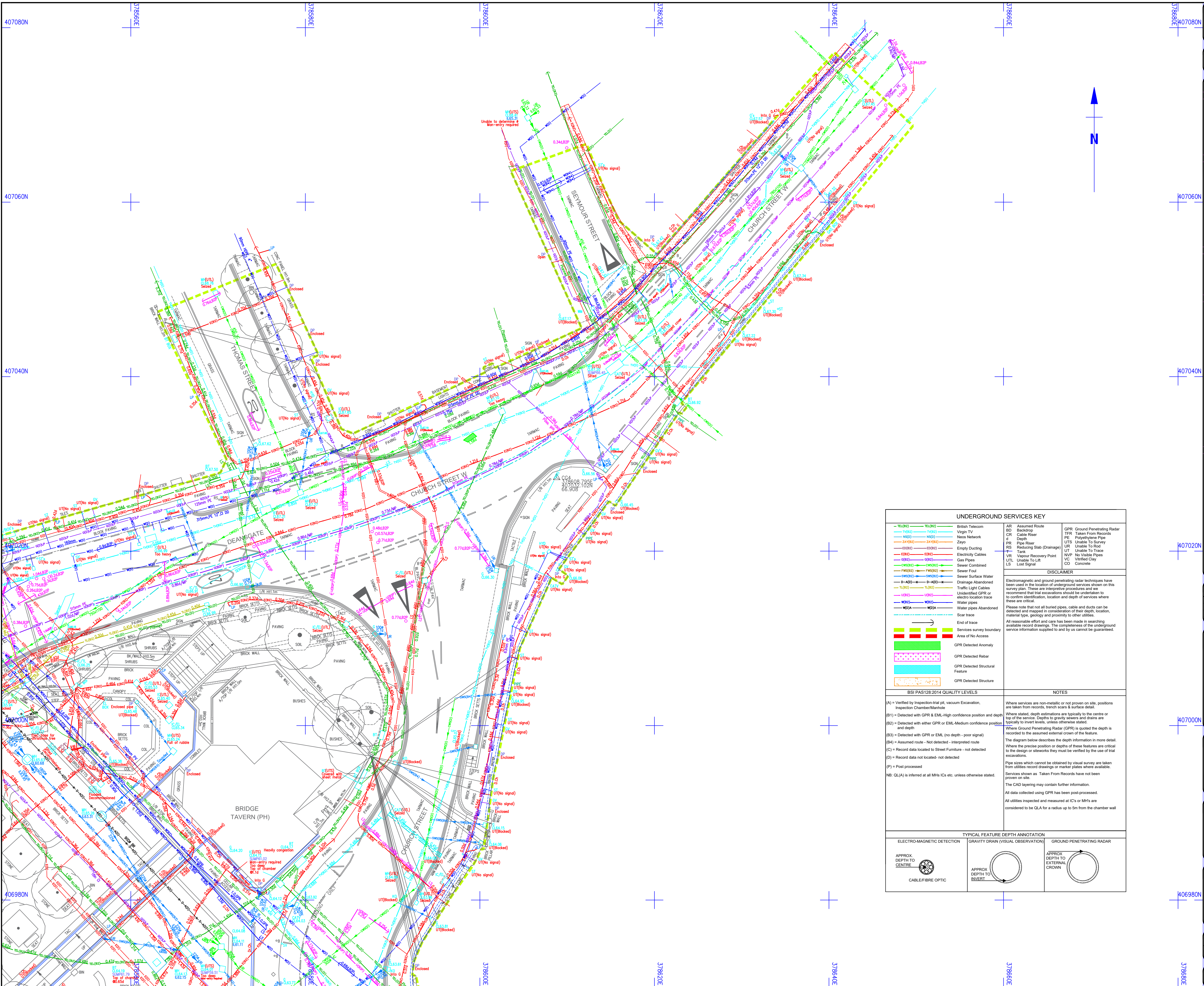
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Client

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DITTON ROAD, WIDNES
CHESHIRE, WA8 0PG

The diagram consists of a large rectangle with the text "RADCLIFFE HUB" centered inside it. A smaller rectangle is positioned in the top-left corner of the larger rectangle, containing the word "Project".

Drawing Title	
UNDERGROUND SERVICES	
SURVEY	
Drawn By	JM 09/02/22
Checked by	DJ 09/02/22
Survey Date	JANUARY 2022
Scale	A1@1:200
Drawing No	57969/UG2
	Revision C



Survey Notes
Grid: Local Plane Grid Fixed to National Grid at Survey Control Station SC2
Levels: OS Datum from GNSS positioning converted using the National Geoid Model OSGM15

Notes

Topographical Survey Legend

Buildings and Walls

General Information

Fence Styles and Descriptions

Overhead Features

Roads

Street Furniture

Inspection Chambers and Pipes

Water Features

Relief and Vegetation

Level and Height Information

Survey Information Signs

Geotechnical Information

UNDERGROUND SERVICES KEY

BSI PAS128:2014 QUALITY LEVELS

NOTES

TYPICAL FEATURE DEPTH ANNOTATION

Rev.	Date	Description
A	13/04/22	Underground services survey extended
B	29/09/22	Underground services survey extended
C	11/11/22	Underground services survey extended

MALCOLM HUGHES

CHARTERED LAND SURVEYORS

65 Cross Street, Sale, Manchester M33 7HF, Tel: 0161 905 1265 survey@mhsl.co.uk

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CHESHIRE, WA8 0PG

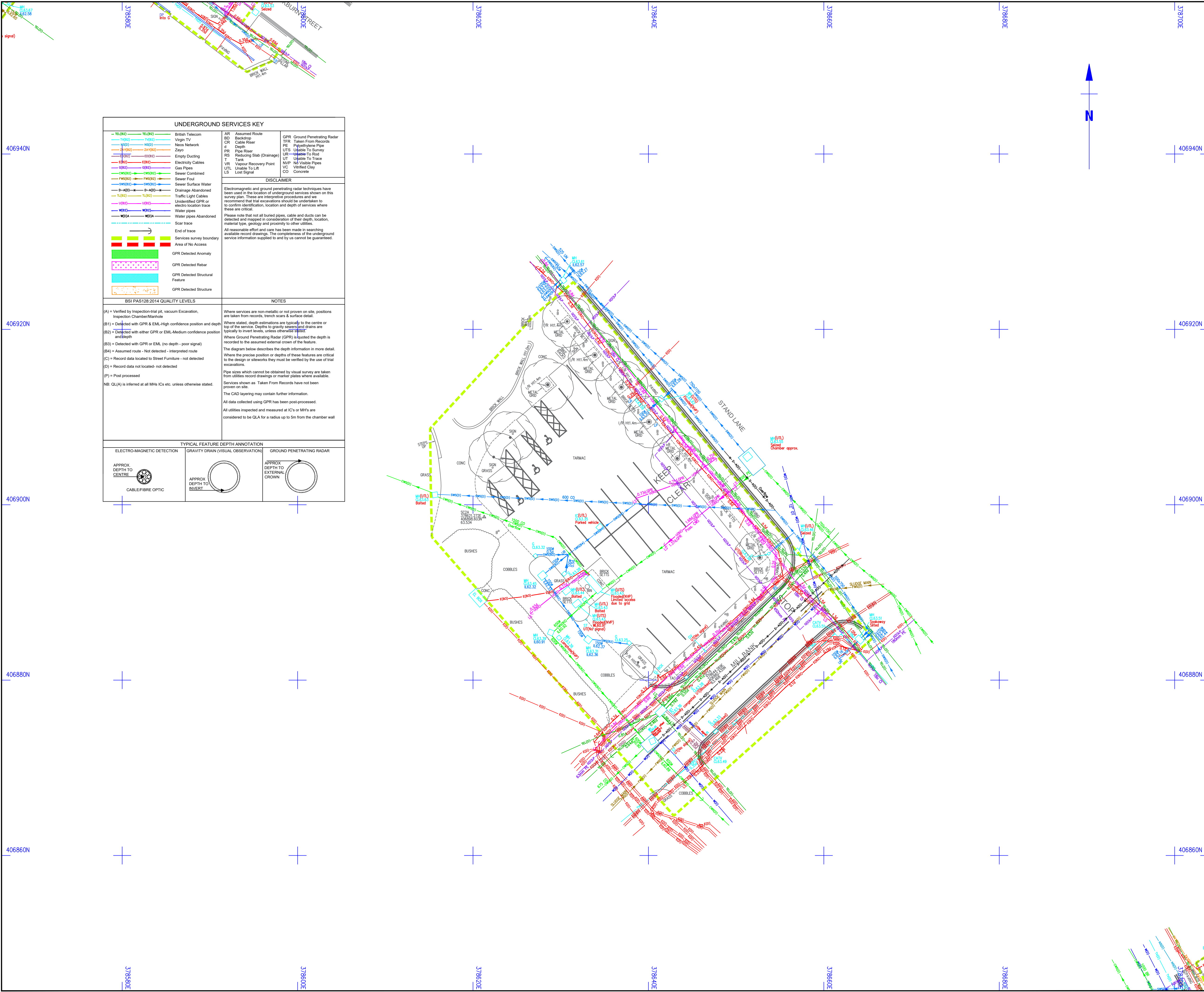
Project

RADCLIFFE HUB

Drawing Title

UNDERGROUND SERVICES
SURVEY

Drawn By	JM	09/02/22	Survey Date	JANUARY 2022
Checked by	DJ	09/02/22	Scale	A1@1:200
Drawing No	57969/UG3		Revision	C



Survey Notes

Grid: Local Plane Grid Fixed to National Grid at Survey Control Station SC2

Levels: OS Datum from GNSS positioning converted using the National Geoid Model OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS	GENERAL INFORMATION
Building Open Road Run Passage Wall with height Retaining Wall	Petrol Pump Basement Light Footbridge Dish Type Channel Spot Type Channel Grate Type Channel Tactile Paving Crown Barrier Column Stanchion Car Vacuum Air Valve C/S Chimney Telephone Call Box
Fence Styles and Descriptions Close Boarded Corrugated Iron Chainlink Paving Quadrant Handrail Iron Rollings Lattice Miscellaneous PAL Post & Chain Post & Rail Post & Wire Post & Barbed Wire Wire mesh Silt Gate Fence line style	OVERHEAD FEATURES Electricity Pylon Electricity Telephone WATER FEATURES Canal Stream Ditch Weir Cutvert Grip (Land Drain) Spring RELIEF AND VEGETATION Hedge Edge of wood/Bushes Shrub Individual Tree Slopes with Height Greater than 1m Cliff Face Reeds LEVEL AND HEIGHT INFORMATION Standard Spot Height Precision Spot Height Bed Level Water Level Soft Level Threshold Level Cover Level Invert Level Pipe Soft Level Pipe Level Finished Floor Level Top of Tank Level Eave Level Ridge Level Roof Hip Level Flat Roof Level Top of Canopy Level Underline of Canopy Level Window Sill Level Window Head Level Arch Level Cable Level Top of Wall Level Underline of Beam Level General Height
ROADS Kerbs Edge of Surfacing Pedestrian Crossing Track Footpath	STREET FURNITURE Ballistic Beacon Bus Stop Bollard Coffin Eye Cool Chute Closed Circuit TV Drain Electricity Pole Flood Light Flag Staff Lamp Post Letter Box Name Plate (street) Mast Mile Post or Mooring Post Service Marker Mile Stone Post Parking Meter Reflector Post Riding Eye Road Sign Speed Camera Information Sign Shop Traffic Light Telegraph Pole Traffic Light Push Button Post Traffic Light Control Control Box British Telecom Box Electricity Box Gas Box
INSPECTION CHAMBERS AND PIPES Inspection Cover (Dial) Inspection Cover (Comms) Cable TV Inspection Cover Traffic Signals Gully Kerf Outlet Vent Pipe Down Pipe Rain Water Pipe Soil Pipe Gas Pipe Unable to lift cover Stop Top Stop Valve Longhole Hydrant Earth Rod Gas Valve Water Meter Washout Riding Eye	INSPECTION CHAMBERS AND PIPES IC IC/L MH BT IC/COM CATV IC/TL IC GO NP DP RWP SPP G-PIPE UTL SV LH HHD GV WM WO RE

BSI PAS128:2014 QUALITY LEVELS

(A) = Verified by Inspection-trial pit, vacuum Excavation, Inspection Chamber/Manhole

(B1) = Detected with GPR & EML-High confidence position and depth

(B2) = Detected with either GPR or EML-Medium confidence position and depth

(B3) = Detected with GPR or EML (no depth - poor signal)

(B4) = Assumed route - Not detected - interpreted route

(C) = Record data located to Street Furniture - not detected

(D) = Record data not located - not detected

(P) = Post processed

NB: QLA(A) is inferred at all MHs ICs etc. unless otherwise stated.

Where services are non-metallic or not proven on site, positions are taken from records, trench scars & surface detail.

Where dated, depth estimations are typically to the centre or top of the service. Depths to gravity sewers and drains are typically to invert levels, unless otherwise stated.

Where Ground Penetrating Radar (GPR) is located the depth is recorded to the assumed external crown of the feature.

The diagram below describes the depth information in more detail. Where the precise position or depths of these features are critical to the design or networks they must be verified by the use of trial excavations.

Pipe sizes which cannot be obtained by visual survey are taken from utilities record drawings or marker plates where available.

Services shown as Taken From Records have not been proven on site.

The CAD layering using GPR has been post-processed.

All data collected using GPR has been post-processed.

All utilities inspected and measured at ICs or MHs are considered to be QLA for a radius up to 5m from the chamber wall

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION	GRAVITY DRAIN (VISUAL OBSERVATION)	GROUND PENETRATING RADAR
APPROX. DEPTH TO CENTRE CABLE/FIBRE OPTIC	APPROX. DEPTH TO INVERT	APPROX. DEPTH TO EXTERNAL CROWN

Rev. **Date** **Description**

A	13/04/22	Underground services survey extended
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CHESHIRE, WA8 0PG

Project

RADCLIFFE HUB

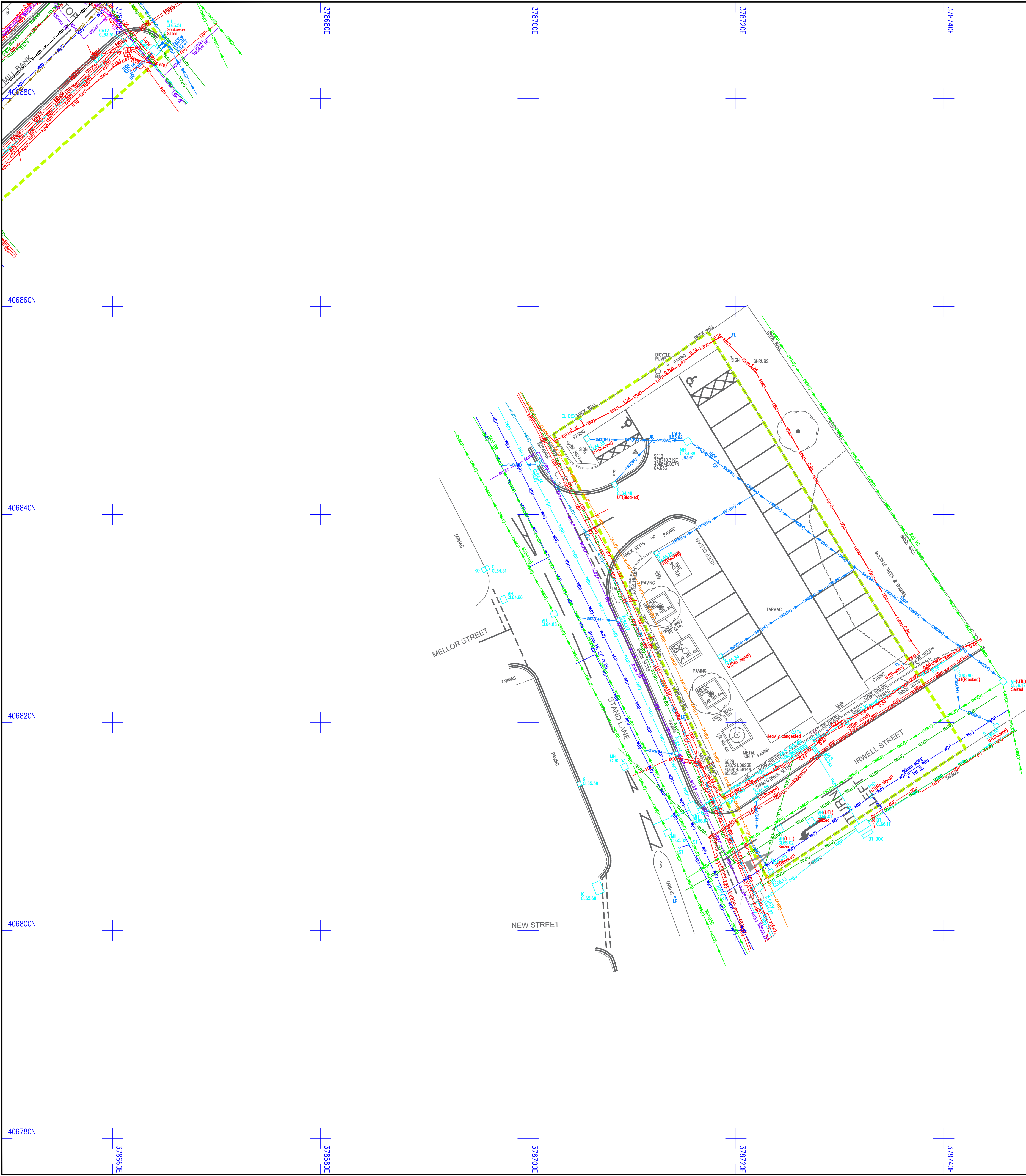
Drawing Title

UNDERGROUND SERVICES
SURVEY

Drawn By **Checked by** **Scale** **Survey Date** **Revision**

JM	DJ	09/02/22	09/02/22	JANUARY 2022	A1@1:200	C
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Drawing No **57969/UG4**



UNDERGROUND SERVICES KEY

TL(80)	TL(80)	British Telecom	AR	Assumed Route	GPR	Ground Penetrating Radar
TL(80)	TL(80)	Virgin TV	BD	Backdrop	TFR	Taken From Records
TL(80)	TL(80)	Neos Network	CR	Cable Riser	PE	Polyethylene Pipe
TL(80)	TL(80)	Zayo	d	Depth	UR	Unable To Run
TL(80)	TL(80)	Empty Ducting	RS	Reducing Slab (Drainage)	UT	Unable To Trace
TL(80)	TL(80)	Electricity Cables	Tank	Tank	VR	Vacuum Recovery Point
TL(80)	TL(80)	Gas Pipes	NVP	No Visible Pipes	VC	Verified Clay
TL(80)	TL(80)	Sewer Combined	UTL	Unable To Lift	LS	Lost Signal
TL(80)	TL(80)	Sewer Foul	CO	Concrete		
TL(80)	TL(80)	Sewer Surface Water				
TL(80)	TL(80)	Drainage Abandoned				
TL(80)	TL(80)	Traffic Light Cables				
TL(80)	TL(80)	Unidentified GPR or electro location trace				
TL(80)	TL(80)	Water pipes				
TL(80)	TL(80)	Water pipes Abandoned				
TL(80)	TL(80)	Scar trace				
TL(80)	TL(80)	End of trace				
TL(80)	TL(80)	Services survey boundary				
TL(80)	TL(80)	Area of No Access				
TL(80)	TL(80)	GPR Detected Anomaly				
TL(80)	TL(80)	GPR Detected Rebar				
TL(80)	TL(80)	GPR Detected Structural Feature				
TL(80)	TL(80)	GPR Detected Structure				

BSI PAS128:2014 QUALITY LEVELS

(A) = Verified by Inspection-pit, vacuum Excavation, Inspection Chamber/Manhole

(B1) = Detected with GPR & EML-High confidence position and depth

(B2) = Detected with either GPR or EML-Medium confidence position and depth

(B3) = Detected with GPR or EML (no depth - poor signal)

(B4) = Assumed route - Not detected - interpreted route

(C) = Record data located to Street Furniture - not detected

(D) = Record data not located - not detected

(P) = Post processed

NB: QLA(A) is inferred at all MHs ICs etc. unless otherwise stated.

NOTES

Where services are non-metallic or not proven on site, positions are taken from records, trench scars & surface detail. Where stated, depth estimations are typically to the centre or top of the service. Depths to gravity sewers and drains are typically to invert levels, unless otherwise stated.

Where Ground Penetrating Radar (GPR) is quoted the depth is recorded to the assumed external crown of the feature.

The diagram below describes the depth information in more detail. Where the precise position or depths of these features are critical to the design or siteworks they must be verified by the use of trial excavations.

Pipe sizes which cannot be obtained by visual survey are taken from utilities record drawings or marker plates where available.

Services shown as 'Taken From Records' have not been proven on site.

The CAD layering may contain further information.

All data collected using GPR has been post-processed.

All utilities inspected and measured at ICs or MHs are considered to be QLA for a radius up to 5m from the chamber wall

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION	GRAVITY DRAIN (VISUAL OBSERVATION)	GROUND PENETRATING RADAR
APPROX. DEPTH TO CENTRE	APPROX. DEPTH TO INVERT	APPROX. DEPTH TO EXTERNAL CROWN
CABLE/FIBRE OPTIC		

Survey Notes

Grid: Local Plane Grid Fixed to National Grid at Survey Control Station SC2

Levels: OS Datum from GNSS positioning converted using the National Geoid Model OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS	GENERAL INFORMATION
Building	Petrol Pump
Open Road	Basement Light
Ruin	Footbridge
Passage	Dish Type Channel
Wall with height	Slot Type Channel
Retaining Wall	Grate Type Channel
	Tactile Paving
	Crown Barrier
	Column
	Staircase
	Car Vacuum
	Air Valve
	Trough
	Chimney
	Telephone Call Box

FENCE STYLES AND DESCRIPTIONS	OVERHEAD FEATURES
Cross Boarded	Electricity Pylon
Corrugated Iron	Electricity
Chainlink Paving	Telephone
Chainlink	
Handrail	
Interwoven	
Iron Railings	
Lattice	
Miscellaneous	
Palisade	
Post & Chain	
Post & Rail	
Post & Wire	
Post & Barbed Wire	
Wire mesh	
Gate	
Fence Instyle	

ROADS	STREET FURNITURE
Kerbs	Bus Stop
Edge of Surfacing	Barrel
Pedestrian Crossing	Coils Eye
Track	Cool Chute
Footpath	Chained Circuit TV
	Drain
	Electricity Pole
	Flood Light
	Flag Staff
	Lamp Post
	Letter Box
	Name Plate (street)
	Moving Ring
	Mail Post or Mooring Post
	Service Marker
	Mix Stone
	Post
	Parking Meter
	Reflector Post
	Roadside Eye
	Road Sign
	Speed Camera
	Information Sign
	Stop
	Traffic Light
	Telegraph Pole
	Traffic Light Push Button Post
	Control Box
	British Telecom Box
	Electricity Box
	Gas Box

INSPECTION CHAMBERS AND PIPES	SURVEY INFORMATION SIGNS
Inspection Cover (Duct)	Permanent Ground Marker
Inspection Cover (Manhole)	O.S. Trip Station
Inspection Cover (Comms)	O.S. Bench Mark
Cable TV	
Inspection Cover Traffic Signals	
Kerb Outlet	
Vent Pipe	
Down Pipe	
Rain Water Pipe	
Soil Pipe	
Gas Pipe	
Unable to lift cover	
Stop Top	
Shoe Valve	
Longhole	
Hydrant	
Earth Pit	
Gas Valve	
Water Meter	
Washout	
Roadside Eye	

LEVEL AND HEIGHT INFORMATION	GEOTECHNICAL INFORMATION
Standard Spot Height	Borehole
Precision Spot Height	Trial Pit
Bed Level	Monitor Pin
Water Level	Probe Hole
Soft Level	Miner Sample
Threshold Level	
Cover Level	
Invert Level	
Pipe Soft Level	
Top of Tank Level	
Finished Floor Level	
Window Sill Level	
Eave Level	
Ridge Level	
Roof Hip Level	
Flat of Canopy Level	
Underline of Canopy Level	
Window Sill Level	
Spring Level	
Arch Level	
Cable Level	
Top of Wall Level	
Underline of Beam Level	
General Height	

Rev.	Date	Description
A	13/04/22	Underground services survey extended
B	29/08/22	Underground services survey extended
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CHARTERED LAND SURVEYORS

65 Cross Street, Sale, Manchester
M33 7HF, Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mh.co.uk

RICS

THE SURVEY ASSOCIATION

ICES

Client

VINCI CONSTRUCTION UK LTD

DITTON ROAD, WIDNES

CHESHIRE, WA8 0PG

Project

RADCLIFFE HUB

Drawing Title

UNDERGROUND SERVICES SURVEY

Drawn By

JM

09/02/22

Survey Date

JANUARY 2022

Checked by

DJ

09/02/22

Scale

A1@1:200

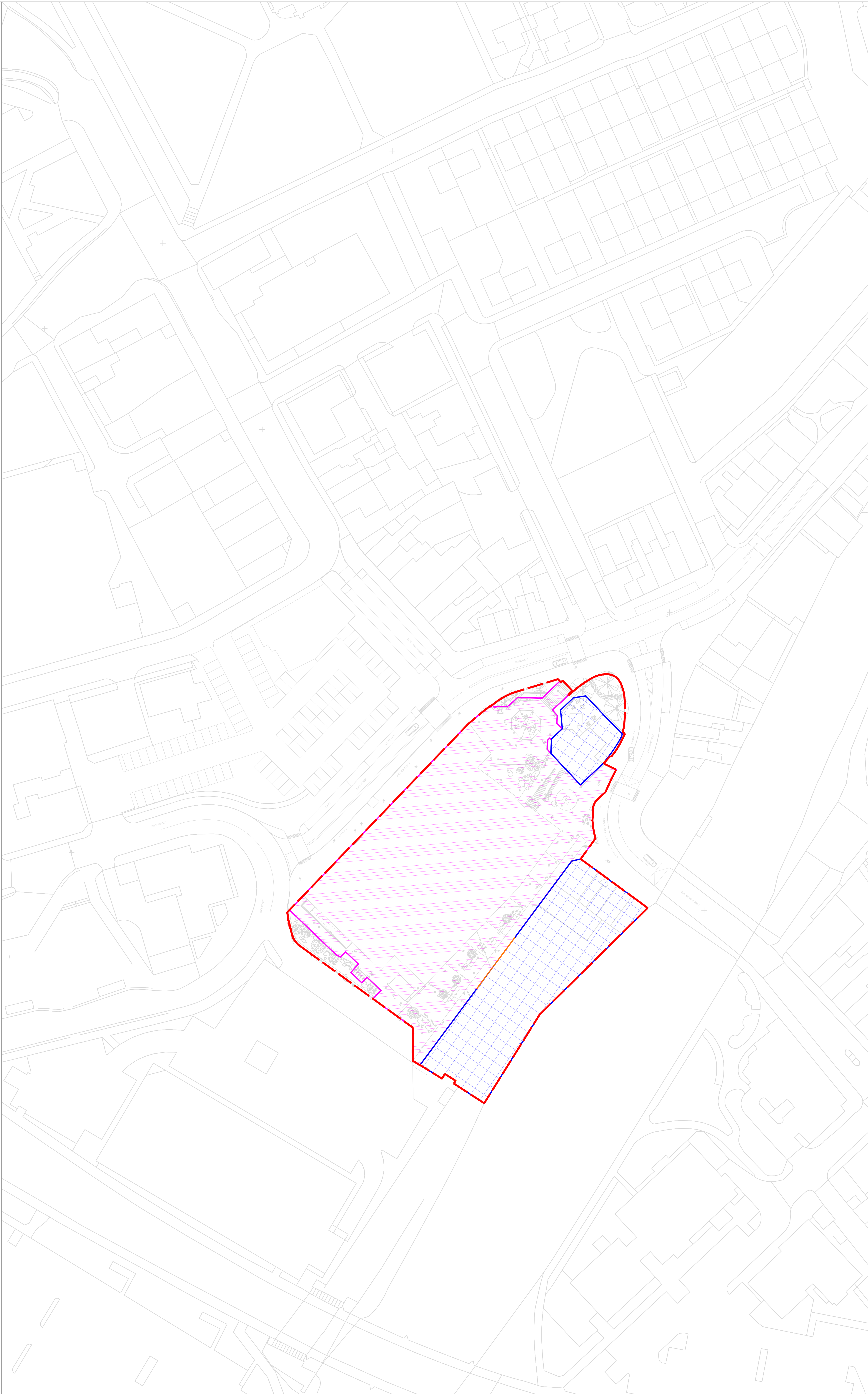
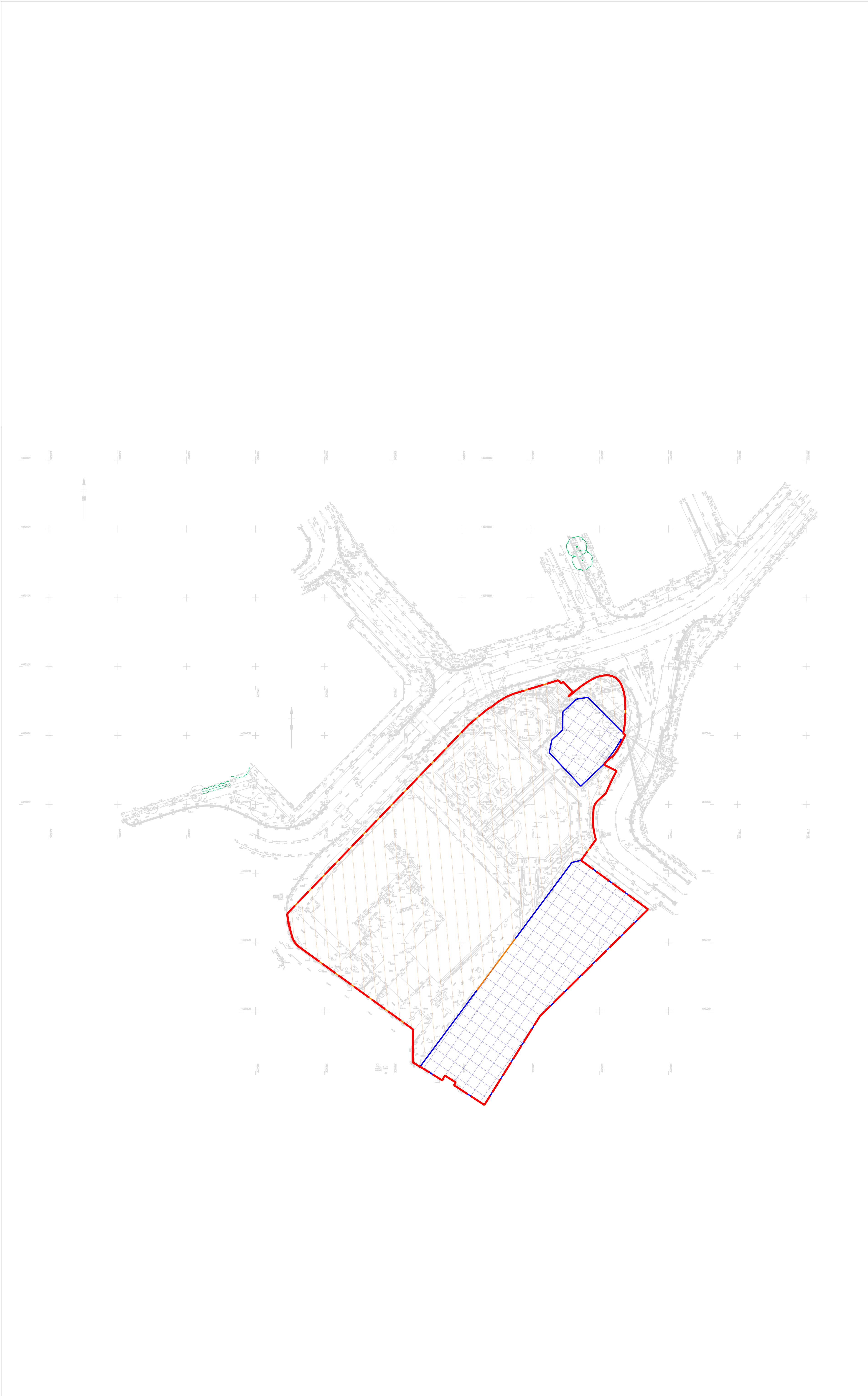
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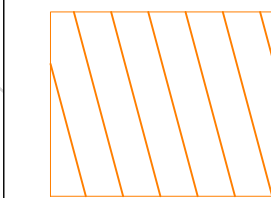
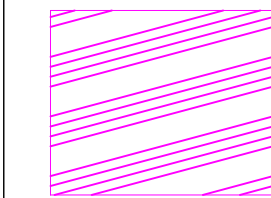
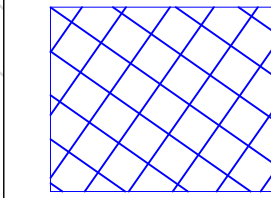
57969/UG5

Revision

C

Appendix G – Pre & Post Development Impermeable Areas Drawing



-  PRE DEVELOPMENT
IMPERMEABLE AREAS = 5,072m²
-  POST DEVELOPMENT
IMPERMEABLE AREAS = 4,711m²
-  AREAS EXCLUDED FROM PROPOSED
DEVELOPMENT = 1,934m²

PN1	22/12/2022	PRELIMINARY - FOR INFORMATION ONLY				JRS	DJS	DJS
REV	DATE	DESCRIPTION				BY	CHK	APP

DRAWING STATUS: **PRELIMINARY**

CLIENT: BURY COUNCIL

ARCHITECT: POZZONI

PROJECT: RADCLIFFE CIVIC HUB

TITLE: BELOW GROUND DRAINAGE
PRE & POST DEVELOPMENT IMPERMEABLE AREAS

STATUS	PROJECT No.	PROJECT	ORIGIN	COLLUSION LEVEL	TYPE	ROLE	DRAWING No.	REV
S2	221-145	RADHUB-AJP-ZZ-XX-SK-C-0001	P01					

SCALE @ A1: 1:500

DESIGNED	DRAWN	CHECKED	APPROVED	DATE
JRS	JRS	DJS	DJS	DEC 2022

 **consulting engineers**
%0151 227 1462 %B info@ajptd.co.uk %1 Dale Street, Liverpool, L2 2ET

Appendix H – Brownfield Runoff Calculations

The Alan Johnston Partnership		Page 1
1 Dale Street Liverpool L2 2ET	221-145 - Radcliffe Civic Hub Existing Brownfield Runoff Discharge Rates	
Date 22/12/2022 15:59	Designed by JRS	
File EXISTING BROWNFIELD RUNOFF.MDX	Checked by DJS	
Micro Drainage	Network 2019.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.325	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.367	4-8	0.141

Total Area Contributing (ha) = 0.508

Total Pipe Volume (m³) = 2.121

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	10.000	0.067	149.3	0.508	5.00	0.0	0.600	o	300	Pipe/Conduit	
S1.001	10.000	0.067	149.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.002	10.000	0.067	149.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.13	63.500	0.508	0.0	0.0	0.0	1.28	90.8	68.8
S1.001	50.00	5.26	63.433	0.508	0.0	0.0	0.0	1.28	90.8	68.8
S1.002	50.00	5.39	63.366	0.508	0.0	0.0	0.0	1.28	90.8	68.8

The Alan Johnston Partnership		Page 2
1 Dale Street Liverpool L2 2ET	221-145 - Radcliffe Civic Hub Existing Brownfield Runoff Discharge Rates	
Date 22/12/2022 15:59	Designed by JRS	
File EXISTING BROWNFIELD RUNOFF.MDX	Checked by DJS	
Micro Drainage	Network 2019.1	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.508	0.508	0.508
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.508	0.508	0.508

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
---------------------	--------------	--------------	--------------	------------------	----------	--------

S1.002	S	65.000	63.299	0.000	0	0
--------	---	--------	--------	-------	---	---

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.325		

The Alan Johnston Partnership		Page 3
1 Dale Street Liverpool L2 2ET	221-145 - Radcliffe Civic Hub Existing Brownfield Runoff Discharge Rates	
Date 22/12/2022 15:59	Designed by JRS	
File EXISTING BROWNFIELD RUNOFF.MDX	Checked by DJS	
Micro Drainage	Network 2019.1	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.325 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s)

Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	SSW01	15 Winter	1	+0%	2/15 Summer			63.736	-0.064	0.000
S1.001	SSW02	15 Winter	1	+0%	2/15 Summer			63.668	-0.065	0.000
S1.002	SSW03	15 Winter	1	+0%	2/15 Summer			63.598	-0.068	0.000

		<u>Pipe</u>		<u>Level</u>	
PN	US/MH Name	Flow / Cap. (l/s)	Overflow Flow (l/s)	Status	Exceeded
S1.000	SSW01	0.95	61.7	OK	
S1.001	SSW02	0.96	62.3	OK	
S1.002	SSW03	0.96	62.2	OK	

The Alan Johnston Partnership		Page 4
1 Dale Street Liverpool L2 2ET	221-145 - Radcliffe Civic Hub Existing Brownfield Runoff Discharge Rates	
Date 22/12/2022 15:59	Designed by JRS	
File EXISTING BROWNFIELD RUNOFF.MDX	Checked by DJS	
Micro Drainage	Network 2019.1	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.325 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s)

Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	SSW01	15 Winter	2	+0%	2/15 Summer				63.861	0.061	0.000
S1.001	SSW02	15 Winter	2	+0%	2/15 Summer				63.768	0.035	0.000
S1.002	SSW03	15 Winter	2	+0%	2/15 Summer				63.676	0.010	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SSW01	1.16		75.4	SURCHARGED	
S1.001	SSW02	1.16		75.0	SURCHARGED	
S1.002	SSW03	1.16		74.9	SURCHARGED	

The Alan Johnston Partnership		Page 5
1 Dale Street Liverpool L2 2ET	221-145 - Radcliffe Civic Hub Existing Brownfield Runoff Discharge Rates	
Date 22/12/2022 15:59	Designed by JRS	
File EXISTING BROWNFIELD RUNOFF.MDX	Checked by DJS	
Micro Drainage	Network 2019.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.325 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s)

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	SSW01	15 Winter	30	+0%	2/15 Summer			64.481	0.681	0.000
S1.001	SSW02	15 Winter	30	+0%	2/15 Summer			64.177	0.444	0.000
S1.002	SSW03	15 Winter	30	+0%	2/15 Summer			63.878	0.212	0.000

PN	US/MH Name	Flow / Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SSW01	2.08	134.9	SURCHARGED	
S1.001	SSW02	2.08	135.1	SURCHARGED	
S1.002	SSW03	2.09	135.6	SURCHARGED	

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1 Dale Street Liverpool L2 2ET	221-145 - Radcliffe Civic Hub Existing Brownfield Runoff Discharge Rates	
Date 22/12/2022 15:59	Designed by JRS	
File EXISTING BROWNFIELD RUNOFF.MDX	Checked by DJS	
Micro Drainage	Network 2019.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.325 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s)

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 0

					Water			Surcharged		Flooded	
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)
S1.000	SSW01	15 Winter	100	+0%	2/15 Summer				64.973	1.173	0.000
S1.001	SSW02	15 Winter	100	+0%	2/15 Summer				64.499	0.766	0.000
S1.002	SSW03	15 Winter	100	+0%	2/15 Summer				64.037	0.371	0.000

		Pipe		Level	
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status
S1.000	SSW01	2.59		168.3	FLOOD RISK
S1.001	SSW02	2.61		169.1	SURCHARGED
S1.002	SSW03	2.61		169.0	SURCHARGED

Appendix I – Preliminary Storage Estimate

The Alan Johnston Partnership		Page 1
1 Dale Street Liverpool L2 2ET	221-145 - Radcliffe Civic Hub Prelim Storage Estimate 50% Betterment	
Date 03/05/2022 12:18	Designed by JRS	
File Prelim Storage Estimate.SRCX	Checked by DJS	
Micro Drainage		Source Control 2019.1

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 49 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control Σ (l/s)	Max Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	63.696	0.696	0.0	34.2	34.2	109.8	0 K
30 min Summer	63.918	0.918	0.0	34.2	34.2	144.7	0 K
60 min Summer	64.046	1.046	0.0	34.2	34.2	164.9	0 K
120 min Summer	64.060	1.060	0.0	34.2	34.2	167.1	0 K
180 min Summer	64.000	1.000	0.0	34.2	34.2	157.7	0 K
240 min Summer	63.918	0.918	0.0	34.2	34.2	144.7	0 K
360 min Summer	63.731	0.731	0.0	34.2	34.2	115.2	0 K
480 min Summer	63.574	0.574	0.0	34.2	34.2	90.6	0 K
600 min Summer	63.453	0.453	0.0	34.2	34.2	71.4	0 K
720 min Summer	63.364	0.364	0.0	34.1	34.1	57.3	0 K
960 min Summer	63.261	0.261	0.0	32.9	32.9	41.2	0 K
1440 min Summer	63.204	0.204	0.0	26.0	26.0	32.1	0 K
2160 min Summer	63.167	0.167	0.0	19.4	19.4	26.3	0 K
2880 min Summer	63.146	0.146	0.0	15.6	15.6	23.0	0 K
4320 min Summer	63.121	0.121	0.0	11.4	11.4	19.1	0 K
5760 min Summer	63.107	0.107	0.0	9.2	9.2	16.9	0 K
7200 min Summer	63.097	0.097	0.0	7.7	7.7	15.3	0 K
8640 min Summer	63.090	0.090	0.0	6.7	6.7	14.2	0 K
10080 min Summer	63.085	0.085	0.0	6.0	6.0	13.3	0 K
15 min Winter	63.797	0.797	0.0	34.2	34.2	125.6	0 K
30 min Winter	64.047	1.047	0.0	34.2	34.2	165.1	0 K
60 min Winter	64.195	1.195	0.0	34.2	34.2	188.5	0 K
120 min Winter	64.191	1.191	0.0	34.2	34.2	187.8	0 K
180 min Winter	64.092	1.092	0.0	34.2	34.2	172.3	0 K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	121.440	0.0	139.5	22
30 min Summer	82.678	0.0	190.0	34
60 min Summer	53.779	0.0	247.5	54
120 min Summer	33.752	0.0	310.7	88
180 min Summer	25.289	0.0	349.2	124
240 min Summer	20.437	0.0	376.3	158
360 min Summer	15.138	0.0	418.1	220
480 min Summer	12.218	0.0	449.9	280
600 min Summer	10.337	0.0	475.8	336
720 min Summer	9.011	0.0	497.8	392
960 min Summer	7.249	0.0	533.9	502
1440 min Summer	5.324	0.0	588.1	738
2160 min Summer	3.900	0.0	646.4	1104
2880 min Summer	3.122	0.0	690.0	1468
4320 min Summer	2.278	0.0	754.9	2204
5760 min Summer	1.819	0.0	804.2	2936
7200 min Summer	1.530	0.0	845.4	3672
8640 min Summer	1.328	0.0	880.7	4360
10080 min Summer	1.179	0.0	911.7	5056
15 min Winter	121.440	0.0	156.3	23
30 min Winter	82.678	0.0	212.9	34
60 min Winter	53.779	0.0	277.2	58
120 min Winter	33.752	0.0	348.0	94
180 min Winter	25.289	0.0	391.1	132

The Alan Johnston Partnership		Page 2
1 Dale Street Liverpool L2 2ET	221-145 - Radcliffe Civic Hub Prelim Storage Estimate 50% Betterment	
Date 03/05/2022 12:18	Designed by JRS	
File Prelim Storage Estimate.SRCX	Checked by DJS	
Micro Drainage	Source Control 2019.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
240 min Winter	63.964	0.964	0.0	34.2	34.2	151.9	0 K
360 min Winter	63.664	0.664	0.0	34.2	34.2	104.7	0 K
480 min Winter	63.441	0.441	0.0	34.2	34.2	69.5	0 K
600 min Winter	63.303	0.303	0.0	33.6	33.6	47.8	0 K
720 min Winter	63.243	0.243	0.0	31.8	31.8	38.4	0 K
960 min Winter	63.204	0.204	0.0	26.0	26.0	32.1	0 K
1440 min Winter	63.166	0.166	0.0	19.2	19.2	26.1	0 K
2160 min Winter	63.137	0.137	0.0	14.1	14.1	21.6	0 K
2880 min Winter	63.121	0.121	0.0	11.3	11.3	19.0	0 K
4320 min Winter	63.101	0.101	0.0	8.3	8.3	15.9	0 K
5760 min Winter	63.090	0.090	0.0	6.6	6.6	14.1	0 K
7200 min Winter	63.082	0.082	0.0	5.6	5.6	12.9	0 K
8640 min Winter	63.076	0.076	0.0	4.8	4.8	11.9	0 K
10080 min Winter	63.071	0.071	0.0	4.3	4.3	11.2	0 K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	20.437	0.0	421.5	170
360 min Winter	15.138	0.0	468.3	234
480 min Winter	12.218	0.0	503.9	288
600 min Winter	10.337	0.0	532.9	336
720 min Winter	9.011	0.0	557.5	382
960 min Winter	7.249	0.0	598.0	500
1440 min Winter	5.324	0.0	658.7	738
2160 min Winter	3.900	0.0	724.0	1104
2880 min Winter	3.122	0.0	772.8	1468
4320 min Winter	2.278	0.0	845.5	2168
5760 min Winter	1.819	0.0	900.7	2912
7200 min Winter	1.530	0.0	946.9	3640
8640 min Winter	1.328	0.0	986.4	4288
10080 min Winter	1.179	0.0	1021.1	5024

The Alan Johnston Partnership		Page 3
1 Dale Street Liverpool L2 2ET	221-145 - Radcliffe Civic Hub Prelim Stroage Estimate 50% Betterment	
Date 03/05/2022 12:18 File Prelim Storage Estimate.SRCX	Designed by JRS Checked by DJS	
Micro Drainage	Source Control 2019.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.325	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.614

Time (mins) Area			Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)	From:	To:	(ha)
0	4	0.205	4	8	0.205	8	12	0.204

The Alan Johnston Partnership		Page 4
1 Dale Street Liverpool L2 2ET	221-145 - Radcliffe Civic Hub Prelim Storage Estimate 50% Betterment	
Date 03/05/2022 12:18 File Prelim Storage Estimate.SRCX	Designed by JRS Checked by DJS	
Micro Drainage	Source Control 2019.1	

Model Details

Storage is Online Cover Level (m) 65.000

Cellular Storage Structure

Invert Level (m) 63.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	166.0	0.0	1.200	166.0	0.0	1.201	0.0	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0248-3420-1200-3420
Design Head (m) 1.200
Design Flow (l/s) 34.2
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 248
Invert Level (m) 63.000
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	34.2	Kick-Flo®	0.868	29.3
Flush-Flo™	0.416	34.2	Mean Flow over Head Range	-	28.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

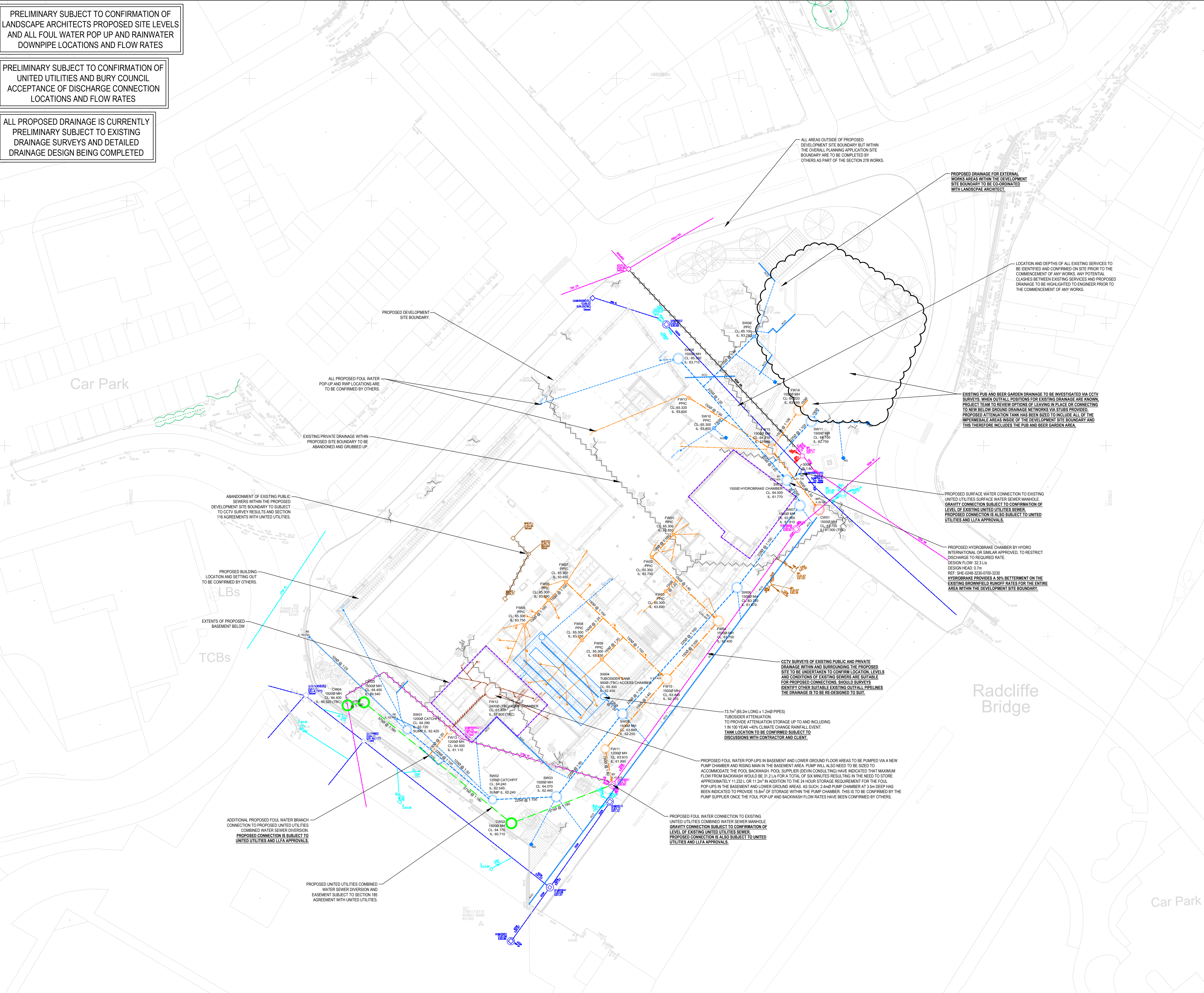
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	8.1	0.800	31.2	2.000	43.7	4.000	61.1	7.000	80.2
0.200	25.3	1.000	31.3	2.200	45.8	4.500	64.7	7.500	82.9
0.300	33.6	1.200	34.2	2.400	47.7	5.000	68.1	8.000	85.6
0.400	34.2	1.400	36.8	2.600	49.6	5.500	71.3	8.500	88.2
0.500	34.0	1.600	39.3	3.000	53.2	6.000	74.4	9.000	90.7
0.600	33.5	1.800	41.5	3.500	57.3	6.500	77.4	9.500	93.1

Appendix J – Outline Drainage Strategy Drawing & SW Calculations

PRELIMINARY SUBJECT TO CONFIRMATION OF LANDSCAPE ARCHITECTS PROPOSED SITE LEVELS AND ALL FOUL WATER POP UP AND RAINWATER DOWNPIPE LOCATIONS AND FLOW RATES

PRELIMINARY SUBJECT TO CONFIRMATION OF UNITED UTILITIES AND BURY COUNCIL ACCEPTANCE OF DISCHARGE CONNECTION LOCATIONS AND FLOW RATES

ALL PROPOSED DRAINAGE IS CURRENTLY PRELIMINARY SUBJECT TO EXISTING DRAINAGE SURVEYS AND DETAILED DRAINAGE DESIGN BEING COMPLETED



- IMPORTANT NOTES**
- SETTING OUT SHALL BE UNDERTAKEN USING ONLY THE INFORMATION GIVEN. DISTANCES SHOULD NOT BE SCALED FROM THIS DRAWING.
 - ALL SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH SEWERS FOR ADOPTION 17TH EDITION AND UNITED UTILITIES DETAILS & GUIDELINES.
 - THE MINIMUM GRAVITY PIPE DIAMETER UNDER ADOPTABLE HIGHWAYS SHALL BE 150mm.
 - IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL INFORMATION GIVEN WITH REGARDS TO EXISTING SERVICES AND DRAINAGE CONNECTIONS ETC. PRIOR TO COMMENCING THE WORKS. THE NOTES SHALL INCLUDE FOR HAND DGS AROUND SERVICES WHERE NECESSARY. THE CONTRACTOR SHALL ADHERE TO THE COM REGULATIONS AT ALL TIMES.
 - THE OUTSIDES OF ALL SEWERS SHALL BE A MINIMUM OF 1.0m FROM KERB LINES AND THE OUTSIDE OF MANHOLES SHALL BE A MINIMUM OF 0.5m FROM KERB LINES.
 - EXISTING FLOWS IN WATERCOURSES, SEWERS AND LAND DRAINS SHALL BE MAINTAINED AT ALL TIMES.
 - ONLY TRAINED PERSONNEL SHALL BE PERMITTED TO ENTER CONFINED SPACES.
 - ALL MATERIALS TO BEAR THE RELEVANT B.S. KITEMARK AND COMPLY FULLY WITH THE SPECIFICATIONS. ALL CONCRETE & CONCRETE PRODUCTS MUST USE SULPHATE RESISTANT CEMENT UNLESS THE SITE INVESTIGATION REPORT PROVES THAT SULPHATE ATTACK FROM SOILS AND GROUNDWATER WILL NOT OCCUR TO WITHSTAND A CLASS.
 - ALL OPENING NOTICES ETC. AS REQUIRED UNDER HIGHWAYS ACTS ETC. ARE TO BE OBTAINED PRIOR TO COMMENCEMENT OF WORKS. ALL WORKS ARE TO BE INSPECTED BY L.A. INHSC OR THE NETWORK OPERATOR AS APPLICABLE.
 - WHEREVER 150mm RCP UPVC PIPES (OR SIMILAR APPROVED) ARE USED IN ADOPTABLE DRAINAGE THEY SHALL STILL BE HANDLED AND JOINTED IN ACCORDANCE WITH THE SPECIFICATION AND GUIDANCE ISSUED BY THE HIGH PERFORMANCE PIPE ASSOCIATION.
 - A CLASS 5 BED AND SURROUND MUST BE USED FOR SUCH PIPES. TRENCH BACKFILL IN HIGHWAYS TO WITHIN 1M OF HIGHWAY SHALL AS DIRECTED BY THE HIGHWAY AUTHORITY BE A SUITABLE GRANULAR MATERIAL ALL IN ACCORDANCE WITH SEWERS FOR ADOPTION CL 4.3.4.
 - SUB LEVELS SHALL NOT BE VARIED WITHOUT REFERENCE TO THE ENGINEER FOR GUIDANCE.
 - ALL GULLY CONNECTIONS TO BE 150mm VITRIFIED CLAY (UNLESS NOTED OTHERWISE).
 - ALL MANHOLE COVERS TO BE RECESSED TO ACCEPT FINISH AS DETAILED BY LANDSCAPE ARCHITECT.
 - SLOW REST BENDS TO BE USED IN ALL LOCATIONS MADE UP FROM 2m 45 DEG BENDS (800mm TO INVERT FROM FFL).
 - MANHOLE POSITIONS AND ACCESS COVERS TO BE ACCURATELY SET OUT BY LANDSCAPE ARCHITECT TO SUIT EXTERNAL FINISHES.
 - ALL DRAINS CAST THROUGH FOUNDATIONS TO HAVE ROCKER PIPES ON BOTH SIDES OF FOUNDATION.
 - ALL POP UP POSITIONS TO BE CONFIRMED SET OUT DIMENSIONS TO BE AGREED & PROVIDED BY OTHERS.
 - ALL DISCHARGE RATES TO BE CONFIRMED BY M&E DESIGNER.
 - ALL SURFACE WATER COLLECTION FEATURES TO BE CONFIRMED BY THE LANDSCAPE ARCHITECT.
 - STORAGE HAS BEEN PROVIDED IN A CELLULAR STORAGE TANK AND UP SIZES MANHOLES AND PIPES.
 - EXISTING SEWER DEPTHS HAVE BEEN APPROXIMATED FROM LIMITED INFORMATION. NEW CONNECTIONS TO BE CONFIRMED PRIOR TO CONSTRUCTION OF ANY DRAINAGE WORKS.
 - LANDSCAPE ARCHITECT TO CONFIRM GULLY AND DRAINAGE CHANNEL LOCATIONS TO LANDSCAPED AREAS.
 - FOUL NETWORK TO BE CONFIRMED FOLLOWING CONFIRMATION OF BRANCH CONNECTION POINTS FROM BUILDING M&E DESIGNER.
 - CCTV SURVEY OF EXISTING SITE DRAINAGE REQUIRED PRIOR TO THE COMMENCEMENT OF ANY WORKS STARTING ON SITE.

- LEGEND**
- PROPOSED SURFACE WATER MANHOLE
 - PROPOSED FOUL WATER MANHOLE
 - PROPOSED SURFACE WATER PIP
 - PROPOSED FOUL WATER PIP
 - PROPOSED SURFACE WATER DRAINAGE
 - PROPOSED FOUL WATER DRAINAGE
 - PROPOSED BASEMENT LEVEL FOUL WATER PUMP CHAMBER
 - PROPOSED BASEMENT LEVEL FOUL WATER DRAINAGE
 - PROPOSED BASEMENT EXTENTS
 - PROPOSED BELOW GROUND TUBESIDE ATTENUATION
 - PROPOSED UNITED UTILITIES COMBINED WATER SEWER DIVERSION WITH SEWER EASEMENT
 - EXISTING UNITED UTILITIES SURFACE WATER SEWER
 - EXISTING UNITED UTILITIES FOUL WATER SEWER
 - EXISTING UNITED UTILITIES COMBINED WATER SEWER
 - EXISTING PRIVATE SURFACE WATER DRAINAGE TO REMAIN
 - EXISTING PRIVATE FOUL WATER DRAINAGE TO REMAIN
 - EXISTING PRIVATE COMBINED WATER DRAINAGE TO REMAIN
 - EXISTING UNITED UTILITIES SEWERS ALREADY ABANDONED
 - EXISTING UNITED UTILITIES SEWERS TO BE ABANDONED
 - EXISTING PRIVATE DRAINAGE TO BE ABANDONED

REV	DATE	DESCRIPTION	BY	CHK	APP
P05	22.02.2022	UPDATED TO SUIT LATEST GENERAL ARRANGEMENTS	JAR	DJS	DJS
P04	21.10.2022	REB STAGE 1 (SPATIAL COORDINATION)	JAR	JRS	DJS
P03	13.09.2022	REB STAGE 1 (DEVELOPED DESIGN)	JAR	JRS	DJS
P02	17.08.2022	STAGE 2 WORK IN PROGRESS FOR DESIGN COORDINATION	JRS	DJS	DJS
P01	04.05.2022	REB STAGE 2 (CONCEPT DESIGN)	JRS	DJS	DJS

DRAWING STATUS: **PRELIMINARY**

CLIENT: BURY COUNCIL

ARCHITECT: POZZONI

PROJECT: RADCLIFFE CIVIC HUB

TITLE: BELOW GROUND DRAINAGE OUTLINE DRAINAGE STRATEGY

STATUS:	PROJECT NO:	PROJECT:	ORIGIN:	FUNCTION:	SPACING:	FORM:	DESC:	DRAWING NO:	REV:
S2	221-145	RADHUB-AJP-V4-ZZ-DR-C-0001						P05	

SCALE & UNIT: 1:200

DESIGNED: JRS

DRAWN: JRS

CHECKED: DJS

APPROVED: DJS

SITE: MAY 2022

AJP consulting engineers

0.0151 227 1462 88info@ajpgtd.co.uk 81 Dale Street, Liverpool, L2 2ET

Appendix K – PHA Waterproofing Risk Assessment

Waterproofing Risk Assessment
For
Radcliffe Hub & Market



Our Reference: PHA/GEN/RA/600



Prepared by:

M. A. Earle | WDS CSSW
L. Dear | CSSW TechICT

Initial Date:

21st October 2022

Instructed by:

Mr Danny Sinclair, Director of AJP Ltd, acting as agent on behalf
of Vinci Construction UK

Legacy of Revision:

A - 21/10/22 – Issue of risk assessment in-line with BS:8102:2022

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AJP Ltd
1 Dale Street
Liverpool
Merseyside
L2 2ET

21st October 2022

PHA-GEN-RA-600

Radcliffe Hub & Market - **Waterproofing Risk Assessment**

Dear Mr Sinclair

I write further to our e-mails and correspondence regarding the waterproofing of the above-mentioned scheme.

To confirm you have appointed me as the Waterproofing Specialist as recommended in BS8102:2022.

The purpose of my appointment is to review the various issues relating to the waterproofing design in conjunction with the method of construction for this particular project and comment as necessary on its compliance to BS8102:2022.

I have also been provided with the following documents as part of my review alongside the structures design:

- Geoenvironmental Appraisal (iD Geoenvironmental Ltd ref: 5238-G-R001– August 2022).

To begin with I will look at outlining BS:8102's requirements/principles.

WATERPROOFING PRINCIPLES AND BS:8102:2022

Penetration of Water from the Ground

Water can penetrate a below ground structure in two ways:

Where the ground is not saturated, it will move through the capillaries of the ground and structure by capillary suction. When this form of moisture comes to the internal surface of the building, surface dampness is evident but there will be no free flow (flooding) of water. Capillary moisture can enter a structure laterally, such as when a wall is earth retaining, and/or it can rise up from the ground through floors or free-standing walls, appearing internally as rising damp.

Where the ground is saturated and hydrostatic pressure occurs, this pressure will push the water through the capillaries of the ground and structure. Where the water comes to the surface, the pressure behind it will force it into the property in the form of liquid water and flooding will occur.

Where a wall is earth-retaining penetration will be lateral, through the retained soil. If the water table is high (either naturally or when water is trapped in a sump created in a low permeability soil when the foundations are excavated), or if rainwater causes the soil to become saturated, then this water will be under hydrostatic pressure and could flood the property internally. If there is no water pressure present, then penetration will be through capillary action, and the property will not flood internally.

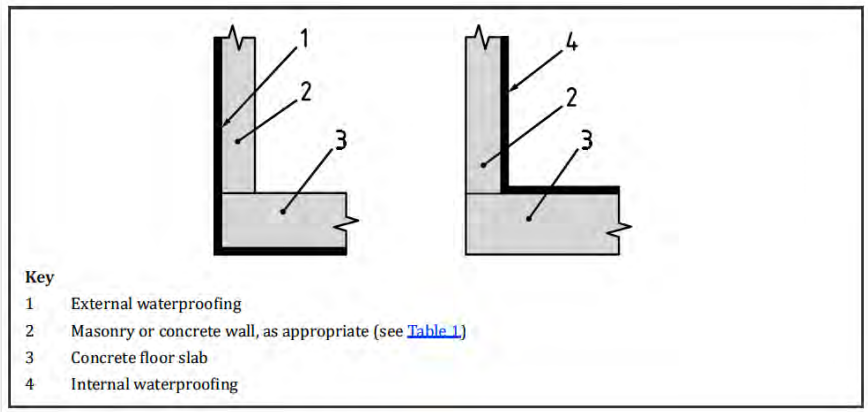
Producing a Dry Environment

Nothing is absolutely dry. Water and water vapour will always exist bound up in the building and in the air. However, a building will be perceived as being dry if the water present does not pose a problem for the inhabitants or contents of that building, or cause damage to internal finishes.

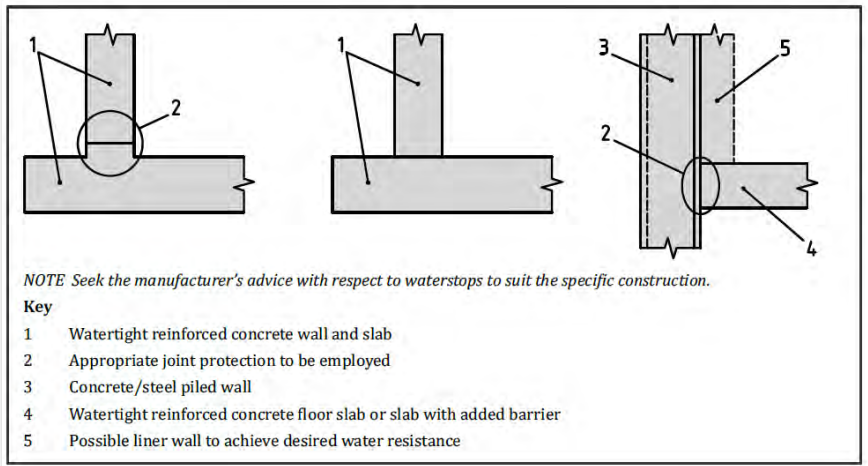
Producing a dry basement requires two distinct and separate steps.

Firstly, penetration of water from the ground must be stopped. BS:8102:2022, Code of Practice for Protection of Below Ground structures against water ingress, defines three forms of waterproofing construction:

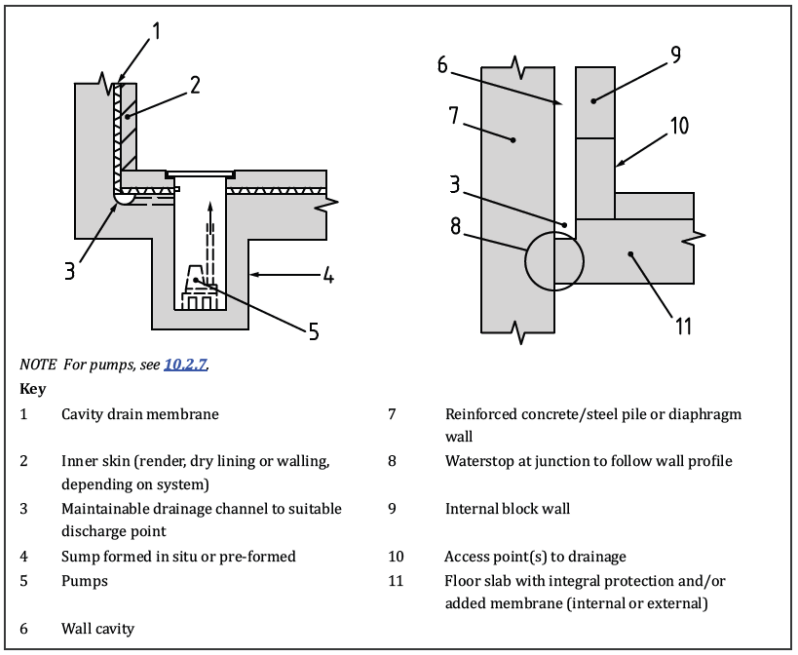
Type A - Barrier Protection, where groundwater is stopped at the point of entry by the application of a waterproof membrane.



Type B - Structurally Integral Protection, where the basement structure is designed and built in such a way that the structure is watertight in its own right. This is usually done using reinforced concrete designed to BS EN 1992-1 Part1 and BS EN 1992-3 and may contain the addition of a concrete waterproofing additive (also see complimenting standards BS:8110 and BS:8007). Waterstops/bars should be present in ALL construction joints.



Type C – Drained Protection, where the structure allows limited groundwater to penetrate, and then diverts that water, in a controlled manner, to a point from where it is removed by drainage or pumping.



Secondly, the internal environment needs to be heated to the appropriate temperature. Furthermore, excess humidity, created by the normal activities of the occupants, must be removed. This is normally done by ensuring there is adequate ventilation (natural or forced) in the area although, in extreme cases, air conditioning or dehumidification may prove to be necessary.

Groundwater

Clause 5.1.2 of BS:8102 says “Even when the site investigation indicates dry conditions, the risk of waterlogging in the future should be assumed”. This effectively means that, regardless of conditions at the time of any site survey/inspection, and regardless of the findings of the soil survey, some groundwater pressure must be assumed.

Defects and Remedial Measures

Paragraph 4.3.2 of BS:8102 says “An ideal waterproofing solution would be defect-free. However, it should be taken into

account that defects might occur in the waterproofing, which then, if subjected to water pressure, could result in the required internal environment not being achieved.”

It then lists types of defect, most of which is avoidable by taking due care during design and installation. However, a category of defect (inherent in the particular system being used) must be allowed for in the design, and it goes on to say, “In either case, the issue of reparability should be taken into account and the

feasibility of remedial measures after completion of the project with finishes in place assessed”.

Environmental Grades

In Table 2 of BS:8102, it defines three grades of internal environment. Grade 1 is generally used for car parks or any other area where absolute dryness is not paramount. Some water ingress may be acceptable provided it does not adversely affect the performance of the area.

Grades 2 & 3 do not permit any penetration of water from the ground but define different levels internal dryness with Grade 3 being reserved normally for habitable or ‘dry’ spaces.

THE STRUCTURE CONSTRUCTION AND USE

Looking at this particular scheme the following observations are relevant in terms of waterproofing design.

1. The scheme is understood to comprise of a new build, mixed use civic centre development. Consisting of swimming pools, communal areas, rock climbing, library, and associated plant & infrastructure. Along with the new build portion there is the redevelopment of an existing Victorian market. Consisting of event spaces, kitchen amenities, retail units, dance studios, offices, and associated plant & infrastructure.

2. The current site layout consists of a series of commercial properties and open space, with the Radcliffe Market Hall Building to the Southeast and the river Irwell beyond. There is a gentle elevation that falls from north to south.

3. Within the new build Hub structure, the retaining elements are against the lift pits, integral pool plant room, water tank room, swimming pools, stair cores and clip and climb area. The lift pits, integral pool plant and water tank room would be considered a Grade 2 environment. The swimming pools, stair cores and clip climb would be considered Grade 3, due to proposed use and internal finishes. Within the existing Market Building, the retaining elements are against the three main areas of the basement: The Chambers, The Link and The Market (there is a fourth basement area which is not covered by this design). The footprint of basement would be considered a Grade 3 area throughout, the only exception being the plant areas which would be considered a Grade 2 environment.

4. Where there are retaining elements within new build Hub structure, these are to be formed from reinforced concrete retaining walls and reinforced concrete slab(s). The lift pits also include a reinforced concrete pile cap foundation. Where there are retaining elements within the existing Market Building, these are formed of an existing Victorian masonry wall, to which will be tied to a new reinforced concrete slab suspended on pile cap foundations.

5. The soils encountered during the site investigation are summarised below, as per iD Geoenvironmental Ltd Geoenvironmental Appraisal: 5238-G-R001, Executive summary:

Made Ground between 0.6m – 1.8m thick is present across the site with several below ground obstructions associated with former buildings encountered during the investigation.

Glaciofluvial Sheet Deposits typically comprising low shear strength brown sandy gravelly clay underlain by medium dense grey gravelly sand were encountered directly beneath the Made Ground and were proven to depths ranging between 3.0m to 5.2mbgl.

Geotechnical testing indicates that cohesive Glaciofluvial Sheet Deposits at the site should be regarded as being of medium volume change potential.

Pennine Middle Coal Measures (PMCM) bedrock comprising grey to dark grey thinly laminated Mudstone with extremely variable rock mass characteristics was encountered at depths ranging from 3.0mbgl to 5.2mbgl and were proven to a maximum depth of 18.0m in BH07. A thin band of coal was encountered in BH06 at a depth of 13.2-13.3m.

6. Groundwater was encountered during site investigations at depth between 1.33mbgl to 4.15mbgl. It should be noted that a slightly deeper, secondary body of water was observed, resting approx. 1m above the Pennine Middle Coal Measures bedrock, this sits the body between 0.3m to 0.4m to the underside of -02 basement lvl.

7. The site is identified to be within a Gas Risk Zone. The site is not identified to be in a Flood Zone (Flood Zone 1) as per UK Government website flood maps flood-map-for-planning.service.gov.uk. However, it runs parallel to a Flood Zone 3 area and body of water in the form of the river Irwell. The South-eastern wall of the market building retains against the river. In December 2015, Irwell broke its banks causing localised flooding. See images bellow featuring The Market Building retaining wall:



8. The site is within an area identified as needing basic Radon protection measures. Radon levels recorded in 1% - 3% of dwellings above actionable levels. As per ukradon.org mapping information. Please advise if otherwise.

Waterproofing of this scheme

Looking at the ground conditions, groundwater has been encountered. Whilst the soil types found within the superficial deposits are permeable, of that found in Secondary A Aquifers, the water table is high. The site, specifically the Market Building, has been found to reside parallel to Flood Zone 3 and a flowing body of water. With this in mind, we would class the risk of the site to be high. As such, a form(s) of waterproofing should be introduced.

I confirm I am a Certificated Surveyor of Structural Waterproofing (CSSW) and appear on the Waterproofing Design Specialist Register, both of which can be confirmed if required by contacting the Property Care Association (PCA).

Yours sincerely,

Michael Earle | WDS CSSW
Director

Luke Dear | CSSW TechICT
Associate

Enc.