SANDILANDS PRIMARY SCHOOL, WYTHENSHAWE

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY REPORT

23rd November 2023

SANDILANDS PRIMARY SCHOOL, WYTHENSHAWE

HIGH LEVEL DRAINAGE STRATEGY REPORT

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TILBURY DOUGLAS - SANDILANDS PRIMARY SCHOOL, WYTHENSHAWE

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SANDILANDS PRIMARY SCHOOL, WYTHENSHAWE FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY REPORT

1.0 INTRODUCTION

This Flood Risk Assessment (FRA) and Drainage Strategy Report has been prepared on behalf of Tilbury Douglas in connection with the construction of the new Sandilands Primary School in Wythenshawe, M23 9JX. The site is situated on the existing Sandilands Primary School site, to the north of Wendover Road in Wythenshawe. Even though the site is located entirely within Flood Zone 1, the total area of the proposed development is over 1.0ha 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 DESCIPTION

The proposed development is situated on the site of the existing Sandilands Primary School, which is located to the north of Wendover Road, Wythenshawe. The site is located at National Grid reference SJ 79596 89624. The site location is illustrated in Appendix A and the extent of the area to which the application relates is shown on the aerial photo, which is attached in Appendix B.

The site is fairly flat, with minimal falls from south to north, with levels falling from approximately 29.00mAOD in the south to approximately 28.30mAOD in the north. The topo and utility survey is attached in Appendix C. The proposed site levels are constrained by the surrounding residential developments and highway to the south.

2.1 Geology

An intrusive site investigation has been completed by 1st Horizon in September 2021, SRP1034-1HZ-ZZ-XX-T-Y-0008. The site investigation indicates that the underlying strata consists of made ground to depths of around 0.80mbgl, which is underlain by Fluvioglacial deposits comprising mainly of gravelly sands to depths of around 3.00mbgl. This is then underlain by Glacial Till deposits comprising mainly of firm clays to a maximum recorded depth of 7.60mbgl and this is underlain by Siltstone bedrock, which was encountered at depths of around 7.20mbgl.

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 the bedrock reported to be of the Tarporley Siltstone Formation comprising of siltstone, mudstone and sandstone.

2.2 Hydrogeology

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

mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin cracks (called fissures) and openings or eroded layers.

The Environment Agency groundwater maps also indicate that the development site is not situated within a groundwater Source Protection Zone (SPZ). Groundwater was encountered within all of the exploratory holes undertaken within the 1st Horizon Ground Investigation Report, SRP1034-1HZ-ZZ-XX-T-Y-0008. However, the report indicates that this is anticipated to be a shallow perched water table resulting from the underlying impermeable strata. Therefore, it is concluded that the groundwater is located at depth.

2.3 Hydrology

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 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 3.250ha but an area of 1.887ha of the site will remain as per the existing scenario. The 1.887ha area comprises of the sports pitches/greenfield areas to the north of the site, the existing hard play area to the west of the site and the nursery, caretakers property and existing access road to the east of the site. As such, the proposed school development will be located within the southern-central area of the overall site and will cover a total area of 1.363ha.

The proposed development is to demolish the existing school buildings and associated hard standing areas and construct a new two storey main school building with accompanying car park, additional access roads and soft play areas. The new school building will be constructed prior to the old school buildings being demolished. As such, the proposed drainage strategy will need to be designed to accommodate this phased approach to the development.

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 highway. 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 in Flood Zone 1, 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 (Schools) as 'More Vulnerable' but as the site is located within Flood Zone 1 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 entire site is located within Flood Zone 1 and therefore, the site is located in Flood Zone 1 with a chance of flooding of less than 0.1% (or 1 in 1000).

The nearest designated main river is the Fairywell Brook, which is located 210m west of the site. There is also an unnamed watercourse located just outside the north-east corner of the site. Despite this, the site is located in Flood Zone 1 and therefore 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 28.300mAOD, 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 the entire site is classified as having a low or very low risk of surface water 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 outline in Section 2.2, groundwater was encountered within all of the exploratory holes undertaken within the 1st Horizon Ground Investigation Report, SRP1034-1HZ-ZZ-XXT-Y-0008. However, the report concludes that the shallow groundwater is actually a perched water table due to the underlying impermeable strata.

However, given the presence of perched groundwater, some minor flood mitigation measures should be implemented across the site to mitigate the minor risk of groundwater flooding. The mitigation measures should include; no basement construction across the site, the external ground levels should fall away from the proposed building and the proposed finished floor level of the building is set above the existing site levels.

As such, due to the proposed mitigation measures and the fact that the site investigation report indicates that the groundwater encountered is actually a perched water table, 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, the only public sewer located within the site boundary is the 225mm diameter combined water sewer, which is located within the south-east corner of the site.

As this is the only nearby public sewer located within the site and all other existing public sewers are located within the existing highway to the south and the surrounding residential developments to the north and west of the site, it is not considered to pose a risk of flooding to the proposed development. This is due to the distance between the public sewer and the proposed new school building.

Therefore, due to the lack of public sewers within the proposed site, the fact that the proposed drainage networks for the site will be suitably designed and the fact that the surrounding public sewers are maintained by United Utilities, 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 Bridgewater Canal which is located 7.71km north-west of the site. The nearest reservoir is Rostherne Mere which is located approximately 7.20km south-west 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.

5.7 Flood Mitigation Measures

As outlined above the only flood mitigation measures required for the proposed site are associated with the minimal risk of groundwater flooding. These are summarised below:

- No basement construction to be completed across the site.
- The external ground levels should fall away from the proposed building.
- Proposed building finished floor level should be set above the existing site levels.

6.0 DRAINAGE STRATEGY

6.1 Effect of Proposed Development

As previously outlined in Section 3.0, the existing site covers a total area of 3.250ha but an area of 1.887ha of the site will remain as per the existing scenario. The 1.887ha area comprises of the sports pitches/greenfield areas to the north of the site, the existing hard play area to the west of the site and the nursery, caretakers property and existing access road to the east of the site.

As such, the proposed school development will be located within the southern-central area of the overall site and will cover a total area of 1.363ha. Therefore, the 1.887ha area which is to drain as per the existing scenario, will be excluded from the rest of the report.

The pre and post development impermeable areas for the 1.363ha 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)
1.363	0.763	0.641

Therefore, the changes to the existing site will decrease the volume of impermeable areas and as such, the proposed development will lead to a 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.

Despite this, 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 public sewer map, attached in Appendix F, there is an existing 225mm diameter public combined sewer located within the site boundary, to the south-east corner of the site. The United Utilities public sewer map indicates that this is the only public sewer located within the site boundary, with all other nearby public sewers located within the surrounding highways to the south, east and west of the site.

The existing topo and utility survey, attached in Appendix C, indicates that there is an existing private combined water drainage network which drains the existing school site and discharges the runoff into the existing 225mm diameter public combined water sewer, located to the south-east corner of the site and also to the existing 300mm/375mm diameter public combined water sewer, located on Wendover Road, to the south-west of the site.

A CCTV survey of the existing private drainage has been completed by Lanes Group plc in August 2021. A copy of the CCTV Survey plan is attached in Appendix F. As can be seen the CCTV survey confirms that the existing private combined water network discharges into the existing 225mm diameter public combined water sewer, located to the south-east corner of the site but was unable to confirm the connection to the existing 300mm/375mm diameter public combined water sewer, located on Wendover Road, to the south-west of the site.

Further CCTV surveys have been undertaken by Layer Surveys, with this information also attached in Appendix F. This survey confirms the connection from the existing private combined water network to the existing 300mm/375mm diameter public combined water sewer, located on Wendover Road, to the south-west of the site and also confirms the details and levels of the existing 300mm/375mm diameter public combined water sewer, located on Wendover Road, to the south of the site.

Due to the location of the only public sewer located within the site; the existing 225mm diameter public combined sewer located to the south-east corner of the site; being predominantly within the area which is to remain as per the existing, the existing public sewer will remain in place and not require an abandonment or diversion.

As such, only the length of the public sewer that lies within the areas being amended would be required to have a sewer easement for United Utilities maintenance. Based on the

public sewer depth of around 2.20m and the pipe diameter of 225mm, the required sewer easement would be 3.0m either side of the public sewer. Therefore, this sewer easement should be maintained to allow United Utilities access to the public sewer for maintenance purposes.

6.3 Proposed Drainage Strategy

6.3.1 Surface Water Drainage

The Planning Policy Guidance and the CIRIA SuDS Manual detail that surface water runoff from a development should be disposed of as high up the following hierarchy as reasonable practicable:

- into the ground (infiltration);
- to a surface water body;
- to a surface water sewer, highway drain, or another drainage system;
- to a combined sewer.

An intrusive site investigation has also been completed by 1st Horizon, SRP1034-1HZ-ZZ-XX-T-Y-0008. The 1st Horizon site investigation indicates that the strata comprises of made ground underlain by fluvioglacial deposits, which is then underlain by glacial till deposits comprising of stiff clays.

The site investigation report also indicates that shallow groundwater was encountered in all of the exploratory holes at depths between 0.70mbgl and 2.00mbgl but the reports indicates that this is a perched water table above the underlying impermeable strata.

Therefore, even though no BRE365 compliant infiltration testing has been completed it has been concluded that due to the presence of the shallow perched water, infiltration is clearly not suitable across the site. This is due to the fact that, if infiltration was suitable there would be no consistent perched water table above the impermeable strata.

As such, no BRE365 compliant infiltration tests are required as the presence of the consistent perched water table across the site is enough to indicate that the underlying impermeable strata precludes the use of infiltration.

As the site investigation has ruled out infiltration, the surface water runoff should discharge to watercourse. The nearest watercourse is the small drain which runs south to north through the existing wooded area to the north-east corner of the site. From the historical maps, attached in Appendix F, it can be seen that this watercourse is actually the remnants of an old field drain.

However, discussions with the Lead Local Flood Authority (LLFA) have been undertaken and they have indicated that a connection to this watercourse would not be suitable. This is due to the fact that the LLFA do not believe that the watercourse is suitable to serve the proposed site.

Currently the LLFA have not got any records of where the watercourse discharges but believe that it discharges into the public sewers on the opposite side of the residential development to the north-east of the site but can't confirm an outfall location.

This coupled with the fact that the watercourse is predominantly dry and that it is located within a heavily wooded area which could pose issues with regards to tree root protection orders, has led to the conclusion that the watercourse is not suitable for the discharge of the surface water runoff from the site. This was confirmed via pre application discussions with the LLFA. A survey of the watercourse can be seen in Appendix C and photos of the watercourse can be seen in Appendix F.

Therefore, as infiltration and discharge to watercourse have been deemed as unsuitable, the only option is discharge to public sewer. As there are no nearby public surface water sewers, an existing private outfall from the site will be re-used.

As such, the surface water from the proposed development will discharge to the existing 300mm/375mm diameter public combined water sewer, located on Wendover Road, to the south of the site, via the existing private outfalls.

As previously outlined, there are 2no. existing private combined water outfalls which have been proven, via CCTV. The outfall pipeline to the south-west corner of the site discharges into the existing 300mm diameter public combined water sewer on Wendover Road, while the outfall pipeline to the south-east of the site discharges into the existing 225mm diameter public combined water sewer located within the site boundary to the south-east corner.

However, the CCTV surveys, attached in Appendix F, indicate that these existing private drainage outfall pipelines are too shallow to allow for a gravity connections from the proposed drainage and therefore, both the surface water and foul water from the proposed development will need to be pumped.

Therefore, the proposed surface water drainage will discharge into the existing 225mm diameter public combined water sewer located within the site boundary to the south-east corner, via the existing private combined water outfall pipeline. The surface water runoff will be pumped into the existing private combined water outfall pipeline.

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 (8th 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 aboveground 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 45% 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 (+45%) 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 site is classified as brownfield, a minimum 50% betterment on the existing surface water brownfield runoff rate is to be applied, in line with Section 3.4.1 of the Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA User Guide.

As previously outlined in Section 6.1, the proposed school development will be located within the southern-central area of the overall site and will cover a total area of 1.363ha. Therefore, the 1.887ha area which is to drain as per the existing scenario will be excluded from the rest of the report, with only the 1.363ha development area being used to calculate the existing brownfield runoff rates and proposed surface water discharge rates.

Therefore, an assessment of the existing surface water run-off from the brownfield site has been completed using a simple three pipe network modelled in Micro Drainage. For the existing 1.363ha site, using an existing impermeable area of 0.763ha, an existing 2-year return period brownfield discharge rate of 26.7 L/s was generated. The brownfield runoff assessment is attached in Appendix H.

Rainfall Return Period (years)	Existing Brownfield Runoff Rate (L/s)	Proposed Runoff Rate - 50% Betterment (L/s)
Qbar (2 Year)	104.7	52.3
30 year	113.6	56.8
100 year	214.2	107.1

Therefore, to comply with the LLFA requirements the surface water discharge from the proposed site should be restricted to a maximum discharge rate of 52.3 L/s for all rainfall events up to and including the 1 in 100 year +45% climate change event.

However, a pre development enquiry has been submitted to United Utilities with a response received. The correspondence is attached in Appendix F. United Utilities have indicated that the surface water discharge from the proposed site should be restricted to a maximum discharge rate of 23.0 L/s.

Therefore, using the total post development impermeable area of 0.641ha at the restricted discharge rate of 23.0 L/s, for the 1 in 100 year + 45% return period design storm, a storage volume of 230.6m^3 is required. The preliminary attenuation storage assessment is attached in Appendix I. This is an estimate only and the actual attenuation storage requirements are indicated within the proposed surface water drainage calculations, attached in Appendix J.

As seen in the Outline Drainage Strategy Drawing attached in Appendix J, the attenuation storage will be provided in the form of permeable paving, a cellular attenuation tank and the surface water drainage network itself with a surface water pump used to restrict the discharge rate to the required 23.0 L/s.

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 prevents any flooding for all rainfall events up to and including the 1 in 100 year + 45% climate change event and also meets the 23.0 L/s discharge restriction.

The proposed surface water drainage calculations are attached in Appendix J and as can be seen from the results, the surcharged runoff is to be stored using a 97.0m^3 below ground cellular attenuation tank, with the remaining surcharged runoff stored within the 400mm deep granular drainage blanket below the areas of permeable paving and also within the proposed surface water drainage network itself.

This is confirmed via the proposed surface water drainage calculations, attached in Appendix J, which indicate that there is no flooding for all rainfall events up to and including the 1 in 100 year +45% climate change event.

As can be seen from the Outline Drainage Strategy Drawing attached in Appendix J, the surface water drainage collects the runoff from the site area via permeable paving/porous macadam, gullies, linear drainage channels and rainwater downpipes and conveys the surface water runoff to the east of the proposed site.

Here the surface water runoff discharges into a proposed surface water pump chamber, prior to discharging via a rising main, into the existing private combined water manhole, located to the east of the site. This existing private combined water manhole then conveys the restricted runoff along the existing access road to the south east corner of the site, where it discharges into the existing 225mm diameter public combined water sewer.

The runoff discharges into the public combined sewer via a pump chamber which restricts the runoff to the required 23.0 L/s discharge rate, for all rainfall events up to and including the 1 in 100 year +45% climate change event.

As the surface water drainage is to be pumped, in compliance with Section D5.5 of the Design and Construction Guidance for foul and surface water sewers (DCG), 125m^3 of additional, separate storage should be provided per hectare of impermeable area, to ensure flooding does not occur in the event of a pump failure.

As such, an additional 81m^3 (0.641ha x 125m^3) of storage has been provided with a high level overflow from the pump compound into the required storage tank. This is indicated on the Outline Drainage Strategy Drawing attached in Appendix J.

As the proposed car park area is to discharge via permeable paving no oil separator is required for the car park drainage. The permeable paving, together with the green roof area will create a treatment train which will help improve the water quality of the surface water discharging from the site.

As mentioned in Section 3.0, the surface water discharge from the existing school buildings will need to be retained to ensure the existing school buildings can continue in use while the proposed new building is being constructed. As such, the existing drainage will be retained until the existing buildings are being demolished.

As the proposed building is located to the north of the existing buildings and the drainage outfalls are located to the south, no diversions of the existing drainage will be required to maintain the current drainage to the existing buildings.

A Section 106 connection application would be required from United Utilities, to ensure acceptance of the proposed indirect connection to the existing public combined water sewer.

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	✓	Suitable and incorporated, where possible.
Rainwater Harvesting	✗	Impractical due to lack of demand for greywater.
Basins, Ponds & Swales	✗	Unsuitable due to topography of site and lack of available space to south of site.
Filter Strips	✗	Unsuitable due to topography of site and lack of available areas to south of site.
Bio-retention Areas	✓	Suitable but only incorporated for small hardstanding areas due to impermeable strata and topography of site.
Infiltration Techniques	✗	Unsuitable due to impermeable strata.
Permeable Surfaces	✓	Suitable and incorporated where possible, but only as non-infiltration due to impermeable strata.
Tanked/Piped Systems	✓	Suitable and incorporated.

Green roof areas have been included where possible across the site, with allowances for plant etc. on roofs where required. The green roof area will not only provide biodiversity benefits but will also incorporate water quality benefits for the site.
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 topography of the site and demolition phasing, any basins, ponds or swales would need to be located to the north of the site but the proposed drainage discharges to the south. As such, due to the lack of available space across the south of the site a pond, detention basin or swale would not be suitable for the proposed site.

Filter drains/strips were also considered but due to a lack of available areas, filter drains/strips areas have not been included. Due to a lack of available areas and the topography of the site, bio-retention areas have only been incorporated to drain small impermeable areas.

As previously discussed infiltration is not feasible across the site and therefore the use of infiltration SuDS techniques is not possible. Despite this, the use of non-infiltration permeable surfaces such as permeable paving/porous tarmac has been considered and incorporated within the car park area.

Finally, the use of below ground cellular attenuation tanks and oversized pipe networks is suitable and is therefore also incorporated. As indicated within the Outline Drainage Strategy Drawing attached in Appendix J, a below ground cellular attenuation tank has been incorporated with the above SuDS solutions and is located below the proposed hardstanding area to the north of the proposed building.

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 consists of roof areas, car park areas and low traffic roads, in accordance within Table G3.2 of the Statutory National Standards for Sustainable Drainage Systems (2018) the pollution hazard level is low and as such the simple index approach can be used to assess the treatment requirements for the low risk of pollution.

The simple index approach is outlined within Chapter 26 of CIRIA Report C753 - The SuDS Manual. Therefore, using Table 26.2 and applying the proposed site description above, results in a low pollution hazard level, with the pollution hazard indices being; TSS - 0.5, Metals - 0.4 and Hydrocarbons - 0.4.

Assessing this against Table 26.3 of CIRIA Report C753 - The SuDS Manual using the SuDS treatment train of green roofs and permeable paving results in the mitigation indices outweighing the pollution hazard indices identified above. The use of a permeable paving itself results in mitigation indices of; TSS - 0.7, Metals - 0.6 and Hydrocarbons - 0.7, which would be sufficient.

Therefore, as the mitigation indices are equal to or greater than each of the pollution hazard indices the use of permeable paving is deemed acceptable from a pollution mitigation perspective 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 (8th 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)

The foul water drainage will collect run off from the proposed building and convey the foul water to the east of the site. Here the foul water discharges into a proposed foul water package pump chamber, prior to discharging via a rising main, into the existing private combined water manhole, located to the east of the site.

This existing private combined water manhole then conveys the runoff along the existing access road to the south east corner of the site, where it discharges into the existing 225mm diameter public combined water sewer.

As the foul water drainage is to be pumped, the proposed foul package pump station should be sized to accommodate 24 hour storage to ensure flooding does not occur in the event of a pump failure. Once the proposed foul flow rates from the proposed building have been confirmed the package pump station will be suitably sized to accommodate this requirement.

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.

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.
- Pump chambers/stations.
- Cellular attenuation tank.
- Permeable paving.
- Green roof.

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 Sandilands Primary School 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 Pump Chambers/Stations

The pump chambers and stations are to have a maintenance regime in line with the inspection chambers, manholes and catchpits information provided within Section 7.2. However, this should also be supplemented by the full information of the installed products and any additional maintenance requirements identified by the supplier. The full maintenance information from the supplier should also be incorporated within the O&M information.

7.6 Cellular Attenuation Tank

Regular inspection and maintenance is important 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.

The maintenance requirements for cellular attenuation tanks are outlined within Table 21.3 of the CIRIA SUDS Manual C753. An extract of that table is given below to set out the maintenance schedule for the cellular attenuation tank component of the proposed drainage systems.

TABLE 21.3 Operation and maintenance requirements for attenuation storage tanks

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
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

7.7 Permeable Paving

The maintenance requirements for permeable paving is covered under the previous pavements section within the CIRIA SUDS Manual C753. As such, the maintenance requirements for permeable paving are outlined within Table 20.15 of the CIRIA SUDS Manual C753. An extract of that table is given below to set out the maintenance schedule for the permeable/porous tarmac component of the proposed drainage systems.

TABLE 20.15 Operation and maintenance requirements for pervious pavements

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

7.8 Green Roofs

Regular inspection and maintenance is important 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.

The maintenance requirements for green roofs are outlined within Table 12.5 of the CIRIA SUDS Manual C753. An extract of that table is given below to set out the maintenance schedule for the green roof component of the proposed drainage systems.

TABLE 12.5 Operation and maintenance requirements for green roofs

Maintenance schedule	Required action	Typical frequency
Regular inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (ie year one), replace dead plants as required	Monthly (but usually responsibility of manufacturer)
	Post establishment, replace dead plants as required (where > 5% of coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

It should be noted that the Main Contractor should provide a Verification Report, including photographic evidence, to demonstrate that the drainage has been constructed as per the design drawings. As-built drawings should as be supplied by the Main Contractor, where the construction of the drainage varies from the design construction status drawings.

8.0 CONCLUSIONS

- The site is located within Flood Zone 1 and has a low risk of flooding from rivers & sea, surface water, reservoirs and all other sources. Therefore, due to the low risk of flooding from all sources, only very minor flood risk mitigation measures are required for the proposed development and these are summarised in Section 5.7.

- There is an existing 225mm diameter public combined water sewer located to the south-east the site. As this sewer serves areas outside of the site boundary the sewer will need to remain. As such, United Utilities will likely require a 3.0m sewer easement on each side of the sewer. This should be confirmed via discussions with United Utilities.

- The existing private drainage is conveyed to the south of the site, where it discharges via 2no. existing outfall pipelines. The existing outfall to the south-west corner discharges into the existing 300mm/375mm diameter public combined water sewer, located on Wendover Road and the outfall to the south-east corner discharges into the existing 225mm diameter public combined water sewer, located to the south-east corner of the site.

- The site investigation report indicates that the underlying strata consists of impermeable clays and shallow perched groundwater. Therefore, due to the underlying impermeable strata, infiltration is not suitable for the proposed development. After discussions with the LLFA, they have confirmed that discharge to watercourse is impractical, as the watercourse is not suitable for the discharge of the surface water runoff from the site.

- As the existing site is brownfield, to comply with the Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA User Guide, the development should aim for a minimum reduction in surface water runoff rates of 50%. This should be applied to all rainfall events up to and including the 1 in 100 year +45% climate change event.

- However, a pre development enquiry has been submitted to United Utilities with a response received and United Utilities have indicated that the surface water discharge from the proposed site should be restricted to a maximum discharge rate of 23.0 L/s.

- CCTV surveys indicate that the existing private drainage outfall pipelines are too shallow to allow for a gravity connections from the proposed drainage and as such, both the surface water and foul water from the proposed development will need to be pumped.

- Therefore, the surface water drainage will collect the runoff from the proposed development and convey it to the east of the site. Here it will be restricted to the required discharge rate via a pump station, prior to connecting to the existing private combined water outfall pipeline, which discharges into the 225mm diameter public combined water sewer, located within the site boundary to the south-east corner of the site.

- As the surface water drainage is to be pumped, in compliance with Section D5.5 of the Design and Construction Guidance for foul and surface water sewers (DCG), 125m^3 of additional, separate storage should be provided per hectare of impermeable area, to ensure flooding does not occur in the event of a pump failure. As such, an additional 81m^3 of storage has been provided with a high level overflow from the pump station into the required storage tank.

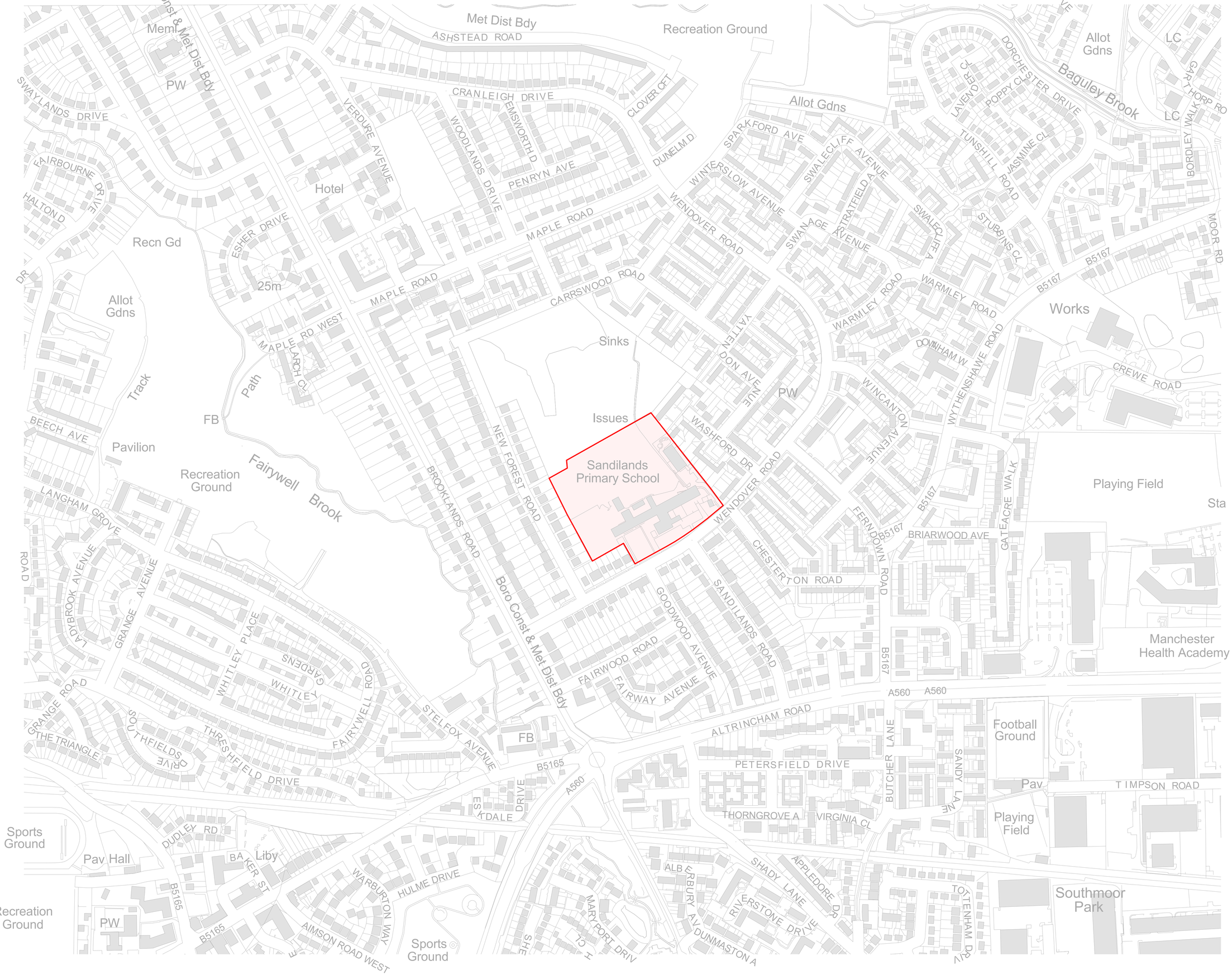
- Non-infiltration permeable paving should be utilised, where possible, with a below ground cellular attenuation tank and the proposed surface water network itself, to provide a minimum of 230.6m^3 of attenuation storage.

- The foul water drainage will collect run off from the proposed building and convey the foul water to the east of the site. Here the foul water discharges into a proposed foul water package pump chamber, prior to discharging via a rising main, into the existing private combined water outfall pipeline, which discharges into the existing 225mm diameter public combined water sewer, located to the south-east corner of the site.

- As the foul water drainage is to be pumped, the proposed foul package pump station should be sized to accommodate 24 hour storage to ensure flooding does not occur in the event of a pump failure. Once the proposed foul flow rates from the proposed building have been confirmed the package pump station will be suitably sized to accommodate this requirement.

- A Section 106 connection agreement is required from United Utilities, to ensure acceptance of the proposed indirect connections to the existing public combined water sewer.

Appendix A – Site Location Plan



NOTES

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Dimensions are in millimetres unless specified.

Rev	Date	Notes	By	Che
P1	24/03/23	Issued to DfE for Stage 3	hmd	ME

Key

Application Site Boundary

NORTH

0 25 50 125 250

Scale 1: 2500 @ A1 (1: 5000 @ A3)

elliswilliams

Project Number: 2914
Project Name: Sandilands Primary School

Drawing Status: Stage 3
Drawing Number: **SRP1034- EWA- ZZ- ZZ- D- L- 9001**
Drawing Name: Site Location Plan

Date: 10.03.23 Rev: P1
Drawn By: LR Scale: As indicated

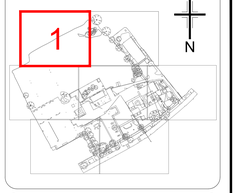
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Appendix B – Aerial Photo


Site Boundary

Appendix C – Topo & Utility Survey

Sheet Layout



Topographic Abbreviations

AV	Air Vent	KO	Kerb Outlet
BB	Belisha Beacon	LB	Litter Bin
BK	Brick	LP	Lamp Post
BL	Base/Bed Level	MH	Man Hole
BOL	Bollard	MK	Service Marker
BP	Brick Pillar	MT	Mercury Telephone Cover
BPV	Brick Pillar Colour	MW	Monitoring Well
BR	Bike Rack	OSBM	Ordnance Survey Benchmark
BS	Bus Stop	PI	Pole
BT	BT Inspection Cover	PB	Post Box
C&W	Cable & Wireless	PCP	Pedestrian Control Point
CA	Camera	PLT	Planter
CAJB	Cable Junction Box	PM	Parking Meter
CATV	Cable Inspection Cover	PPL	Parapet Level
CB	Control Box	PU	Pump
CCTV	Close Circuit Television	RE	Rodding Eye
CD	Cable Duct	RL	Ridge Level
CG	Cattle Grid	RS	Road Sign
CH	Coal Hole	RW	Retaining Wall
CIP	Cable Inspection Point	RWC	Rain Water Channel
CL	Cover Level	RWP	Rain Water Pipe
COL	Column	S/A	Soakaway
CR	Cable Riser	SB	Sliding Bollard
DK	Drop Kerb	SC	Water Stop Cock
DPC	Damp Proof Course	SD	Slot Drain
EB	Electricity Control Box	SEG	Side Entry Gully
EJB	Electricity Junction Box	SL	Sill Level
EL	Eave Level	SP	Sign Post
ELEC	Electricity Inspection Cover	ST	Stay Cable
EM	Electricity Meter	SV	Stop Valve
EP	Electricity Pylon/Pole	SVP	Soil Vent Pipe
ER	Earth Rod	TB	Telephone Call Box
FB	Flower Bed	TBM	Temporary Bench Mark
FC	Fuel Cover	TC	Traffic Control Inspection Cover
FH	Fire Hydrant	TH	Trial Hole
FL	Floor Level	THL	Threshold Level
FLT	Flood Light	TIC	Telephone Inspection Cover
FO	Fibre Optic	TJB	Telephone Junction Box
FP	Footpath	TL	Traffic Light
FRL	Flat Roof Level	TOF	Top of Fence Level
G	Gully	TOW	Top of Wall Level
GAS	Gas Inspection Cover	TP	Telegraph Pole
GJB	Gas Junction Box	TS	Tree Stump
GM	Gas Meter	UTSF	Unable to Survey Further
GP	Gate Post	VP	Vent Pipe
GV	Gas Vent	WL	Water Level
HL	Head Level	WM	Water Meter
IC	Inspection Cover	WO	Wash Out
IL	Invert Level	WP	Waste Pipe
JB	Junction Box	WTR	Water Inspection Cover

Topographic Legend

- Gate
- Paving
- Bottom Of Batter
- Top Of Batter
- Building/Wall
- Drip/Vegetative Line
- Slab/concrete
- Slope of batter
- Kerb
- Pipes
- Fencelines
- Vegetative Border
- Railing
- Pin Kerb
- Overhead Power Line
- Building Canopy
- Grass Edge
- Contour With Level
- Edge of Hardstanding
- Bore Hole
- Tree
- Bush
- Survey Station
- Photograph Origin

Utility & CCTV Abbreviations

A.C.E	APPROXIMATE CHAMBER EXTENTS	M.A.R	MAN ACCESS REQUIRED
AG	ABOVE GROUND	NDI	NO DEPTH INFORMATION
AR	ASSUMED ROUTE	NOVP	NO OTHER VISIBLE PIPES
BD	BACKDROP	NOVS	NO OTHER VISIBLE SERVICES
CP	CATCHPIT	NVP	NO VISIBLE PIPE
C.O.C	CHAMBER COVER	NVS	NO VISIBLE SERVICE
D.T.B	DEPTH TO BOTTOM	OVA	OUTSIDE SURVEY AREA
D.T.L	DEPTH TO LANDING	OVA	OUT OF SURVEY AREA
D.T.S	DEPTH TO SILT	PT	POOR TRACE
D.T.W	DEPTH TO WATER	R.O.D	RISK OF DAMAGE
EOC	END OF CAMERA	SA	SURVEY ABANDONED
EOS	END OF SONDE	TFR	TAKEN FROM RECORDS
EOT	END OF TRACE	UTL	UNABLE TO LIFT
EUD	EMPTY UTILITY DUCT	UTC	UNABLE TO CAMERA
LAT	LATERAL DRAIN	UTS	UNABLE TO SONDE
		UTT	UNABLE TO TRACE

Utility Legend

- FUEL LINE - PETROL
- FUEL LINE - DIESEL, KERO OR PARAFFIN
- ELECTRICITY CABLE
- HIGH VOLTAGE ELECTRICITY CABLE
- WATER SUPPLY PIPE
- GAS
- TELECOM CABLE
- BT CABLE
- CABLE TELEVISION
- FIBRE OPTICS
- EMPTY UTILITY DUCT
- CATHODIC PROTECTION
- EARTH TAPE
- HEATING PIPES
- SURFACE WATER DRAIN
- FOUL WATER DRAIN
- COMBINED DRAIN
- UNIDENTIFIED (LOCATED USING GPR) - SEE NOTES
- UNIDENTIFIED (LOCATED BY INDUCTION) - SEE NOTES
- UNIDENTIFIED (LOCATED BY RADIO) - SEE NOTES
- UNIDENTIFIED PIPELINE
- TANK GAUGE LINE OR COMMS CABLE
- OFF-SET FILL
- VENT PIPE
- OIL PIPE
- REMEDIATION PIPES
- VAPOR RECOVERY
- SURVEY EXTENTS BOUNDARY LINE
- END OF TRACE/SONDE

Chamber Extents

Report Photos

STATUTORY RECORD INFORMATION SHOWN IN GREY (COLOUR 8)

Notes

THE ACCURACY OF BOTH THE RADIO DETECTION EQUIPMENT AND THE GROUND PENETRATING RADAR, CAN ONLY BE ASSUMED TO BE +/-15% OF THE LOCATED DEPTH, FOR BOTH X,Y AND Z HEIGHT INFORMATION.

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Reference Material

THIS DRAWING HAS BEEN PRODUCED WITH REFERENCE TO STATUTORY AUTHORITY PLANS

Rev	Details	Name	Date

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Project: DfE - Sandilands Primary School
Wendover Road, Manchester
M23 9JX

Title: Sandilands Primary School
Topographic & Utility Survey
(Sheet 1 of 7)

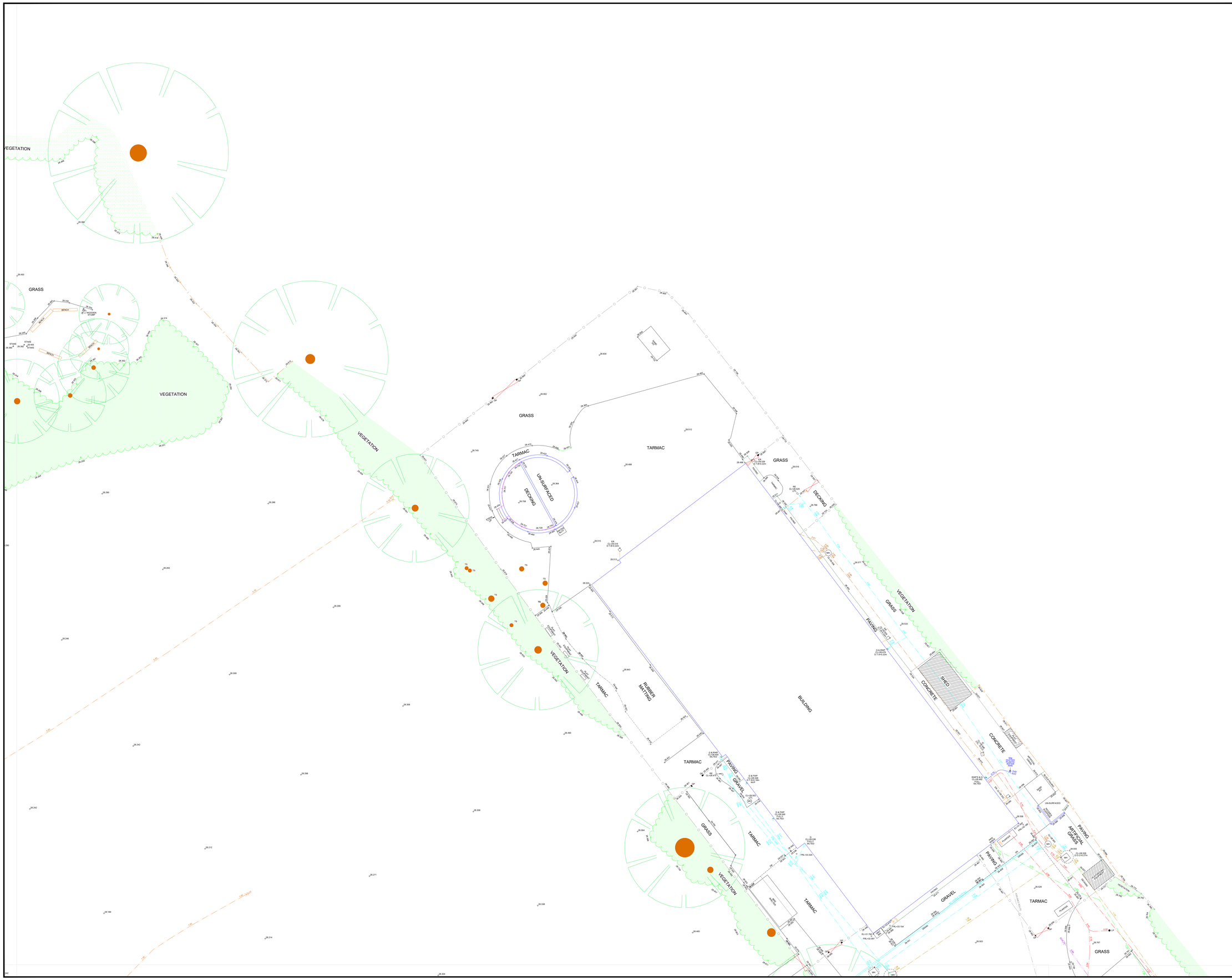
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Date:	18.06.21	Scale:	1:100@A0

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No. FG-SPS6020-01 Rev:



Sheet Layout



Topographic Abbreviations

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GJB	Gas Junction Box	TS	Tree Stump
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HL	Head Level	WM	Water Meter
IC	Inspection Cover	WO	Wash Out
IL	Invert Level	WP	Waste Pipe
JB	Junction Box	WTR	Water Inspection Cover

Topographic Legend

- Gate
- Paving
- Bottom Of Batter
- Top Of Batter
- Building/Wall
- Drip/Vegetative Line
- Slab/concrete
- Slope of batter
- Kerb
- Pipes
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- Vegetative Border
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- Overhead Power Line
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- Tree
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- Survey Station
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Utility & CCTV Abbreviations

A.C.E	APPROXIMATE CHAMBER EXTENTS	M.A.R	MAN ACCESS REQUIRED
AG	ABOVE GROUND	NDI	NO DEPTH INFORMATION
AR	ASSUMED ROUTE	NOVP	NO OTHER VISIBLE PIPES
BD	BACKDROP	NOVS	NO OTHER VISIBLE SERVICES
CP	CATCHPIT	NVP	NO VISIBLE PIPE
C.O.C	CHAMBER COVER	NVS	NO VISIBLE SERVICE
D.T.B	DEPTH TO BOTTOM	OVA	OUT OF SURVEY AREA
D.T.L	DEPTH TO LANDING	PT	POOR TRACE
D.T.S	DEPTH TO SILT	R.O.D	RISK OF DAMAGE
D.T.W	DEPTH TO WATER	SA	SURVEY ABANDONED
EOC	END OF CAMERA	TFR	TAKEN FROM RECORDS
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- FUEL LINE - PETROL
- FUEL LINE - DIESEL, KERO OR PARAFFIN
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- HIGH VOLTAGE ELECTRICITY CABLE
- WATER SUPPLY PIPE
- GAS
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Chamber Extents

Report Photos

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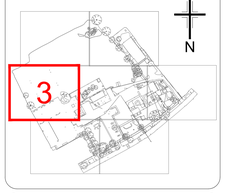
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Topographic & Utility Survey
(Sheet 2 of 7)

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Ch'k'd:	RC	App'd:	JG
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www.1sth.co.uk
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No. FG-SPS6020-02 Rev:

Sheet Layout



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Chamber Extents

Report Photos

STATUTORY RECORD INFORMATION SHOWN IN GREY (COLOUR B)

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M23 9JX

Title: Sandilands Primary School
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(Sheet 3 of 7)

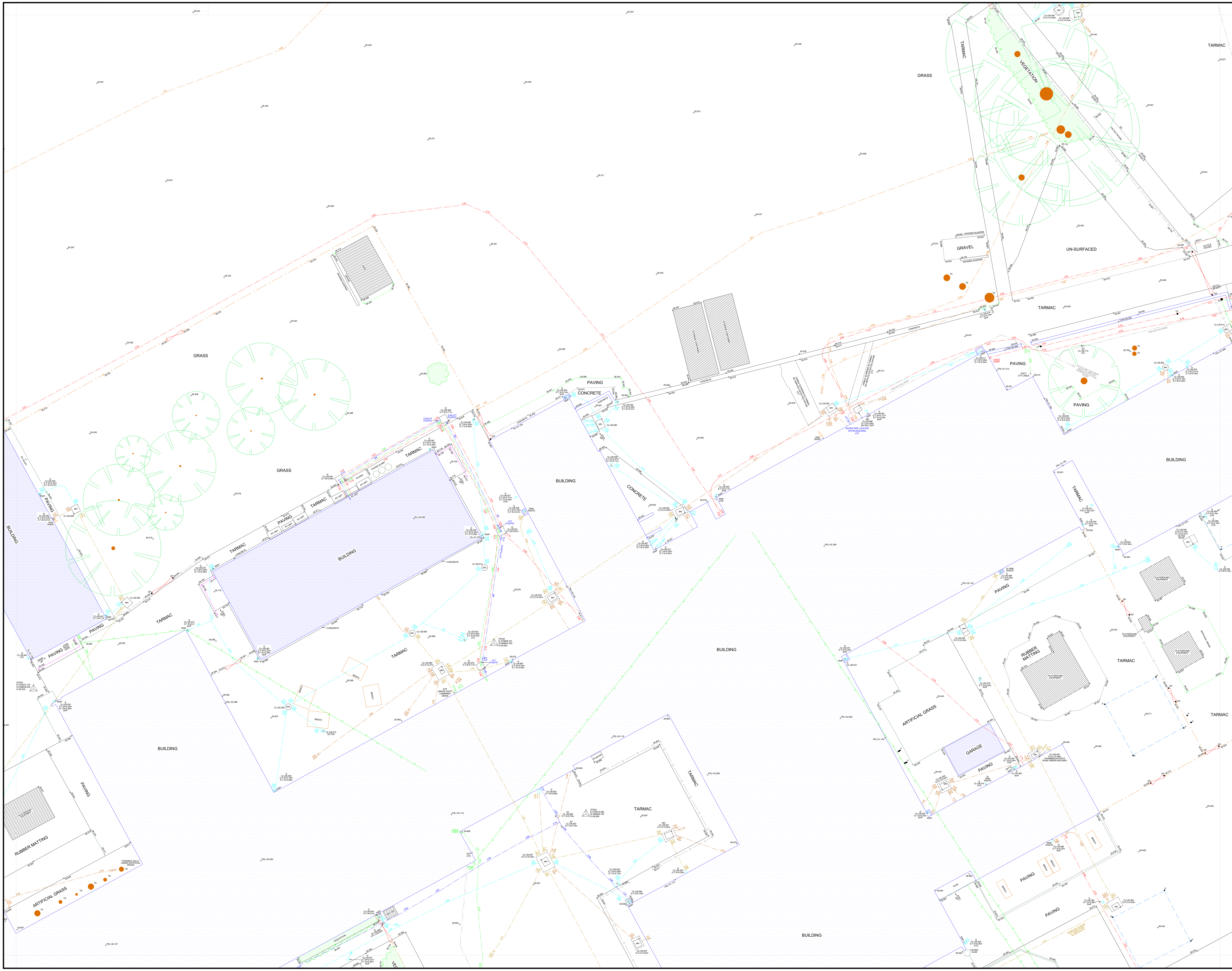
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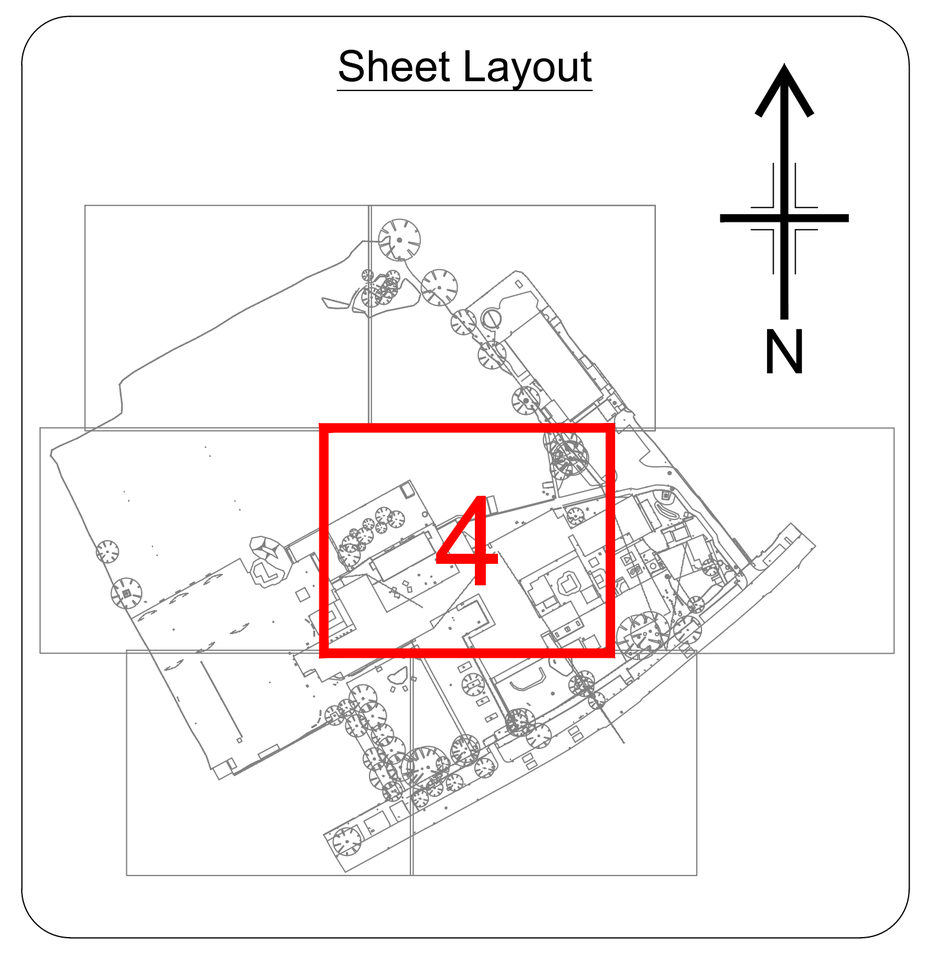
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No. FG-SPS6020-03 Rev:



Sheet Layout



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D.O.C	DEPTH OF COVER	NVS	NO VISIBLE SERVICE
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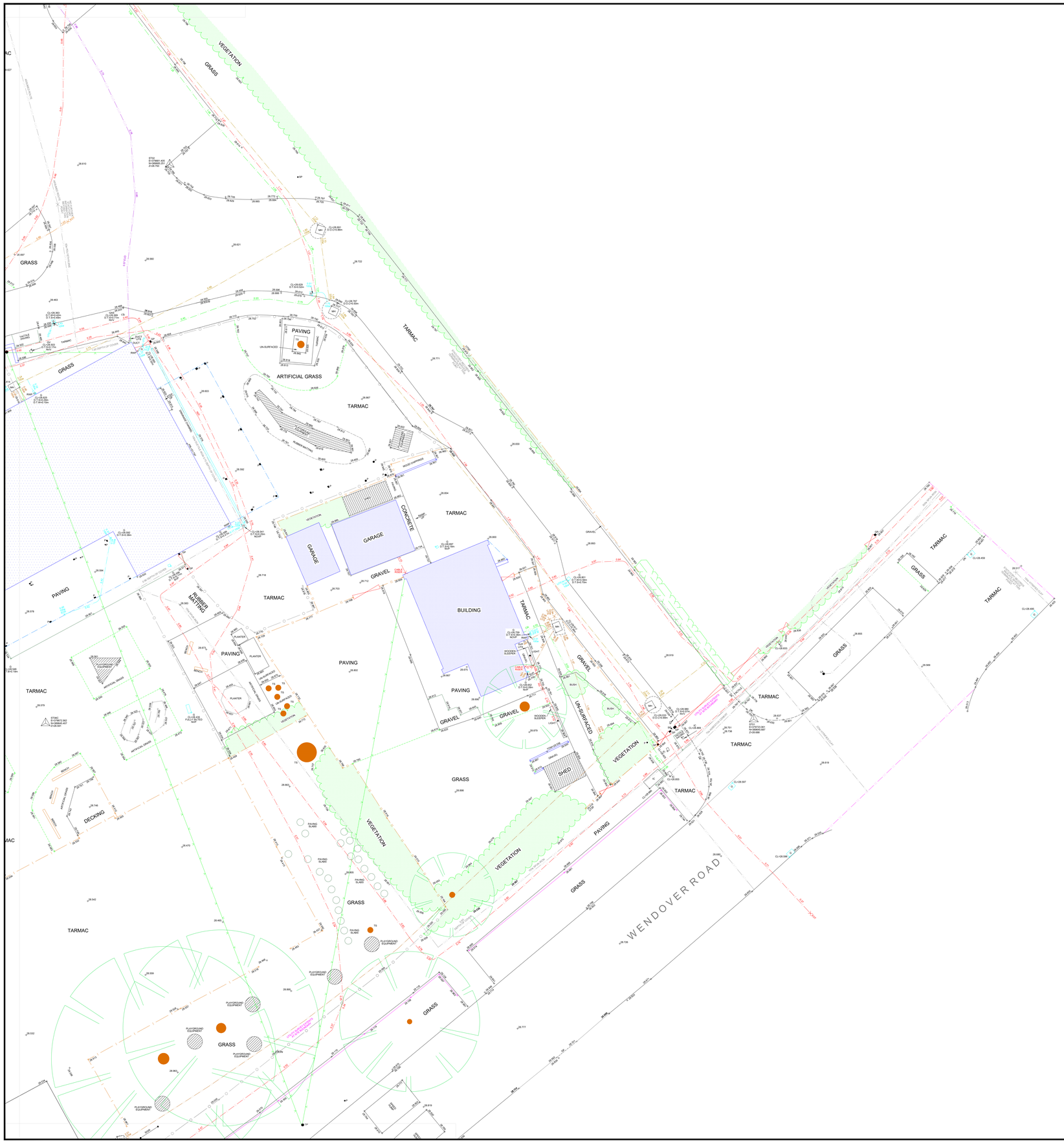
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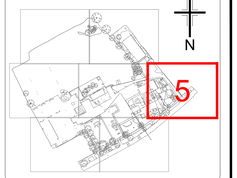
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Reference Material

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Rev	Details	Name	Date

Client: **Faithful and Gould**
1 Kings Court,
Charles Hastings Way,
Worcester,
WR5 1WS

Project: DfE - Sandilands Primary School
Wendover Road, Manchester
M23 9JX

Title: Sandilands Primary School
Topographic & Utility Survey
(Sheet 5 of 7)

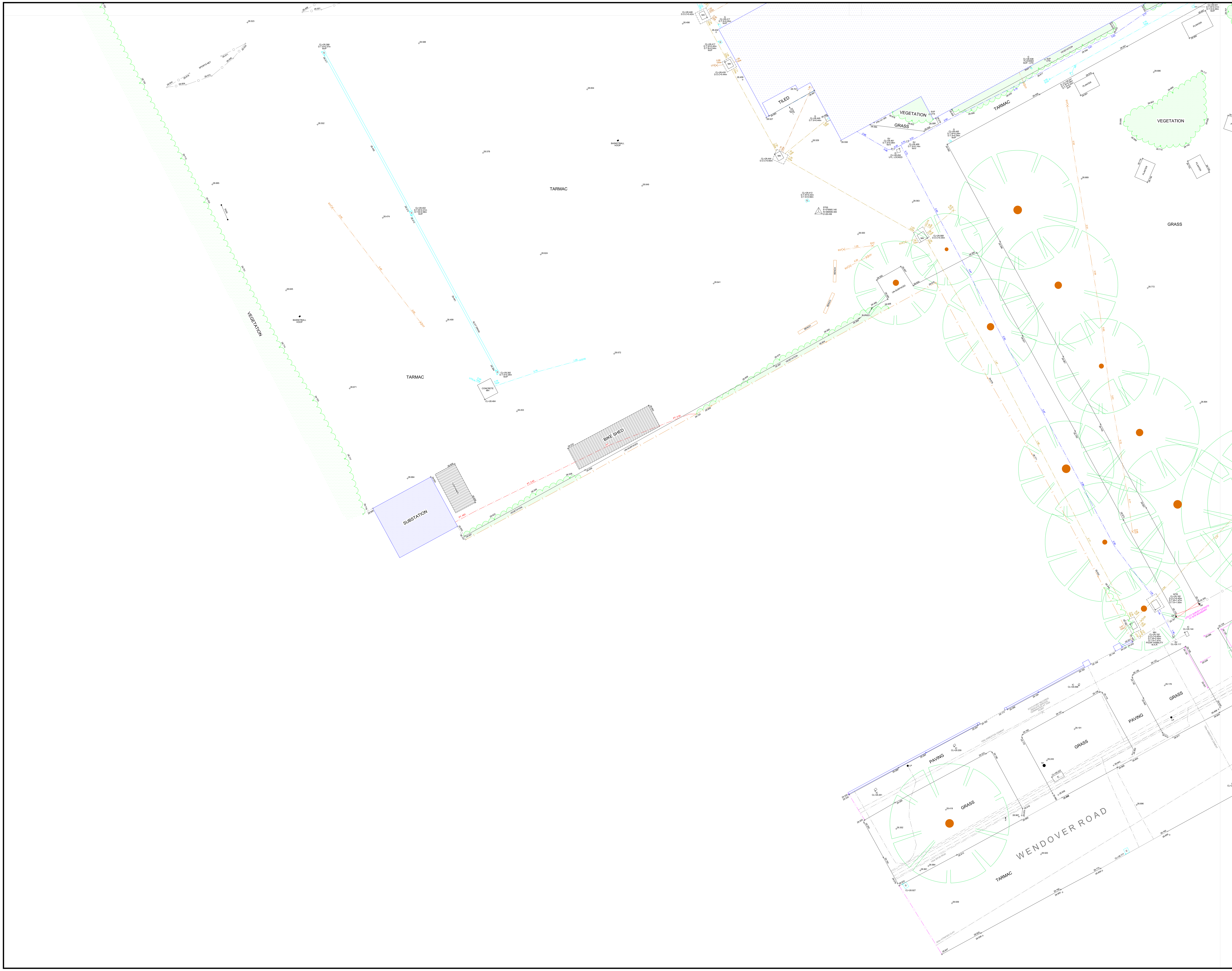
Surveyed:	NR, CS, DF, AW	CAD:	CS, JB
Chk'd:	RC	App'd:	JG
Date:	18.06.21	Scale:	1:100@A0

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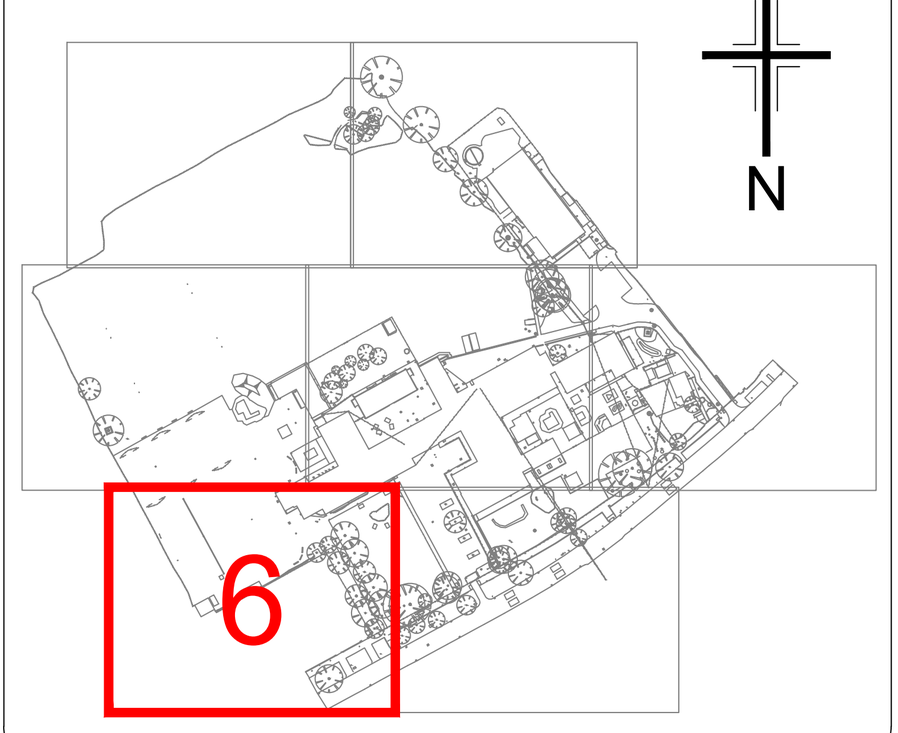
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www.1sth.co.uk
info@1sth.co.uk

No. FG-SPS6020-05 Rev:



Sheet Layout



Topographic Abbreviations

AV	Air Vent	KO	Kerb Outlet
BB	Belisha Beacon	LB	Litter Bin
BK	Brick	LP	Lamp Post
BL	Base/Bed Level	MH	Man Hole
BOL	Bollard	MK	Service Marker
BP	Brick Pillar	MT	Mercury Telephone Cover
BPV	Brick Paviour	MW	Monitoring Well
BR	Bike Rack	OSBM	Ordnance Survey Benchmark
BS	Bus Stop	P	Post
BT	BT Inspection Cover	PB	Post Box
C&W	Cable & Wireless	PCP	Pedestrian Control Point
CA	Camera	PLT	Planter
CAJB	Cable Junction Box	PM	Parking Meter
CATV	Cable Inspection Cover	PPL	Parapet Level
CB	Control Box	PU	Pump
CCTV	Close Circuit Television	RE	Rodding Eye
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CG	Cattle Grid	RS	Road Sign
CH	Coal Hole	RW	Retaining Wall
CIP	Cable Inspection Point	RWC	Rain Water Channel
CL	Cover Level	RWP	Rain Water Pipe
COL	Column	S/A	Soakaway
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- Gate
- Paving
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Utility & CCTV Abbreviations

A.C.E	APPROXIMATE CHAMBER EXTENTS	M.A.R	MAN ACCESS REQUIRED
		NDI	NO DEPTH INFORMATION
AG	ABOVE GROUND	NOVP	NO OTHER VISIBLE PIPES
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CP	CATCHPIT	NVS	NO VISIBLE SERVICE
D.O.C	DEPTH OF COVER	NVV	NO VISIBLE VALVE
D.T.B	DEPTH TO BOTTOM	OSA	OUT OF SURVEY AREA
D.T.L	DEPTH TO LANDING	PT	POOR TRACE
D.T.S	DEPTH TO SILT	R.O.D	RISK OF DAMAGE
D.T.W	DEPTH TO WATER	SA	SURVEY ABANDONED
EOC	END OF CAMERA	TFR	TAKEN FROM RECORDS
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- FUEL LINE - PETROL
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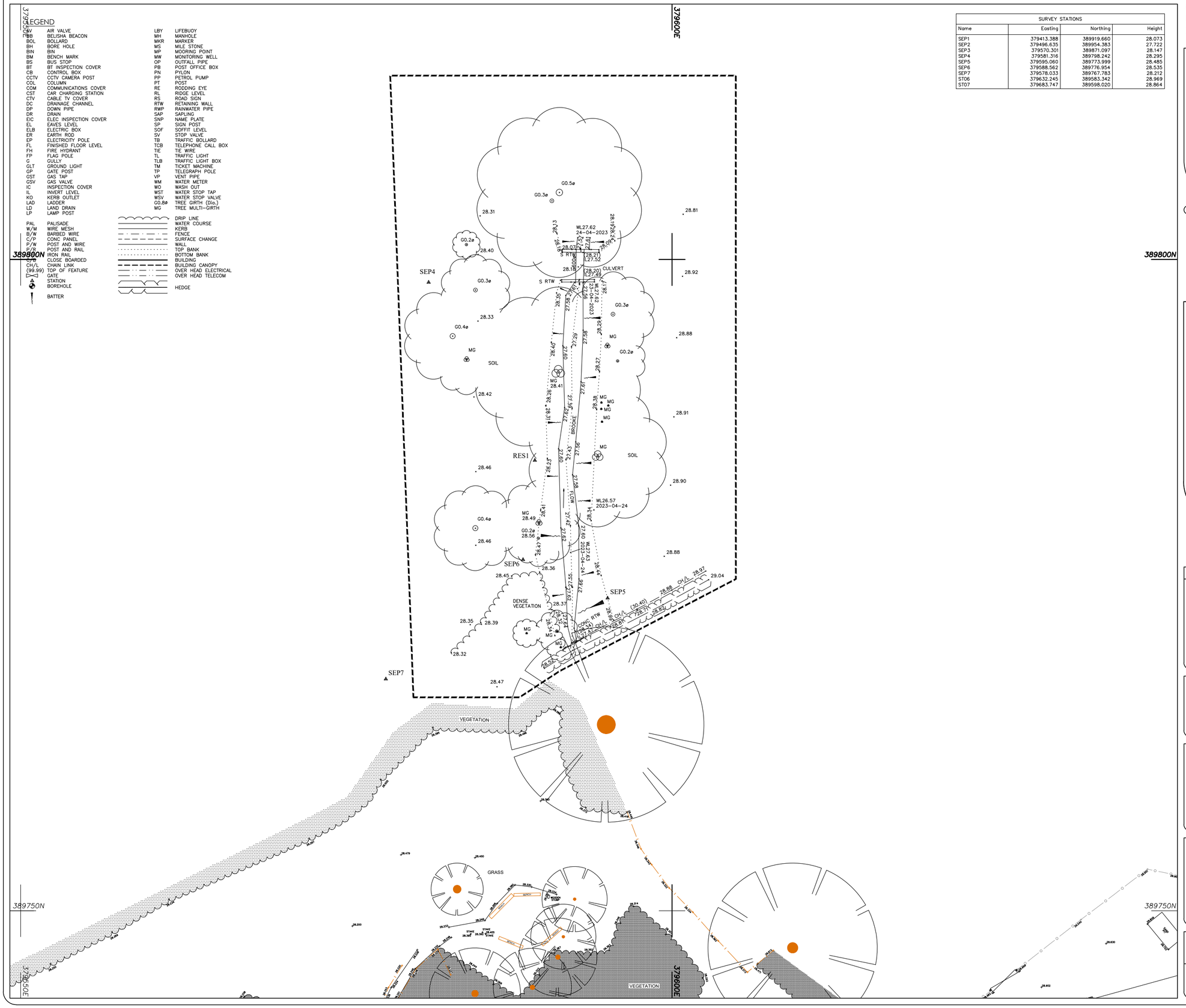
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LEGEND

AV	AIR VALVE	LBY	LIFEBUOY
BB	BELISHA BEACON	MH	MANHOLE
BOL	BOLLARD	MKR	MARKER
BH	BORE HOLE	MS	MILE STONE
BIN	BIN	MP	MOORING POINT
BM	BENCH MARK	MW	MONITORING WELL
BS	BUS STOP	OP	OUTFALL PIPE
BT	BT INSPECTION COVER	PB	POST OFFICE BOX
CB	CONTROL BOX	PN	PYLON
CCTV	CCTV CAMERA POST	PP	PETROL PUMP
COL	COLUMN	PT	POST
COM	COMMUNICATIONS COVER	RE	RODDING EYE
CST	CAR CHARGING STATION	RL	RIDGE LEVEL
CTV	CABLE TV COVER	RS	ROAD SIGN
DC	DRAINAGE CHANNEL	RTW	RETAINING WALL
DP	DOWN PIPE	RWP	RAINWATER PIPE
DR	DRAIN	SAP	SAPLING
EIC	ELEC INSPECTION COVER	SNP	NAME PLATE
EL	EAVES LEVEL	SP	SIGN POST
ELB	ELECTRIC BOX	SOF	SOFFIT LEVEL
ER	EARTH ROD	SV	STOP VALVE
EP	ELECTRICITY POLE	TB	TRAFFIC BOLLARD
FL	FINISHED FLOOR LEVEL	TCB	TELEPHONE CALL BOX
FH	FIRE HYDRANT	TIE	TIE WIRE
FP	FLAG POLE	TL	TRAFFIC LIGHT
G	GULLY	TLB	TRAFFIC LIGHT BOX
GLT	GROUND LIGHT	TM	TICKET MACHINE
GP	GATE POST	TP	TELEGRAPH POLE
GST	GAS TAP	VP	VENT PIPE
GSV	GAS VALVE	WM	WATER METER
IC	INSPECTION COVER	WO	WASH OUT
IL	INVERT LEVEL	WST	WATER STOP TAP
KO	KERB OUTLET	WSV	WATER STOP VALVE
LAD	LADDER	G0.8ø	TREE GIRTH (Dia.)
LD	LAND DRAIN	MG	TREE MULTI-GIRTH
LP	LAMP POST		

PAL	PALISADE		DRIP LINE
W/M	WIRE MESH		WATER COURSE
B/W	BARBED WIRE		KERB
C/P	CONC PANEL		FENCE
P/W	POST AND WIRE		SURFACE CHANGE
P/R	POST AND RAIL		WALL
IRON	IRON RAIL		TOP BANK
CLOSE	CLOSE BOARDED		BOTTOM BANK
CH/L	CHAIN LINK		BUILDING
(99.99)	TOP OF FEATURE		BUILDING CANOPY
	GATE		OVER HEAD ELECTRICAL
	STATION		OVER HEAD TELECOM
	BOREHOLE		HEDGE
	BATTER		

SURVEY STATIONS			
Name	Easting	Northing	Height
SEP1	379413.388	389919.660	28.073
SEP2	379496.635	389954.383	27.722
SEP3	379570.301	389871.097	28.147
SEP4	379581.316	389798.242	28.295
SEP5	379595.060	389773.999	28.485
SEP6	379588.562	389776.954	28.535
SEP7	379578.033	389767.783	28.212
ST06	379632.245	389583.342	28.969
ST07	379683.747	389598.020	28.864



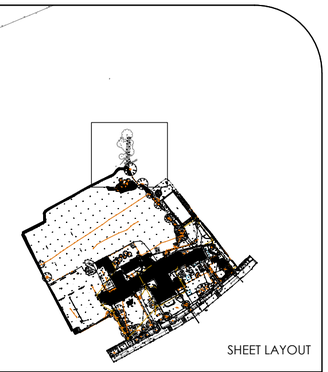
NOTES:
All levels relate to O.S (Newlyn) Datum, Established using network RTK.
Survey plotted on a plane local grid, orientated to National Grid.

Area within dashed line surveyed on 24/04/23 and added onto existing survey.

N

PLAN GRID NORTH

File Name: S24388-T.dwg



SHEET LAYOUT

0 2m 4m 8m 12m 16m

SCALE BAR

REV	DATE	DESCRIPTION

SURVEY & ENGINEERING PROJECTS

Client
Tilbury Douglas Construction Limited
Woodhouse Drive
Wigan
WN67NT

Project Title
Topographical Survey of Land at:
Sandilands
Wendover Rd
Manchester
M23 9JX

Surveyed	Drawn	Checked
D.Balmer	B.Foy	R.Critchley

Scale	Date	Drawing Ref.	No.	Size	Rev
1:200	Apr 23	S24388-T	01	A2	--

Appendix D – Proposed Site Plan

0 5 10 15 20 25 30 35 40 45 50

Scale m's

Existing Habitat Area

Surestart Nursery

WASHFORD DR

WENDOVER ROAD

Soft Outdoor PE

3No. Acer campestre Streetwise

External dining

kitchen

plant room

bin store

Infants

1No. Betula utilis jacquemontii multi stemmed

1m high circular vertical timber post fenceline

Timber canopy

Sensory garden

timber planting boxes to legs of outdoor canopy

Nursery

Reception

Outdoor canopy

Hard Outdoor PE, existing macadam surface retained

Existing cycle shelter

Existing sub station

Deliveries & Service access

Vehicular entrance

Main Entrance

Cycle shelter 10 cycles

4No. Crataegus laevigata 'Paul Scarlet'

5No. Amelanchier lamarckii

Car park

Soft Social & Informal

Grass mound

Pedestrian entrance

Vehicular entrance

4No. Alnus glutinosa

3No. Prunus padus

2No. Acer campestre Streetwise

Retained caretakers property

Grass mound

Vehicular/pedestrian entrance

2No. Sorbus aucuparia

existing fencing retained

3No. Sorbus aucuparia

12No. Tilia mongolica

existing relocated gate

Pedestrian entrance

5No. Prunus avium Plena

existing gate retained

Vehicular entrance

Pedestrian entrance

WENDOVER ROAD

FFL 28600

2.4m gate

1.8m gate

3.1m gate

1.2m gate

1m gate

NOTES

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Rev	Date	Notes	By	Chk
P0	21.02.23	First issue	NH	HD
P01	28.02.23	Updated for CEM 5	NH	HD
P02	03.03.23	Updated for CEM 6	NH	HD
P03	23.03.23	Stage 3	NH	HD
P04	17.04.23	Stage 3	NH	HD
P05	21.04.23	Future Extension Area added	NH	HD
P07	20.04.23	Sport provision revised	LR	HD
P08	21.04.23	Trees to be removed numbered in red. New trees numbered in black.	LR	HD
		Note 10no. trees to be removed and 44no. new trees.		
P09	03.05.23	Football pitch added to grass area to front of school, grass mounds relocated	NH	HD
		PLANNING ISSUE		

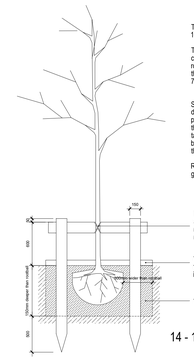
KEY

- Vehicular grade Asphalt Concrete to Engineers spec with 125mm HB2 road kerbs
- Pedestrian grade macadam to Engineers spec with 50mm pcc pin kerbs laid flush
- Concrete block paving
- Coloured Wet pour safety surface
- 10no. Existing trees/woodland to be removed
- Existing trees. Retained and protected during construction in accordance with Tree Protection Plan
- 39No. New tree planting, 14 - 16cm girth
- 5No. New tree planting, 8-10cm girth
- Green Roof System, Bauder Flora 3 Seed Mix or similar.
- Maintain / re-establish amenity grass areas. New grass areas to be seeded over minimum 150mm depth of topsoil
- Eco Species Rich Grassland 'Germinal WFG 20' over 300mm depth topsoil over 300mm depth subsoil to ensure tree growth
- Hedge shrub planting into 400mm depth topsoil & compost. 4No. shrubs per m2 in 3 litre pots. 75mm depth bark mulch spread on completion of planting. Hawthorne, field maple, holly, crab apple, field rose, wild cherry & guelder rose. Planted in a double staggered row.
- Ornamental shrub/perennial planting into 400mm depth topsoil & compost. 4No. shrubs per m2 in 3 litre pots. 75mm depth bark mulch spread on completion of planting

  Species to include:
  Buxus sempervirens
  Calamagrostis Karl Foerster
  Choisya'ternata 'Aztec Pearl'
  Euonymus 'Green Spot'
  Fuchsia Tom Thumb
  Hebe rakaiensis
  Hebe Mayorie
  Phlomis fruticosa
  Rosmarinus officinalis
  Crocosmia 'Lucifer'
  Senecio 'Sunshine'
  Sedum Spectabile
  Stipa gigantea
  Lavandula hammuel
  Euonymus fortunei Silver Queen
  Photinia fraseri 'Little Red Robin'
  Rudbeckia Goldsturm
  Philadelphus Manteau D'Ermine
  Achemilla mollis
  Perovskia Blue Spire
  Spirea Goldflame
- Existing building to be demolished
- 1.8m high Bin store fencing
- Existing fencing to be retained
- New Weldmesh Fencing 2.4m high
- 1.2m High hoop top railing
- 1m high circular vertical timber post hit and miss fenceline
- Red line boundary
- Potential location for outdoor legacy equipment
- 28359 Proposed Levels
- 28.556 Existing Levels
- Possible school expansion
- 5No. EV charging (1no. unit per 2no. cars) to Engineers specification

A Tree Planting in Landscape Area

14 - 16cm girth trees



TREE PIT SPECIFICATION NOTES - 14 - 16cm girth trees

Tree pit to be excavated to allow adequate clearance between the perimeter of the root-ball and the side of the pit. The depth of the pit to be a minimum of 700mm and at least 75mm greater than the depth of the root-ball.

Stakes and rail to be half-round 150mm diameter sweet chestnut or peeled larch poles, pointed at one end, preserved to resist rot for their intended lifespan, and strong enough to take nails without splitting. Stakes driven in to be a minimum of 500mm below the bottom of the pit and 600mm above ground level.

Rail secured to the stakes with 2No. galvanised nails per stake.

Tree to be secured to the rail using 2Nr. approved hessian natural tree ties nailed to the rail. Ties are to be secured so as to allow for movement but prevent damage to the trunk.

75mm depth layer medium grade bark mulch. 1.2m diameter circle around each tree located in grass

Topsoil

14 - 16cm Girth

elliswilliams

Project Number: 2914
Project Name: SANDILANDS

Drawing Status: STAGE 4
Drawing Number: **SRP1034- EWA- ZZ- ZZ- DR- L- 9003**
Drawing Name: LANDSCAPE PLAN

Date: 28.02.23 Rev: P09
Drawn By: NH Scale: 1:300 @ A0

Wellfield Chester Road Preston Brook WA7 3BA
T: 01928 752200 E: info@ewa.co.uk W: ewa.co.uk

Appendix E – Flood Maps

Flood map for planning

Your reference	Location (easting/northing)	Created
222-171	**379587/389644**	**28 Nov 2022 15:25**

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

You will need to do a flood risk assessment if your site is **any of the following:**

- bigger that 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

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



Environment Agency

Flood map for planning

Your reference
222-171

Location (easting/northing)
379587/389644

Scale
1:2500

Created
28 Nov 2022 15:25

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

0 20 40 60m

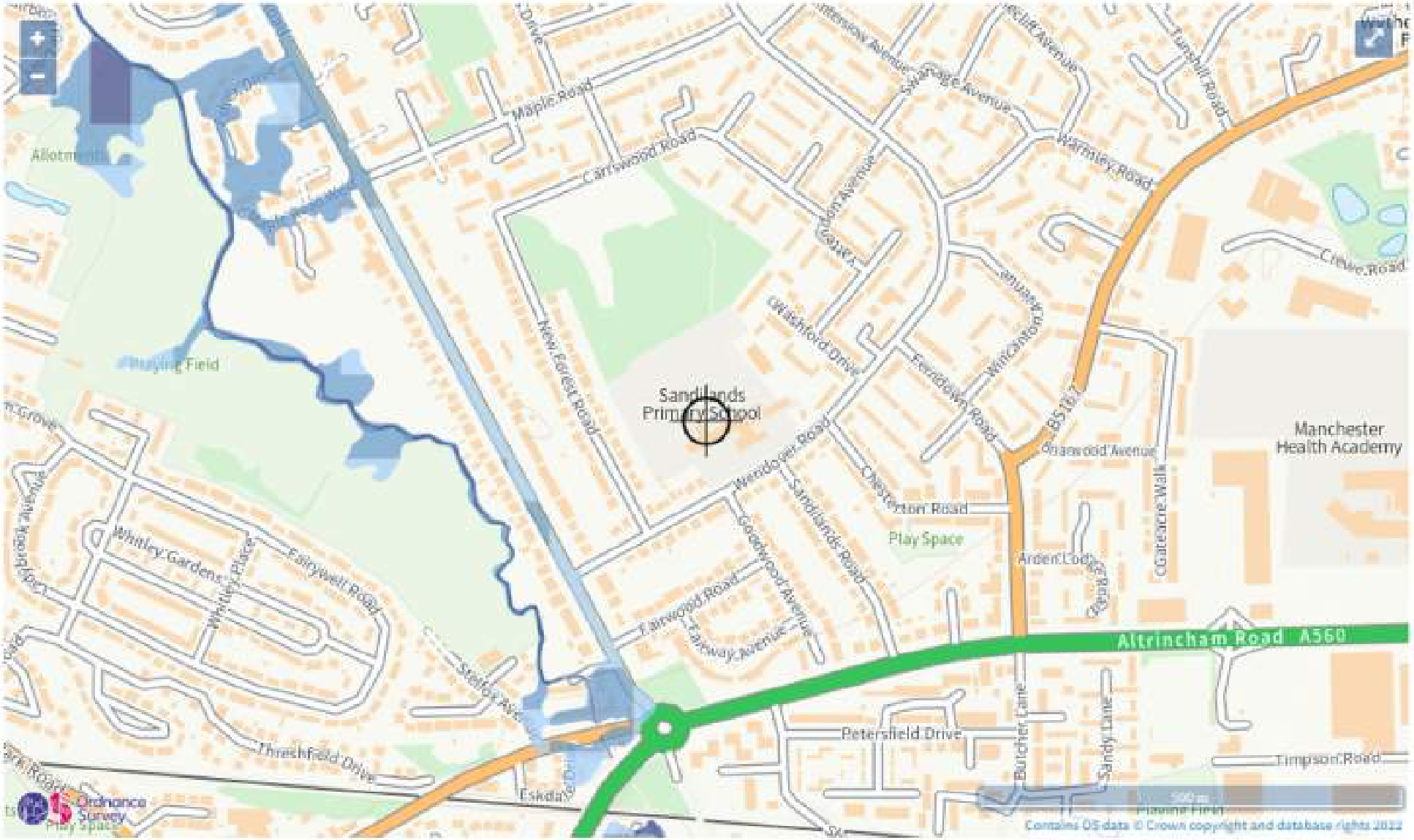
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Flood risk

Extent of flooding

Location

Enter a place or postcode



Extent of flooding from rivers or the sea

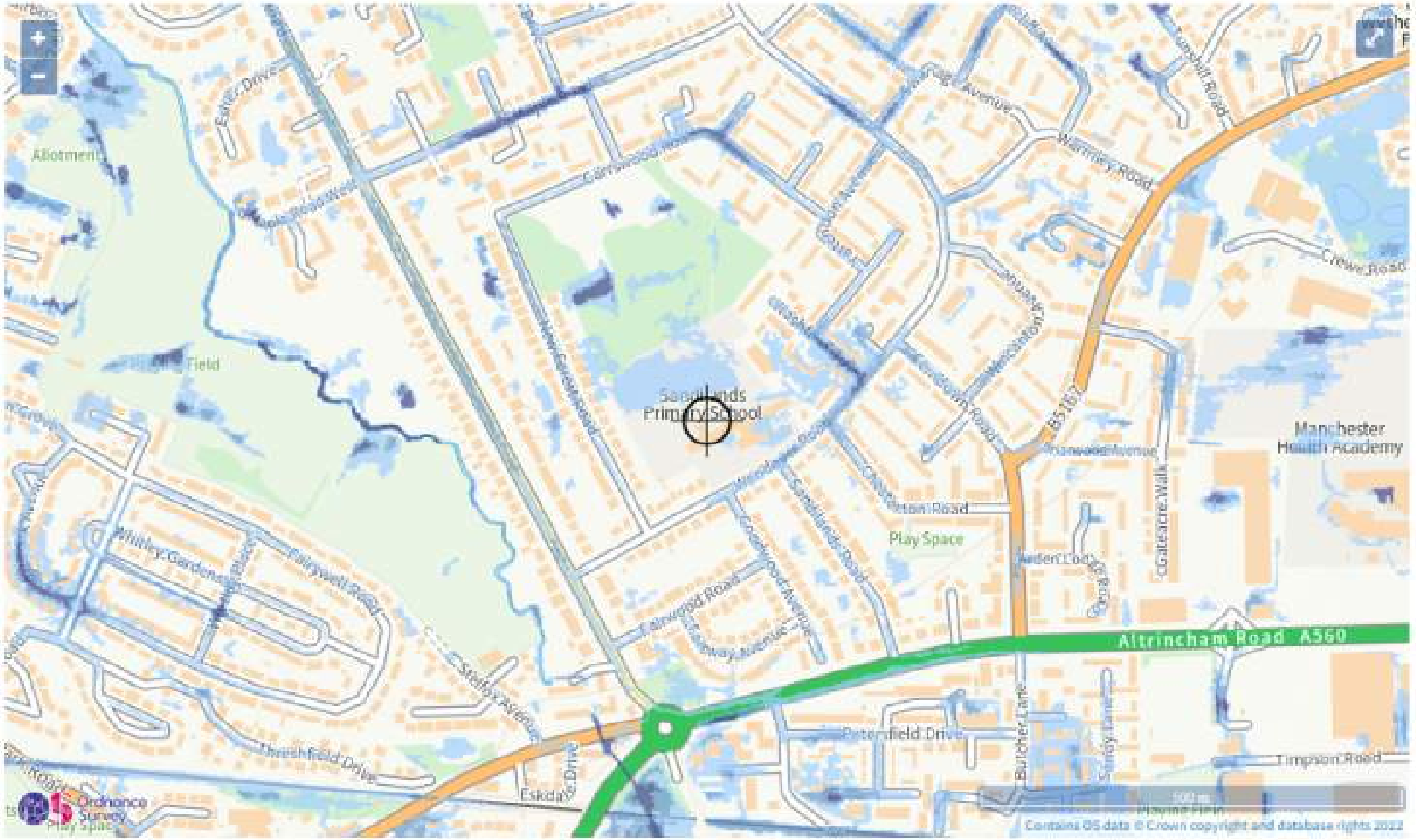
High Medium Low Very low Location you selected

Flood risk

Extent of flooding

Location

Enter a place or postcode



Extent of flooding from surface water

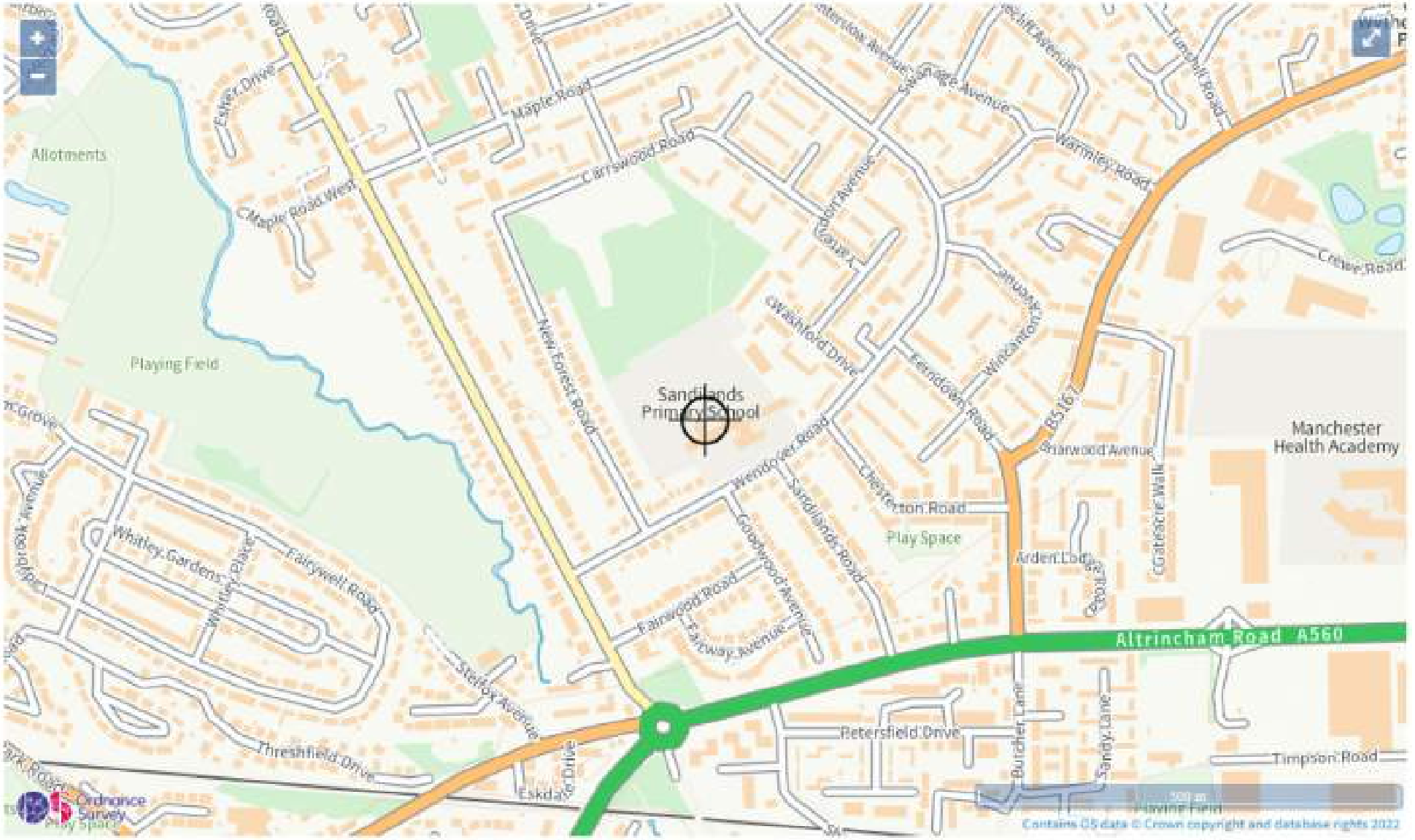
High Medium Low Very low Location you selected

Flood risk

Extent of flooding

Location

Enter a place or postcode



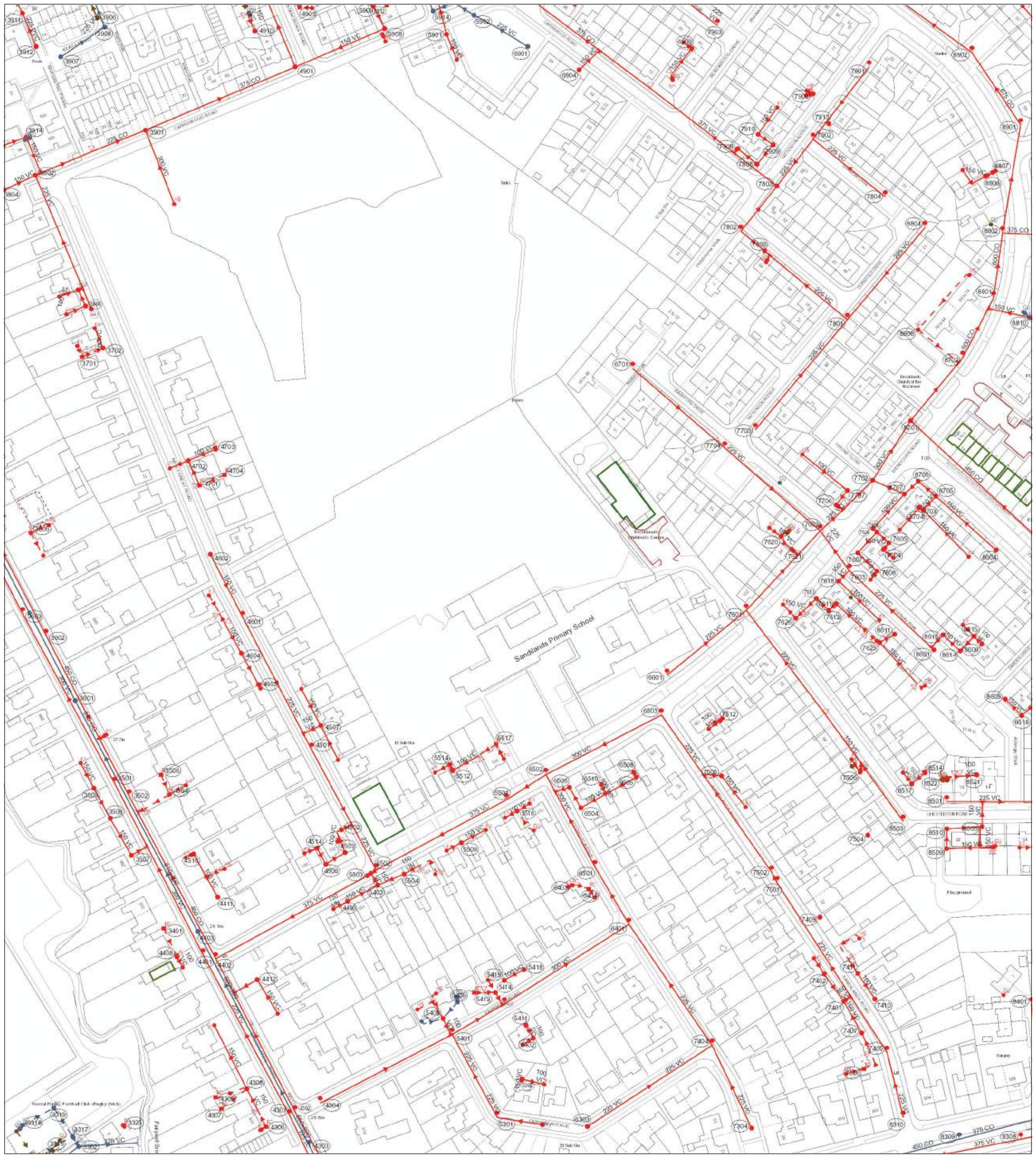
Maximum extent of flooding from reservoirs:

when river levels are normal

when there is also flooding from rivers

Location you selected

Appendix F – Existing Drainage Information



Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
4406		CO		150			VC	18.91374	
8807		CO		150			VC	1.880903	
7402		CO		150			VC	18.60631	
6401	29.11	CO	26.99	300			VC	37.21559	1 in 310
6510		CO		100			VC	5.867159	
6508		CO		100			VC	3.22851	
7702	28.74	CO	26.09	300			VC	39.11522	
8401	31.34	CO	29.46	225			VC	43.18565	1 in 90
3302	29.95	SW	28.76	225			VC	33.06055	
4514		CO		100			VC	10.03112	
8701		CO	0	600			CO	45.45327	
5509		CO		150			VC	15.48153	
7802	28.24	CO	25.84	225			VC	32.01562	1 in 246
4601	28.32	CO	26.93	225			VC	82.29824	1 in 158
7603	28.85	CO	26.87	225			VC	27.20294	1 in 124
4303	29.06	SW	25.36	650			BR	67.53518	1 in 563
3806		CO		100			VC	9.690263	
8702	29.15	CO	25.7	600			CO	37.12142	1 in 177
3603	27.33	CO	25	300			VC	106.8925	1 in 255
7621		CO		150			VC	4.561382	
8703		CO		150			VC	2.692817	
3906	28.02	FO	26.46	225			VC	12.3602	1 in 65
8902	28.25	CO	25.26	675			CO	53.00943	
5909		CO		150			VC	14.02349	
8801	28.94	CO	25.47	600			CO	36.34556	1 in 1817
7618		CO		150			VC	8.153526	
7620		CO		150			VC	9.798903	
8308	30.89	CO	28.23	375			VC	87.66413	1 in 487
7404	29.94	CO	28.17	225			VC	81.27115	1 in 70
5503		CO	25.78	375			VC	95.77056	1 in 115
3911	26.96	CO	25.01	300			PVC	12.23275	1 in 14
7801	28.63	CO		225			VC	17.06478	
7707		CO		100			VC	10.26813	
7624		CO		100			VC	25.90812	
3602	27.41	CO	23.81	450			CO	101.5332	1 in 192
6402		CO		100			VC	6.876077	
4502		CO		100			VC	6.477428	
7604		CO		150			VC	4.762467	
5414		CO		150			VC	8.03727	
4703		CO		100			VC	16.59781	
7908		CO		150			VC	3.204253	
4702		CO		100			VC	10.99128	
4501	28.67	CO	26.39	225			VC	75.91502	1 in 141
8604		CO		150			VC	44.82403	
6701	28.82	CO	27.19	225			VC	67.35725	1 in 160
3914		CO		150			VC	1.657563	
7608		CO		150			VC	5.8442	
6504		CO		100			VC	13.05351	
3804		CO		150			VC	19.2139	
8503	29.57	CO	27.61	150			VC	73.00685	1 in 174
7607		CO		150			VC	14.8195	
5302		CO		150			VC	0.717939	
7909		CO		150			VC	13.98166	
5408		CO		100			VC	10.19516	
3801	28.31	CO	26.28	225			VC	80.23092	1 in 110
8707		CO		150			VC	19.2209	
7602	28.57	CO	26.25	225			VC	20.51833	1 in 256
6303	29.89	CO	28.69	225			VC	82.37718	1 in 162
6601	29.14	CO	27.05	225			VC	56.85068	1 in 203
6503	28.71	CO	26.74	300			VC	72.00694	1 in 218
3502	27.77	CO	24.35	450			CO	100.1848	1 in 193
8802	28.73	CO	25.39	675			CO	60.82763	1 in 869
4506		CO		100			VC	12.44645	
5401	29.59	CO	27.5	300			VC	33.61547	1 in 240
7804	28.44	CO	26.21	225			VC	51.22499	1 in 197
4302	28.79	CO	25.48	450			CO	95.71352	1 in 181
8901	28.35	CO	25.3	675			CO	48.25971	1 in 2413
4507		CO		150			VC	10.60758	
4301	28.8	CO	26.73	225			VC	101.1187	1 in 100
4603		CO		100			VC	2.706295	
6904		CO		150			VC	15.57167	
7910		CO		150			VC	10.13884	
4510		CO		100			VC	4.756354	
3601	27.55	SW	24.84	675			CO	110.4762	1 in 442
7606		CO		150			VC	15.61285	
8705		CO		150			VC	12.71808	
8706		CO		150			VC	10.3588	
7706		CO		100			VC	4.655756	
7501	29.56	CO	27.72	225			VC	6.708204	1 in 61
7625		CO		150			VC	9.454213	
8518		CO		150			VC	12.96205	
7801	28.63	CO	26.33	225			VC	59.62942	
5402	29.61	CO	27.34	300			VC	81.8352	1 in 241
3702		CO		100			VC	11.88832	
7803	28.05	CO	25.53	375			VC	88.40814	1 in 442
5403		CO		150			VC	7.604153	
3807		CO		100			VC	2.529214	
6506		CO		100			VC	8.23857	
5512		CO		100			VC	3.865896	
4503		CO		100			VC	15.25147	
4604		CO		100			VC	19.63496	
8309	31	SW	29.57	450			CO	90.95603	1 in 505
3908	28.24	SW	26.56	225			VC	17.82973	1 in 71
3912	27.96	CO	26.31	225			PVC	19.90952	1 in 15
5411		CO		100			VC	8.236087	
7304	29.98	CO	28.48	225			VC	60.9902	1 in 176
5514		CO		100			VC	9.312987	
5504		CO		150			VC	15.9501	
4901	27.98	CO	24.82	375			CO	48.8467	1 in 407
7601	28.85	CO	26.75	225			VC	60.1415	1 in 125
5301	29.88	CO	28.07	225			VC	52.35456	1 in 93
4411		CO		100			VC	27.57837	
4412		CO		150			VC	14.94003	
8806		CO		150			VC	4.651484	
8704		CO		150			VC	10.32817	
3907	28.37	SW	26.9	225			VC	29.49484	1 in 87
8517		CO		150			VC	7.937628	
7401		CO		150			VC	4.715211	
7808		CO		150			VC	13.85132	
7512		CO		100			VC	7.650768	
7703	28.64	CO	26.86	225			VC	79.51101	1 in 156
8804	28.29	CO	26.74	225			VC	66.70832	1 in 171
6304	29.9	CO	28.28	225			VC	25.31798	1 in 133
7605		CO		150			VC	8.819921	
5302		CO		100			VC	12.63798	
3901	28.39	CO	25.1	375			CO	90.07774	1 in 346
7704	28.74	CO	26.76	225			VC	70.17834	1 in 180
7506		CO		150			VC	4.338225	
6505		CO		100			VC	19.24297	
6501	28.93	CO	26.85	300			VC	57.70615	1 in 251
7505		CO		150			VC	9.832949	
7611		CO		150			VC	5.510689	
4304	29	CO	27.87	300			VC	82.29824	1 in 235.137823
4308		CO		150			VC	39.69824	
5502	29.32	CO	25.84	375			VC	3.398962	
4602		CO	0	150			VC	39.35734	
7902	27.94	CO	25.94	225			VC	32.80244	1 in 149
8509		CO		150			VC	11.01614	
5908		CO		150			VC	53.97689	
7901	27.68	CO	26.27	225			VC	50.60632	1 in 163
3802	28.63	CO	25.53	225			VC	33.6155	1 in 168
7502	29.51	CO	27.59	225			VC	106.2544	1 in 128
3507		CO		150			VC	10.03294	
8310	30.69	CO	0	225			VC	37.10795	
4403	28.14	SW	25.09	610			BR	72.47068	1 in 604
8505		CO		150			VC	13.95805	
6502	28.86	CO	26.39	300			VC	26.07681	1 in 2608
4402	28.23	CO	24.93	450			CO	102	1 in 182
7613		CO		150			VC	9.979785	
8510		CO		150			VC	19.49833	
6901	28.01	SW	26.45	225			VC	34.63809	1 in 139
5902	27.45	SW	26.2	225			VC	13.17795	1 in 146
5914	27.36	SW	26.03	225			VC	21.87668	1 in 168
5418		CO		100			VC	12.67117	
5518		CO		150			VC	7.466302	
3501	27.74	CO	0	300			VC	106.9439	
7903	27.7	CO	25.82	225			VC	97.6166	1 in 144
8616		CO		150			VC	9.399779	
6906		CO		150			VC	5.482078	
7411		CO		100			VC	17.12107	
5901	27.7	CO	25.69	150			VC	25.89721	
3509		CO		150			VC	18.95776	
8615		CO		150			VC	11.22444	
8614		CO		150			VC	13.12302	
8501	29.62	CO	27.4	225			VC	60	1 in 154
7626		CO		150			VC	10.33162	
7612		CO		150			VC	9.551622	
3508		CO		150			VC	23.61457	
5501	28.92	CO	26.36	375			VC	81.90273	1 in 164
7405	30.5	CO	28.6	225			VC	112.058	1 in 130
4401	28.16	CO	25.7	300			VC	106.8925	1 in 124
8601	29.48	CO	27.15	225			VC	64.38208	1 in 248
8606		CO		100			VC	6.025507	
7407		CO		150			VC	20.4297	

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned · Foul · Surface Water · Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

All point assets follow the standard colour convention:
red - combined · blue - surface water
brown - foul · purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement
BR	Brick
PE	Polyethylene
RP	Reinforced Plastic Matrix
CO	Concrete
CSB	Concrete Segment Bolted
CSU	Concrete Segment Unbolted
CC	Concrete Box Culverted
PSC	Plastic / Steel Composite
GRC	Glass Reinforced Plastic
DI	Ductile Iron
PVC	Polyvinyl Chloride
CI	Cast Iron
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
PP	Polypropylene
PF	Pitch Fibre
MAC	Masonry, Coursed
MAR	Masonry, Random
U	Unspecified

Address or Site Reference:

SANDILANDS PRIMARY SCHOOL WENDOVER ROAD,
MANCHESTER,
M23 9JX

Scale: 1:1250 **Date:** 02/06/2021
Nodes: 164
Sheet: 1 of 1

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

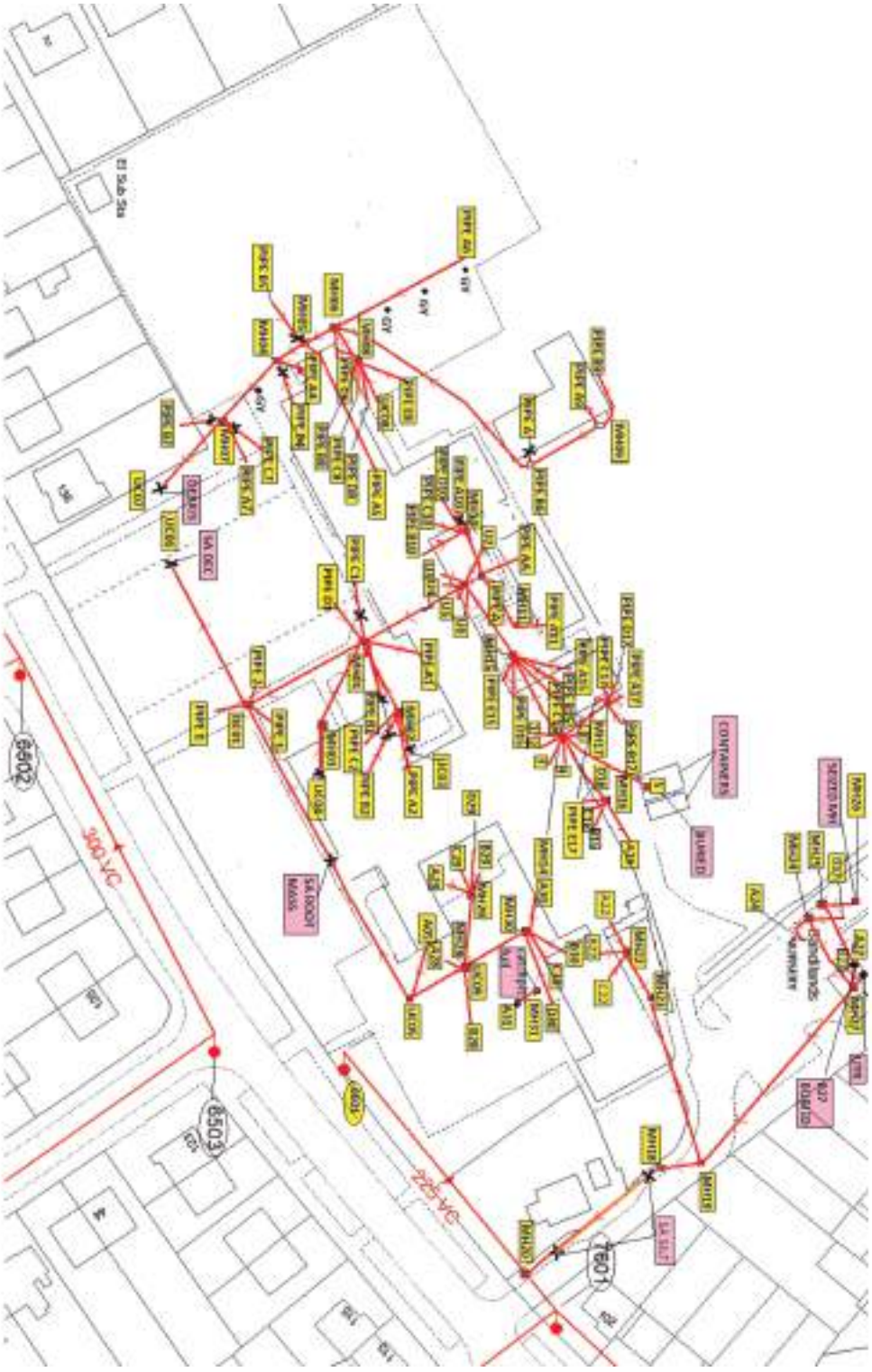
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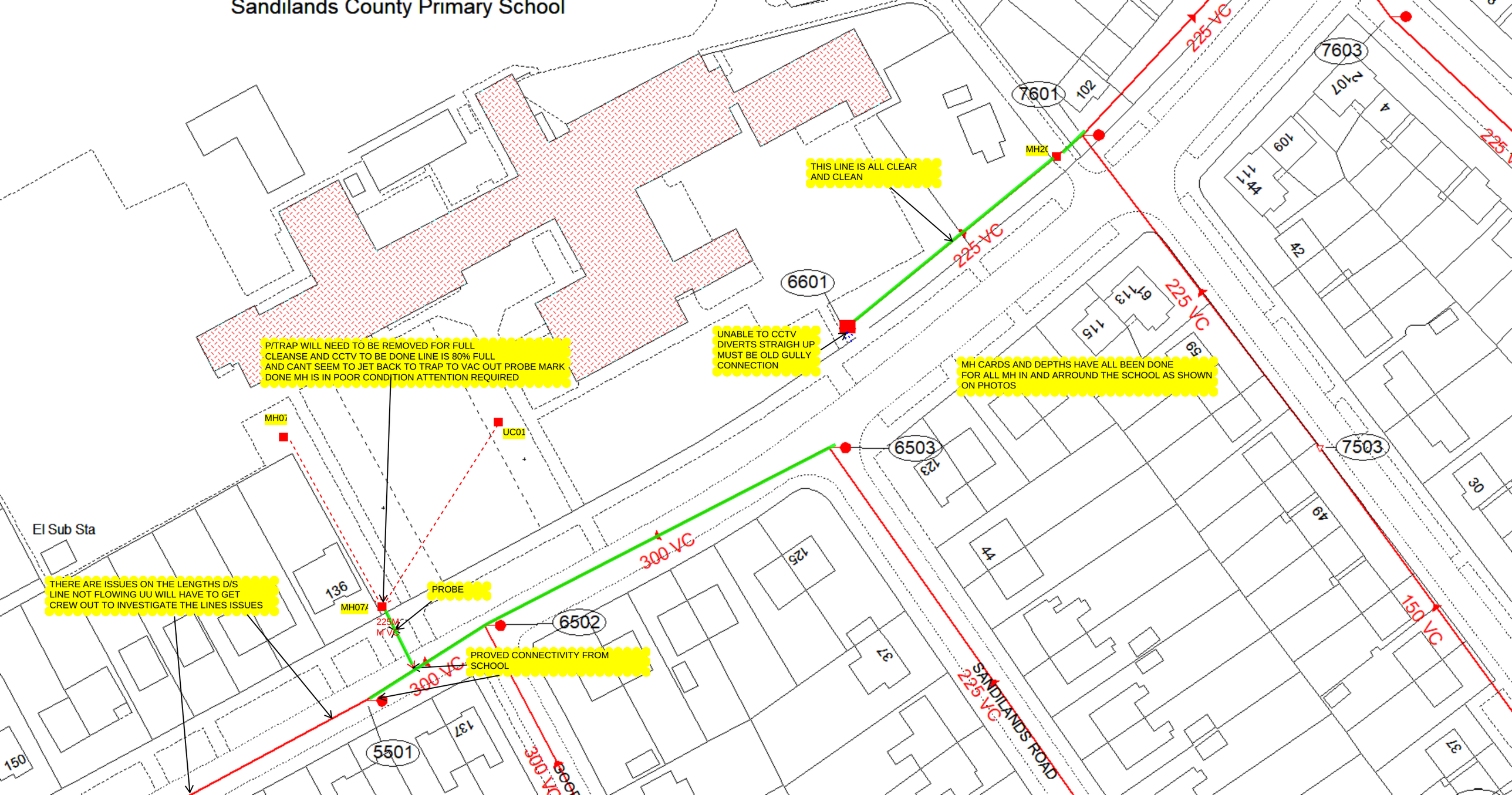
Lanes Group plc
300 Lansdowne Road, Manchester
Tel. 0161 788 2222
cctvsupport@lanesfordrains.co.uk

Project Information

Project Name	Project Date
Faithful Gould ltd - Sandlands Primary school - PJ00415663	02/08/2021

Project Drawing, Page 'Faithful Gould ltd - Sandlands Primary school -




Sandilands County Primary School
El Sub Sta
THIS LINE IS ALL CLEAR AND CLEAN
P/TRAP WILL NEED TO BE REMOVED FOR FULL CLEANSE AND CCTV TO BE DONE LINE IS 80% FULL AND CANT SEEM TO JET BACK TO TRAP TO VAC OUT PROBE MARK DONE MH IS IN POOR CONDITION ATTENTION REQUIRED
UNABLE TO CCTV DIVERTS STRAIGH UP MUST BE OLD GULLY CONNECTION
MH CARDS AND DEPTHS HAVE ALL BEEN DONE FOR ALL MH IN AND ARROUND THE SCHOOL AS SHOWN ON PHOTOS
THERE ARE ISSUES ON THE LENGTHS D/S LINE NOT FLOWING UU WILL HAVE TO GET CREW OUT TO INVESTIGATE THE LINES ISSUES
PROBE
PROVED CONNECTIVITY FROM SCHOOL
SANDILANDS ROAD
225 VC
300 VC
150 VC
7601
7603
6601
6503
7503
6502
5501
MH07
UC01
MH07A
MH20
102
2107
4
109
111
44
42
6713
115
59
123
125
44
49
30
37
136
137
150



LAYER SURVEYS LTD

SEE THE COMPLETE PICTURE

DRAINAGE SURVEY

LAYER SURVEYS LTD
SEE THE COMPLETE PICTURE

Project Information

Layer Surveys Ltd
Francis House
Meadowcroft Business Park
Pope Lane
Preston
Lancashire
PR4 4BA

Job Number	Surveyed by (Operator)	Base Unit	Date
LAYERSERV0001635	**Joe COLLINS**	**DJVV56JNNH**	**20/02/2023**

Client Details:

Tilbury Douglas
Woodhouse Drive
Wigan
WN6 7NT

Client Contact Name: Kabir Salihi
Client Contact Tel: 07771974201

Site Details:

Sandilands Primary School,
Wendover Rd,
Manchester,
M23 9JX

Site Contact Name: Andy (Caretaker)
Site Contact Tel: 07914 852692

Contractor Details:

Layer Surveys Ltd
Francis House
Meadowcroft Business Park
Pope Lane
Preston
Lancashire
PR4 4BA

Office Contact Number: 01772 611634

Purpose of Survey:

Report Contents

Page 1 Cover Page

Page 2 Job Overview

Page 3 Contents Page

Page 4 Survey Run Sheet(Survey 1 - MH20 to 6601)

Page 6 Survey Run Sheet(Survey 2 - MH20 to 7601)

Page 9 Survey Run Sheet(Survey 3 - 6503 to 6502)

Page 14 Survey Run Sheet(Survey 4 - 5501 to 6502)

Page 16 Survey Run Sheet(Survey 5 - MH07A to MH07AJ)

Page 18 Survey Run Sheet(Survey 6 - MH20 to 6601)

Page 21 Final Page

LAYER SURVEYS LTD
SEE THE COMPLETE PICTURE

CCTV Inspection Report

Layer Surveys Ltd
Francis House
Meadowcroft Business Park
Pope Lane
Preston
Lancashire
PR4 4BA

Surveyed by (Operator)	Job Number	Pipe Length Reference(PLR)	Date	Pre Cleaned
Joe COLLINS	**LAYERSERV0001635**	**6601 X**	**20/02/2023**	**Not Cleaned**
Weather	Customer Present	Service Grade/Structural Grade	Base Unit	Section Number
1 - Dry		**4/0**	**DJVV56JNNH**	**1**

Road **Sandilands Primary School,**
Place **Wendover Rd,**
Location **Manchester,**

Division
District
Location Details

Purpose
Duty **Combined**
Catchment

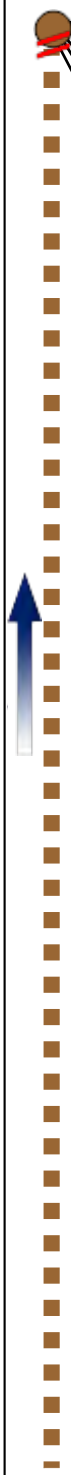
Shape/Size **225mm**
Material **Vitrified clay**
Category

Start Node **MH20**
End Node **6601**
Total length **49 metres**

Scale **1:2.57**
Direction **Upstream**

Start Node Ref:MH20 | I/L : metres | Depth: 2.2 metres

Position	Code	Description	Photo	Type/Grade
0.00	MH	Start node type, manhole, reference MH20	7517932	Comment / 0
0.00	WL	Water level 5% height/diameter	7517933	Comment / 0
0.06	DER	Settled deposits coarse 25% cross-sectional area loss	7517935	Service / 4
0.06	DEE	Attached deposits, encrustation from 7 to 4 o'clock 25% cross-sectional area loss	7517942	Service / 4
0.41	SA	Survey abandoned - Remark: DUE TO 25% DER	7517943	Comment / 0



End Node Ref:6601 | I/L : metres | Depth: 1.96 metres

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Job Number	Surveyed by (Operator)	Base Unit	Date
LAYERSERV0001635	**Joe COLLINS**	**DJVV56JNNH**	**20/02/2023**



Start node type, manhole, reference MH20



Water level 5% height/diameter



Settled deposits coarse 25% cross-sectional area loss



Attached deposits, encrustation from 7 to 4 o'clock 25% cross-sectional area loss



Survey abandoned - Remark: DUE TO 25% DER

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Surveyed by (Operator)	Job Number	Pipe Length Reference(PLR)	Date	Pre Cleaned
Joe COLLINS	**LAYERSERV0001635**	**MH20 X**	**20/02/2023**	**Not Cleaned**
Weather	Customer Present	Service Grade/Structural Grade	Base Unit	Section Number
1 - Dry		**4/0**	**DJVV56JNNH**	**2**

Road **Sandilands Primary School,**
Place **Wendover Rd,**
Location **Manchester,**

Division
District
Location Details

Purpose
Duty **Combined**
Catchment

Shape/Size **225mm**
Material **Vitrified clay**
Category

Start Node **MH20**
End Node **7601**
Total length **5.98 metres**

Scale **1:0.31**
Direction **Downstream**

Start Node Ref:MH20 | I/L : metres | Depth: 2.2 metres

Position	Code	Description	Photo	Type/Grade
0.00	MH	Start node type, manhole, reference MH20	7518003	Comment / 0
0.00	WL	Water level 5% height/diameter	7518004	Comment / 0
0.01	DEC	Settled deposits hard or compacted 25% cross-sectional area loss	7518006	Service / 4
0.69	DEE	Attached deposits, encrustation from 7 to 4 o'clock 15% cross-sectional area loss	7518007	Service / 3
1.13	DEE	Attached deposits, encrustation from 8 to 12 o'clock 25% cross-sectional area loss	7518008	Service / 4
2.92	DEE (S01)	Attached deposits, encrustation from 12 to 12 o'clock 10% cross-sectional area loss, Start	7518009	Service / 3
4.49	JN	Junction at 10 o'clock, diameter 150mm	7518010	Comment / 0
5.64	DEE (F01)	Attached deposits, encrustation from 12 to 12 o'clock 10% cross-sectional area loss, Finished	7518016	Service / 3
5.98	MHF	Finish node type, manhole, reference 7601	7518019	Comment / 0

End Node Ref:7601 | I/L : metres

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Job Number	Surveyed by (Operator)	Base Unit	Date
LAYERSERV0001635	**Joe COLLINS**	**DJVV56JNNH**	**20/02/2023**



Start node type, manhole, reference MH20



Water level 5% height/diameter



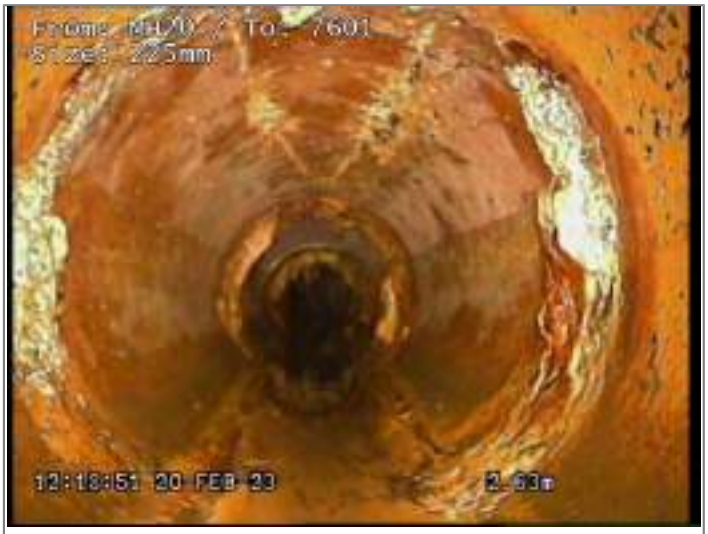
Settled deposits hard or compacted 25% cross-sectional area loss



Attached deposits, encrustation from 7 to 4 o'clock 15% cross-sectional area loss



Attached deposits, encrustation from 8 to 12 o'clock 25% cross-sectional area loss



Attached deposits, encrustation from 12 to 12 o'clock 10% cross-sectional area loss, Start

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Job Number	Surveyed by (Operator)	Base Unit	Date
LAYERSERV0001635	**Joe COLLINS**	**DJVV56JNNH**	**20/02/2023**



Junction at 10 o'clock, diameter 150mm



Attached deposits, encrustation from 12 to 12 o'clock 10% cross-sectional area loss, Finished



Finish node type, manhole, reference 7601

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CCTV Inspection Report

Surveyed by (Operator)	Job Number	Pipe Length Reference(PLR)	Date	Pre Cleaned
Joe COLLINS	**LAYERSERV0001635**	**6503 X**	**21/02/2023**	**HPWJ to clean prior to survey**
Weather	Customer Present	Service Grade/Structural Grade	Base Unit	Section Number
1 - Dry		**0/2**	**DJVV56JNNH**	**3**

Road **Sandilands Primary School,**
Place **Wendover Rd,**
Location **Manchester,**

Division
District
Location Details

Purpose
Duty **Combined**
Catchment

Shape/Size **300mm**
Material **Vitrified clay**
Category

Start Node **6503**
End Node **6502**
Total length **70.01 metres**

Scale **1:3.68**
Direction **Downstream**

Start Node Ref:6503 | I/L : metres | Depth: 2.02 metres

Position	Code	Description	Photo	Type/Grade
0.00	MH	Start node type, manhole, reference 6503	7523353	Comment / 0
0.00	WL	Water level 5% height/diameter	7523354	Comment / 0
5.40	JN	Junction at 9 o'clock, diameter 150mm	7523355	Comment / 0
5.40	CN	Connection other than junction at 12 o'clock, diameter 150mm	7523358	Comment / 0
10.90	SAP	Aggregate projecting from surface at 12 o'clock	7523366	Structural / 2
11.16	CN	Connection other than junction at 12 o'clock, diameter 150mm	7523367	Comment / 0
17.02	JN	Junction at 3 o'clock, diameter 150mm	7523373	Comment / 0
17.04	JN	Junction at 9 o'clock, diameter 150mm	7523374	Comment / 0
24.16	JN	Junction at 3 o'clock, diameter 150mm	7523384	Comment / 0
24.40	JN	Junction at 9 o'clock, diameter 150mm	7523431	Comment / 0
43.54	JN	Junction at 3 o'clock, diameter 150mm	7523448	Comment / 0
44.07	JN	Junction at 9 o'clock, diameter 150mm	7523449	Comment / 0
46.53	CN	Connection other than junction at 11 o'clock, diameter 150mm	7523455	Comment / 0
57.66	JN	Junction at 9 o'clock, diameter 150mm	7523471	Comment / 0
60.48	JN	Junction at 3 o'clock, diameter 150mm	7523472	Comment / 0
61.23	JN	Junction at 9 o'clock, diameter 150mm	7523481	Comment / 0
61.31	WL	Water level 20% height/diameter	7523479	Comment / 0
61.80	JN	Junction at 3 o'clock, diameter 150mm	7523488	Comment / 0
70.01	MHF	Finish node type, manhole, reference 6502	7523514	Comment / 0

End Node Ref:6502 | I/L : metres | Depth: 2.43 metres

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Job Number	Surveyed by (Operator)	Base Unit	Date
LAYERSERV0001635	**Joe COLLINS**	**DJVV56JNNH**	**21/02/2023**



Start node type, manhole, reference 6503



Water level 5% height/diameter



Junction at 9 o'clock, diameter 150mm



Connection other than junction at 12 o'clock, diameter 150mm



Aggregate projecting from surface at 12 o'clock



Connection other than junction at 12 o'clock, diameter 150mm

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Job Number	Surveyed by (Operator)	Base Unit	Date
LAYERSERV0001635	**Joe COLLINS**	**DJVV56JNNH**	**21/02/2023**



Junction at 3 o'clock, diameter 150mm



Junction at 9 o'clock, diameter 150mm



Junction at 3 o'clock, diameter 150mm



Junction at 9 o'clock, diameter 150mm



Junction at 3 o'clock, diameter 150mm



Junction at 9 o'clock, diameter 150mm

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Job Number	Surveyed by (Operator)	Base Unit	Date
LAYERSERV0001635	**Joe COLLINS**	**DJVV56JNNH**	**21/02/2023**



Connection other than junction at 11 o'clock, diameter 150mm



Junction at 9 o'clock, diameter 150mm



Junction at 3 o'clock, diameter 150mm



Junction at 9 o'clock, diameter 150mm



Water level 20% height/diameter



Junction at 3 o'clock, diameter 150mm

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Job Number	Surveyed by (Operator)	Base Unit	Date
LAYERSERV0001635	**Joe COLLINS**	**DJVV56JNNH**	**21/02/2023**



Finish node type, manhole, reference 6502

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Surveyed by (Operator)	Job Number	Pipe Length Reference(PLR)	Date	Pre Cleaned
Joe COLLINS	**LAYERSERV0001635**	**6502 X**	**21/02/2023**	**HPWJ to clean prior to survey**
Weather	Customer Present	Service Grade/Structural Grade	Base Unit	Section Number
1 - Dry		**0/0**	**DJVV56JNNH**	**4**

Road **Sandilands Primary School,**
Place **Wendover Rd,**
Location **Manchester,**

Division
District
Location Details

Purpose
Duty **Combined**
Catchment

Shape/Size **300mm**
Material **Vitrified clay**
Category

Start Node **5501**
End Node **6502**
Total length **24.19 metres**

Scale **1:1.27**
Direction **Upstream**

Start Node Ref:5501 | I/L : metres | Depth: 2.6 metres

Position	Code	Description	Photo	Type/Grade
0.00	MH	Start node type, manhole, reference 5501	7523794	Comment / 0
0.00	WL	Water level 50% height/diameter	7523796	Comment / 0
9.52	JN	Junction at 9 o'clock, diameter 225mm	7523825	Comment / 0
14.85	JN	Junction at 2 o'clock, diameter 150mm	7523845	Comment / 0
24.19	MHF	Finish node type, manhole, reference 6502	7523867	Comment / 0

End Node Ref:6502 | I/L : metres | Depth: 2.43 metres

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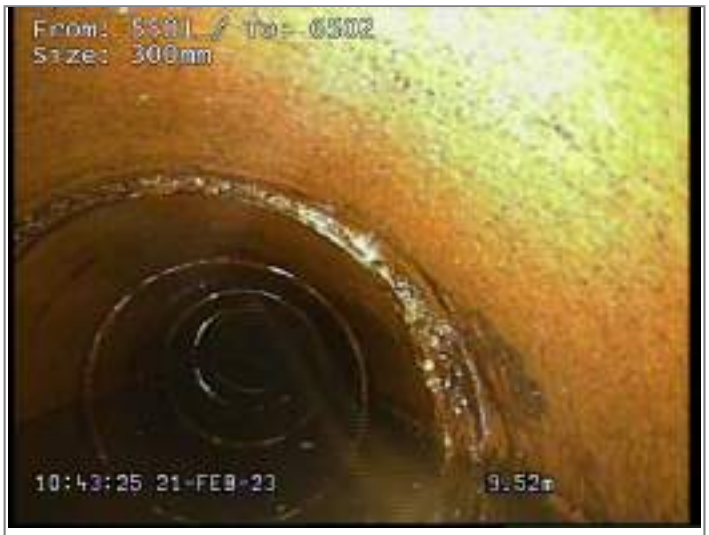
Job Number	Surveyed by (Operator)	Base Unit	Date
LAYERSERV0001635	**Joe COLLINS**	**DJVV56JNNH**	**21/02/2023**



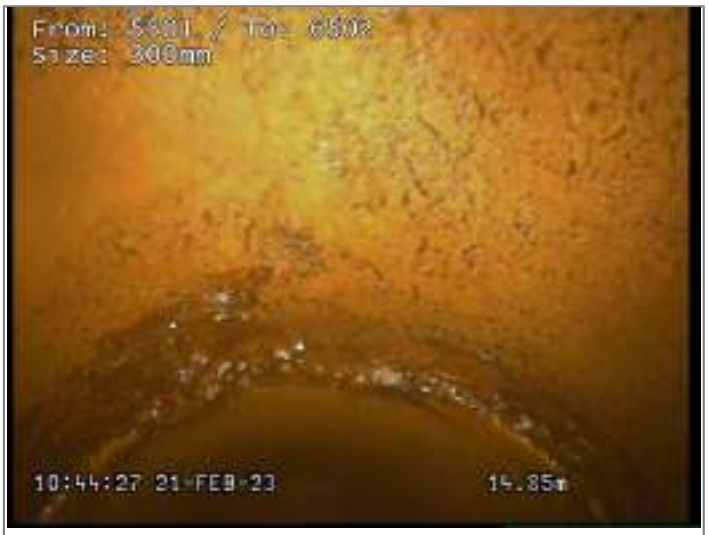
Start node type, manhole, reference 5501



Water level 50% height/diameter



Junction at 9 o'clock, diameter 225mm



Junction at 2 o'clock, diameter 150mm



Finish node type, manhole, reference 6502

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Surveyed by (Operator)	Job Number	Pipe Length Reference(PLR)	Date	Pre Cleaned
Joe COLLINS	**LAYERSERV0001635**	**MH07A X**	**21/02/2023**	**Flushed through to enable survey**
Weather	Customer Present	Service Grade/Structural Grade	Base Unit	Section Number
1 - Dry		**0/0**	**DJVV56JNNH**	**5**

Road **Sandilands Primary School,**
Place **Wendover Rd,**
Location **Manchester,**

Division
District
Location Details

Purpose
Duty **Combined**
Catchment

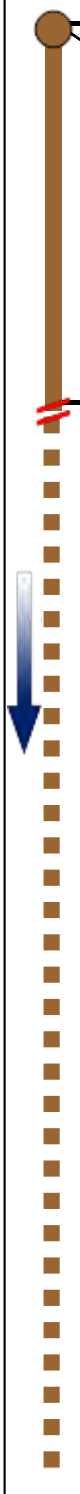
Shape/Size **225mm**
Material **Vitrified clay**
Category

Start Node **MH07A**
End Node **MH07AJ**
Total length **15 metres**

Scale **1:0.79**
Direction **Downstream**

Start Node Ref:MH07A | I/L : metres

Position	Code	Description	Photo	Type/Grade
0.00	MH	Start node type, manhole, reference MH07A	7526186	Comment / 0
0.00	WL	Water level 5% height/diameter	7526187	Comment / 0
3.95	SA	Survey abandoned - Remark: POSSIBLE DAMAGED PIPE UNABLE TO GET PAST	7526188	Comment / 0



End Node Ref:MH07AJ | I/L : metres

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Job Number	Surveyed by (Operator)	Base Unit	Date
LAYERSERV0001635	**Joe COLLINS**	**DJVV56JNNH**	**21/02/2023**



Start node type, manhole, reference MH07A



Water level 5% height/diameter



Survey abandoned - Remark: POSSIBLE DAMAGED PIPE UNABLE TO GET PAST

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Surveyed by (Operator)	Job Number	Pipe Length Reference(PLR)	Date	Pre Cleaned
Joe COLLINS	**LAYERSERV0001635**	**6601 X**	**21/02/2023**	**Flushed through to enable survey**
Weather	Customer Present	Service Grade/Structural Grade	Base Unit	Section Number
1 - Dry		**0/0**	**DJVV56JNNH**	**6**

Road **Sandilands Primary School,**
Place **Wendover Rd,**
Location **Manchester,**

Division
District
Location Details

Purpose
Duty **Combined**
Catchment

Shape/Size **225mm**
Material **Vitrified clay**
Category

Start Node **MH20**
End Node **6601**
Total length **48.35 metres**

Scale **1:2.54**
Direction **Upstream**

Start Node Ref:MH20 | I/L : metres | Depth: 2.2 metres

Position	Code	Description	Photo	Type/Grade
0.00	MH	Start node type, manhole, reference MH20	7526454	Comment / 0
0.00	WL	Water level 10% height/diameter	7526457	Comment / 0
4.02	JN	Junction at 2 o'clock, diameter 150mm	7526467	Comment / 0
12.38	WL	Water level 5% height/diameter	7526468	Comment / 0
19.03	JN	Junction at 10 o'clock, diameter 150mm	7526479	Comment / 0
33.93	JN	Junction at 9 o'clock, diameter 150mm	7526487	Comment / 0
48.35	MHF	Finish node type, manhole, reference 6601	7526537	Comment / 0

End Node Ref:6601 | I/L : metres

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Job Number	Surveyed by (Operator)	Base Unit	Date
LAYERSERV0001635	**Joe COLLINS**	**DJVV56JNNH**	**21/02/2023**



Start node type, manhole, reference MH20



Water level 10% height/diameter



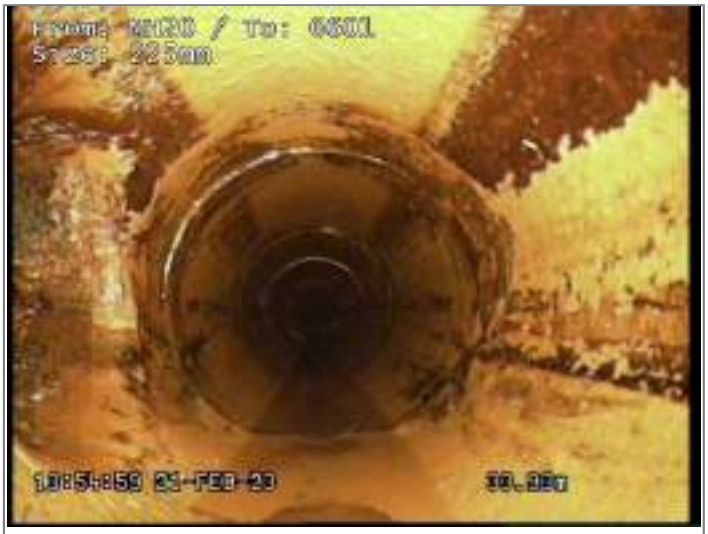
Junction at 2 o'clock, diameter 150mm



Water level 5% height/diameter



Junction at 10 o'clock, diameter 150mm



Junction at 9 o'clock, diameter 150mm

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Job Number	Surveyed by (Operator)	Base Unit	Date
LAYERSERV0001635	**Joe COLLINS**	**DJVV56JNNH**	**21/02/2023**



Finish node type, manhole, reference 6601



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Layer Surveys Ltd Manhole Survey Card

Card No	4	Map No	
Catchment		MH No	5501
Location	WENDOVER ROAD SANDILANDS PRIMARY SCHOOL		
Town	MANCHESTER		

★		★	★	
PR Status	Syphon	C Function	MH MH Type	Date of Survey

COVER DETAILS

☒ Square	☐ Rectangle	☐ Triangle	☐ Dbl Triangle	☐ Circular	☐ Oval	☐ Other	☐ Multiple	☐ Hinged	☐ Lockable

			★	
Cover Level	m	H / M / L Cover Duty	H	Initials JC

PIPE DETAILS

Incoming Pipes

Clockwise from pipe X

Pipe	Depth from Invert (m)	Upstream / Downstream MH Ref	Shape	Size (mm) Height		Width	Pipe Mat	Lining Mat	Back Drop Dia (mm)	Back Drop Depth (m)
A	2.54		C	300	X		VC			
B			C		X		VC			
C			C		X		VC			
D			C		X		VC			
E			C		X		VC			
F			C		X		VC			

Outgoing Pipes

X	2.60		C	300	X		VC			
Y					X					

Cover Opening at narrowest	450 450 mm	Chamber Dimension	1.52 1000 mm	Evidence of Surcharge	☒
Shaft at narrowest	600 630 mm	Shaft Depth (from CL)	620 mm	OX / H2S / METH Toxic atmosphere	☒

MANHOLE CONSTRUCTION DETAILS

☐ Pre Cast Concrete	☐ In Situ Concrete	☒ Brick	☐ GRP	☐ Arch	☐ Corbel	☐ Taper	☐ Side Entry
☒ Reducing Slab	☐ Segments	☐ No. of Landings	5 No. of Step Irons	☐ No. of Ladders			
4 No. of Regulating Brick Courses							

CONDITION INFORMATION (specific in remark)

	Cover	Shaft	Irons / Ladders	Chamber	Benching	Channel
OK	☒	☒	☒	☒	☒	☒
Needs attention	☐	☐	☐	☐	☐	☐
Urgent attention	☐	☐	☐	☐	☐	☐

Depth of Flow	mm	Depth of Silt	mm	Height of Surcharge from CL	mm

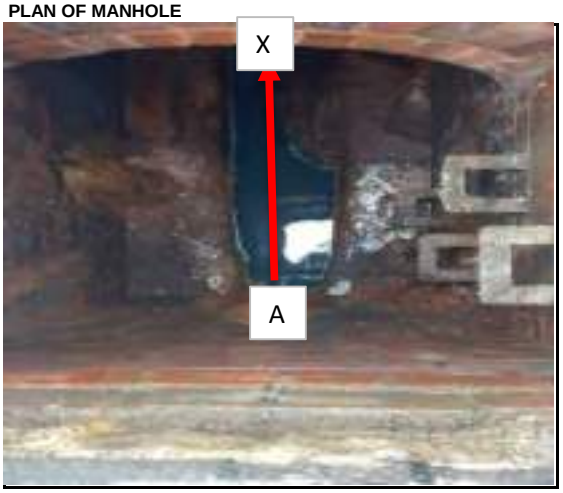
REMARKS

★ *See Overleaf for Key*

LOCATION SKETCH



PLAN OF MANHOLE



STATUS	PU : Public	PR : Private	WC : Culverted Watercourse	}	Applies to main outlet
	24 : Section 24	HD : Highway Drain			
FUNCTION	F : Foul	C : Combined	S : Surface Water	}	Applies to main outlet
MANHOLE TYPE	IF : Infall	MH : Manhole	CP : Catchpit	CSO	:Consented Sewer Overflow
	LH : Lamphole	RE : Rodding Eye	SO : Storm Overflow	DS	:Dual system Manhole
	GU : Gully	OF : Outfall	SA : Soakaway	PS	:Pumping Station
COVER DUTY	L : Light Duty	M : Medium Duty	H : Heavy Duty		
SHAPE	C : Circular	E : Egg	R : Rectangular		
	S : Square	T : Trapezoidal	A : Arched		
	B : Barrel	H : Horseshoe (Inverted U)	U : U-shaped with flat top		
	X : Other (state in words)				
PIPE (OR LINING) MATERIAL	AK : Alkathene	AC : Asbestos Cement	BR : Brick		
	CI : Cast Iron	SI : Spun (Grey) Iron	CO : Concrete		
	CSB : Concrete Segments (Bolted)	CSU : Concrete Segments (Unbolted)	CC : Concrete Box Culvert		
	DI : Ductile Iron	GRC : Glass Reinforced Concrete	GRP : Glass Reinforced Plastic		
	PSC : Plastic/Steel Composite	PVC : Polyvinyl Chloride	PE : Polyethylene		
	RPM : Reinforced Plastic Matrix	ST : Steel	VC : Vitrified Clay		
	PP : Polypropylene	PF : Pitch Fibre	MAC : Masonry, Coursed		
	MAR : Masonry, Randon Courses	XXX : Other (State in remarks)			
LINING	BL : Bitumen	RL : Resin	IS : Insituform		
	CL : Cement	PI : Plastic			

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Layer Surveys Ltd Manhole Survey Card

Card No	5	Map No	
Catchment		MH No	6502
Location	WENDOVER ROAD SANDILANDS PRIMARY SCHOOL		
Town	MANCHESTER		

★ PR Status	Syphon	★ C Function	★ MH MH Type	Date of Survey

COVER DETAILS

Square	Rectangle	Triangle	Dbl Triangle	Circular	Oval	Other	Multiple	Hinged	Lockable
☑	☐	☐	☐	☐	☐	☐	☐	☐	☐

Cover Level	m	H / M / L Cover Duty ★	Initials
		H	JC

PIPE DETAILS

Incoming Pipes

Clockwise from pipe X

Pipe	Depth from Invert (m)	Upstream / Downstream MH Ref	Shape	Size (mm) Height		Width	Pipe Mat	Lining Mat	Back Drop Dia (mm)	Back Drop Depth (m)
A	2.45		C	300	X		VC			
B	2.23		C	300	X		VC			
C			C		X		VC			
D			C		X		VC			
E			C		X		VC			
F			C		X		VC			

Outgoing Pipes

X	2.43		C	300	X		VC			
Y					X					

Cover Opening at narrowest	600 600 mm	Chamber Dimension	1.55 900 mm	Evidence of Surcharge	☑
Shaft at narrowest	500 500 mm	Shaft Depth (from CL)	1 mm	OX / H2S / METH Toxic atmosphere	☑

MANHOLE CONSTRUCTION DETAILS

Pre Cast Concrete	In Situ Concrete	Brick	GRP	Arch	Corbel	Taper	Side Entry
☐	☐	☑	☐	☐	☐	☐	☐

Reducing Slab	Segments	No. of Landings	No. of Step Irons	No. of Ladders
☑	☐	☐	3	☐

5 No. of Regulating Brick Courses

CONDITION INFORMATION (specific in remark)

	Cover	Shaft	Irons / Ladders	Chamber	Benching	Channel
OK	☑	☑	☑	☑	☑	☑
Needs attention	☐	☐	☐	☐	☐	☐
Urgent attention	☐	☐	☐	☐	☐	☐

Depth of Flow	mm	Depth of Silt	mm	Height of Surcharge from CL	mm

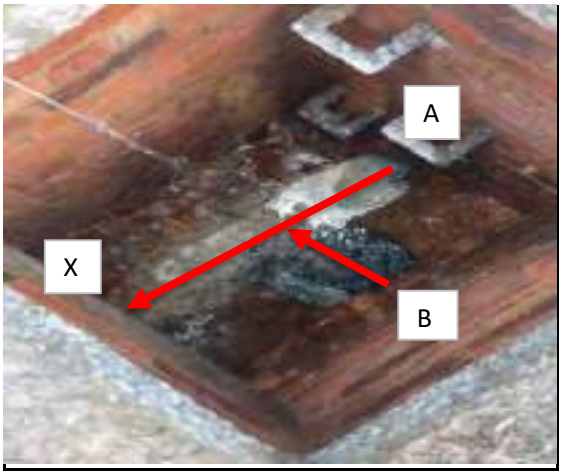
REMARKS

★ *See Overleaf for Key*

LOCATION SKETCH



PLAN OF MANHOLE



STATUS	PU : Public	PR : Private	WC : Culverted Watercourse	}	Applies to main outlet
	24 : Section 24	HD : Highway Drain			
FUNCTION	F : Foul	C : Combined	S : Surface Water	}	Applies to main outlet
MANHOLE TYPE	IF : Infall	MH : Manhole	CP : Catchpit	CSO	:Consented Sewer Overflow
	LH : Lamphole	RE : Rodding Eye	SO : Storm Overflow	DS	:Dual system Manhole
	GU : Gully	OF : Outfall	SA : Soakaway	PS	:Pumping Station
COVER DUTY	L : Light Duty	M : Medium Duty	H : Heavy Duty		
SHAPE	C : Circular	E : Egg	R : Rectangular		
	S : Square	T : Trapezoidal	A : Arched		
	B : Barrel	H : Horseshoe (Inverted U)	U : U-shaped with flat top		
	X : Other (state in words)				
PIPE (OR LINING) MATERIAL	AK : Alkathene	AC : Asbestos Cement	BR : Brick		
	CI : Cast Iron	SI : Spun (Grey) Iron	CO : Concrete		
	CSB : Concrete Segments (Bolted)	CSU : Concrete Segments (Unbolted)	CC : Concrete Box Culvert		
	DI : Ductile Iron	GRC : Glass Reinforced Concrete	GRP : Glass Reinforced Plastic		
	PSC : Plastic/Steel Composite	PVC : Polyvinyl Chloride	PE : Polyethylene		
	RPM : Reinforced Plastic Matrix	ST : Steel	VC : Vitrified Clay		
	PP : Polypropylene	PF : Pitch Fibre	MAC : Masonry, Coursed		
	MAR : Masonry, Randon Courses	XXX : Other (State in remarks)			
LINING	BL : Bitumen	RL : Resin	IS : Insituform		
	CL : Cement	PI : Plastic			

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Layer Surveys Ltd Manhole Survey Card

Card No	6	Map No	
Catchment		MH No	6503
Location	WENDOVER ROAD SANDILANDS PRIMARY SCHOOL		
Town	MANCHESTER		

★ PR Status	Syphon	★ C Function	★ MH MH Type	Date of Survey

COVER DETAILS

Square	Rectangle	Triangle	Dbl Triangle	Circular	Oval	Other	Multiple	Hinged	Lockable
☑	☐	☐	☐	☐	☐	☐	☐	☐	☐

Cover Level	m	H / M / L Cover Duty ★	Initials
		H	JC

PIPE DETAILS

Incoming Pipes

Clockwise from pipe X

Pipe	Depth from Invert (m)	Upstream / Downstream MH Ref	Shape	Size (mm) Height		Width	Pipe Mat	Lining Mat	Back Drop Dia (mm)	Back Drop Depth (m)
A	1.97		C	225	X		VC			
B			C		X		VC			
C			C		X		VC			
D			C		X		VC			
E			C		X		VC			
F			C		X		VC			

Outgoing Pipes

X	2.08		C	300	X		VC			
Y					X					

Cover Opening at narrowest	600 600 mm	Chamber Dimension	1.3 900 mm	Evidence of Surcharge	☑
Shaft at narrowest	500 500 mm	Shaft Depth (from CL)	580 mm	OX / H2S / METH Toxic atmosphere	☑

MANHOLE CONSTRUCTION DETAILS

Pre Cast Concrete	In Situ Concrete	Brick	GRP	Arch	Corbel	Taper	Side Entry
☐	☐	☑	☐	☐	☐	☐	☐

Reducing Slab	Segments	No. of Landings	No. of Step Irons	No. of Ladders
☑	☐	☐	4	☐

☐ No. of Regulating Brick Courses

CONDITION INFORMATION (specific in remark)

	Cover	Shaft	Irons / Ladders	Chamber	Benching	Channel
OK	☑	☑	☑	☑	☑	☑
Needs attention	☐	☐	☐	☐	☐	☐
Urgent attention	☐	☐	☐	☐	☐	☐

Depth of Flow	mm	Depth of Silt	mm	Height of Surcharge from CL	mm

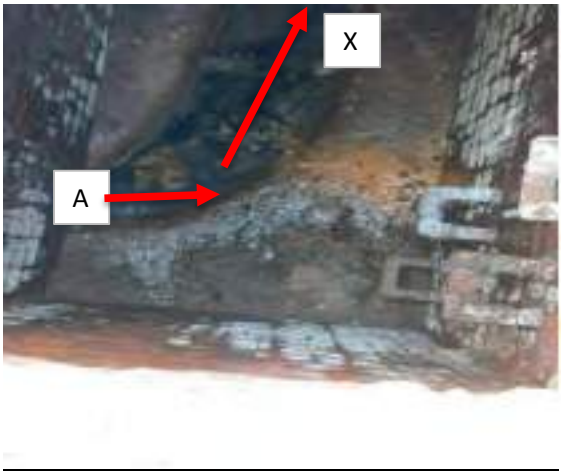
REMARKS

★ *See Overleaf for Key*

LOCATION SKETCH



PLAN OF MANHOLE



STATUS	PU : Public	PR : Private	WC : Culverted Watercourse	}	Applies to main outlet
	24 : Section 24	HD : Highway Drain			
FUNCTION	F : Foul	C : Combined	S : Surface Water	}	Applies to main outlet
MANHOLE TYPE	IF : Infall	MH : Manhole	CP : Catchpit	CSO	:Consented Sewer Overflow
	LH : Lamphole	RE : Rodding Eye	SO : Storm Overflow	DS	:Dual system Manhole
	GU : Gully	OF : Outfall	SA : Soakaway	PS	:Pumping Station
COVER DUTY	L : Light Duty	M : Medium Duty	H : Heavy Duty		
SHAPE	C : Circular	E : Egg	R : Rectangular		
	S : Square	T : Trapezoidal	A : Arched		
	B : Barrel	H : Horseshoe (Inverted U)	U : U-shaped with flat top		
	X : Other (state in words)				
PIPE (OR LINING) MATERIAL	AK : Alkathene	AC : Asbestos Cement	BR : Brick		
	CI : Cast Iron	SI : Spun (Grey) Iron	CO : Concrete		
	CSB : Concrete Segments (Bolted)	CSU : Concrete Segments (Unbolted)	CC : Concrete Box Culvert		
	DI : Ductile Iron	GRC : Glass Reinforced Concrete	GRP : Glass Reinforced Plastic		
	PSC : Plastic/Steel Composite	PVC : Polyvinyl Chloride	PE : Polyethylene		
	RPM : Reinforced Plastic Matrix	ST : Steel	VC : Vitrified Clay		
	PP : Polypropylene	PF : Pitch Fibre	MAC : Masonry, Coursed		
	MAR : Masonry, Randon Courses	XXX : Other (State in remarks)			
LINING	BL : Bitumen	RL : Resin	IS : Insituform		
	CL : Cement	PI : Plastic			

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Layer Surveys Ltd Manhole Survey Card

Card No	2	Map No	
Catchment		MH No	6601
Location	WENDOVER ROAD SANDILANDS PRIMARY SCHOOL		
Town	MANCHESTER		

★ PR Status	Syphon	★ C Function	★ MH MH Type	Date of Survey

COVER DETAILS

Square	Rectangle	Triangle	Dbl Triangle	Circular	Oval	Other	Multiple	Hinged	Lockable
☑	☐	☐	☐	☐	☐	☐	☐	☐	☐

Cover Level	m	H / M / L Cover Duty ★	Initials
		H	JC

PIPE DETAILS

Incoming Pipes

Clockwise from pipe X

Pipe	Depth from Invert (m)	Upstream / Downstream MH Ref	Shape	Size (mm) Height		Width	Pipe Mat	Lining Mat	Back Drop Dia (mm)	Back Drop Depth (m)
A	1.96		C	150	X		VC			
B			C		X		VC			
C			C		X		VC			
D			C		X		VC			
E			C		X		VC			
F			C		X		VC			

Outgoing Pipes

X	1.96		C	225	X		VC			
Y					X					

Cover Opening at narrowest	500 500 mm	Chamber Dimension	900 mm	Evidence of Surcharge	☑
Shaft at narrowest	580.00 mm	Shaft Depth (from CL)	320 mm	OX / H2S / METH Toxic atmosphere	☑

MANHOLE CONSTRUCTION DETAILS

Pre Cast Concrete	In Situ Concrete	Brick	GRP	Arch	Corbel	Taper	Side Entry
☐	☐	☑	☐	☐	☐	☐	☐

Reducing Slab	Segments	No. of Landings	No. of Step Irons	No. of Ladders
☑	☐	☐	5	☐

☐ No. of Regulating Brick Courses

CONDITION INFORMATION (specific in remark)

	Cover	Shaft	Irons / Ladders	Chamber	Benching	Channel
OK	☑	☑	☑	☑	☑	☑
Needs attention	☐	☐	☐	☐	☐	☐
Urgent attention	☐	☐	☐	☐	☐	☐

Depth of Flow	mm	Depth of Silt	mm	Height of Surcharge from CL	mm

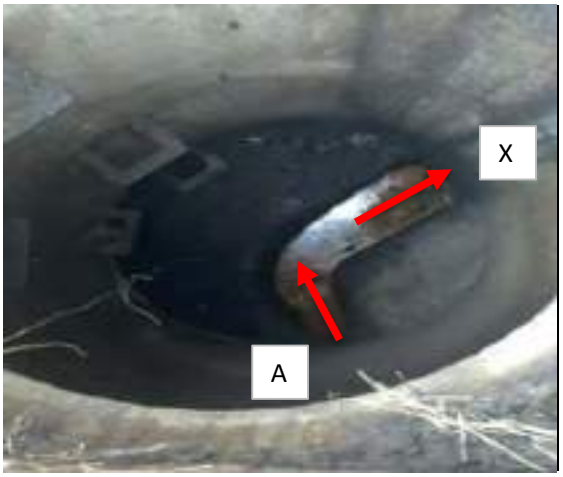
REMARKS

★ *See Overleaf for Key*

LOCATION SKETCH



PLAN OF MANHOLE



STATUS	PU : Public	PR : Private	WC : Culverted Watercourse	}	Applies to main outlet
	24 : Section 24	HD : Highway Drain			
FUNCTION	F : Foul	C : Combined	S : Surface Water	}	Applies to main outlet
MANHOLE TYPE	IF : Infall	MH : Manhole	CP : Catchpit	CSO	:Consented Sewer Overflow
	LH : Lamphole	RE : Rodding Eye	SO : Storm Overflow	DS	:Dual system Manhole
	GU : Gully	OF : Outfall	SA : Soakaway	PS	:Pumping Station
COVER DUTY	L : Light Duty	M : Medium Duty	H : Heavy Duty		
SHAPE	C : Circular	E : Egg	R : Rectangular		
	S : Square	T : Trapezoidal	A : Arched		
	B : Barrel	H : Horseshoe (Inverted U)	U : U-shaped with flat top		
	X : Other (state in words)				
PIPE (OR LINING) MATERIAL	AK : Alkathene	AC : Asbestos Cement	BR : Brick		
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	CSB : Concrete Segments (Bolted)	CSU : Concrete Segments (Unbolted)	CC : Concrete Box Culvert		
	DI : Ductile Iron	GRC : Glass Reinforced Concrete	GRP : Glass Reinforced Plastic		
	PSC : Plastic/Steel Composite	PVC : Polyvinyl Chloride	PE : Polyethylene		
	RPM : Reinforced Plastic Matrix	ST : Steel	VC : Vitrified Clay		
	PP : Polypropylene	PF : Pitch Fibre	MAC : Masonry, Coursed		
	MAR : Masonry, Randon Courses	XXX : Other (State in remarks)			
LINING	BL : Bitumen	RL : Resin	IS : Insituform		
	CL : Cement	PI : Plastic			

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Layer Surveys Ltd Manhole Survey Card

Card No	1	Map No	
Catchment		MH No	MH07A
Location	WENDOVER ROAD SANDILANDS PRIMARY SCHOOL		
Town	MANCHESTER		

★		★	★	
PR Status	Syphon	C Function	MH MH Type	Date of Survey

COVER DETAILS

☒ Square	☐ Rectangle	☐ Triangle	☐ Dbl Triangle	☐ Circular	☐ Oval	☐ Other	☐ Multiple	☐ Hinged	☐ Lockable

			★	
Cover Level	m	H / M / L Cover Duty	H	Initials JC

PIPE DETAILS

Incoming Pipes

Clockwise from pipe X

Pipe	Depth from Invert (m)	Upstream / Downstream MH Ref	Shape	Size (mm) Height		Width	Pipe Mat	Lining Mat	Back Drop Dia (mm)	Back Drop Depth (m)
A	2.46		C	225	X		VC			
B	1.89		C	150	X		VC			
C	1.59		C	100	X		VC			
D			C		X		VC			
E			C		X		VC			
F			C		X		VC			

Outgoing Pipes

X	2.60		C	225	X		VC			2.46
Y					X					

Cover Opening at narrowest	650 510 mm	Chamber Dimension	1.58 1000 mm	Evidence of Surcharge	☒
Shaft at narrowest	610 450 mm	Shaft Depth (from CL)	850 mm	OX / H2S / METH Toxic atmosphere	☒

MANHOLE CONSTRUCTION DETAILS

☐ Pre Cast Concrete	☐ In Situ Concrete	☒ Brick	☐ GRP	☐ Arch	☐ Corbel	☐ Taper	☐ Side Entry
☒ Reducing Slab	☐ Segments	☐ No. of Landings	5 No. of Step Irons	☐ No. of Ladders			
8 No. of Regulating Brick Courses							

CONDITION INFORMATION (specific in remark)

	Cover	Shaft	Irons / Ladders	Chamber	Benching	Channel
OK	☐	☒	☒	☐	☐	☐
Needs attention	☐	☐	☐	☐	☐	☐
Urgent attention	☒	☐	☐	☒	☒	☒

Depth of Flow	mm	Depth of Silt	mm	Height of Surcharge from CL	mm

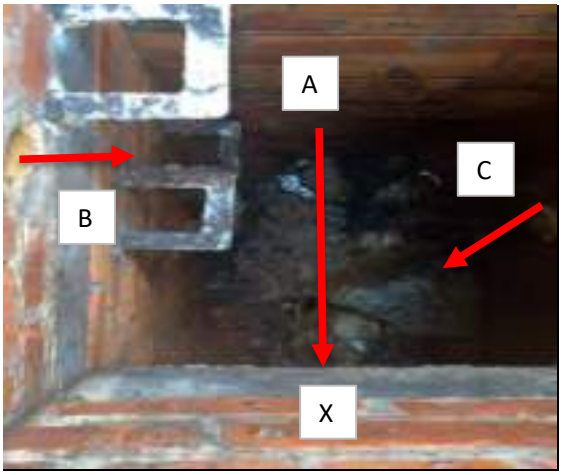
REMARKS

★ *See Overleaf for Key*

LOCATION SKETCH



PLAN OF MANHOLE



STATUS	PU : Public	PR : Private	WC : Culverted Watercourse	}	Applies to main outlet
	24 : Section 24	HD : Highway Drain			
FUNCTION	F : Foul	C : Combined	S : Surface Water	}	Applies to main outlet
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	LH : Lamphole	RE : Rodding Eye	SO : Storm Overflow	DS	:Dual system Manhole
	GU : Gully	OF : Outfall	SA : Soakaway	PS	:Pumping Station
COVER DUTY	L : Light Duty	M : Medium Duty	H : Heavy Duty		
SHAPE	C : Circular	E : Egg	R : Rectangular		
	S : Square	T : Trapezoidal	A : Arched		
	B : Barrel	H : Horseshoe (Inverted U)	U : U-shaped with flat top		
	X : Other (state in words)				
PIPE (OR LINING) MATERIAL	AK : Alkathene	AC : Asbestos Cement	BR : Brick		
	CI : Cast Iron	SI : Spun (Grey) Iron	CO : Concrete		
	CSB : Concrete Segments (Bolted)	CSU : Concrete Segments (Unbolted)	CC : Concrete Box Culvert		
	DI : Ductile Iron	GRC : Glass Reinforced Concrete	GRP : Glass Reinforced Plastic		
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	RPM : Reinforced Plastic Matrix	ST : Steel	VC : Vitrified Clay		
	PP : Polypropylene	PF : Pitch Fibre	MAC : Masonry, Coursed		
	MAR : Masonry, Randon Courses	XXX : Other (State in remarks)			
LINING	BL : Bitumen	RL : Resin	IS : Insituform		
	CL : Cement	PI : Plastic			

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Layer Surveys Ltd Manhole Survey Card

Card No	3	Map No	
Catchment		MH No	MH20
Location	WENDOVER ROAD SANDILANDS PRIMARY SCHOOL		
Town	MANCHESTER		

★		★	★		
PR Status	Syphon	C Function	MH MH Type	Date of Survey	

COVER DETAILS

☒ Square	☐ Rectangle	☐ Triangle	☐ Dbl Triangle	☐ Circular	☐ Oval	☐ Other	☐ Multiple	☐ Hinged	☐ Lockable

			★	
Cover Level	m	H / M / L Cover Duty	H	Initials JC

PIPE DETAILS

Incoming Pipes

Clockwise from pipe X

Pipe	Depth from Invert (m)	Upstream / Downstream MH Ref	Shape	Size (mm) Height		Width	Pipe Mat	Lining Mat	Back Drop Dia (mm)	Back Drop Depth (m)
A	2.16		C	225	X		VC			
B	2.17		C	225	X		VC			
C			C		X		VC			
D			C		X		VC			
E			C		X		VC			
F			C		X		VC			

Outgoing Pipes

X	2.20		C	225	X		VC			
Y					X					

Cover Opening at narrowest	600 600 mm	Chamber Dimension	1200 mm	Evidence of Surcharge	☒
Shaft at narrowest	570 580 mm	Shaft Depth (from CL)	880 mm	OX / H2S / METH Toxic atmosphere	☒

MANHOLE CONSTRUCTION DETAILS

☐ Pre Cast Concrete	☐ In Situ Concrete	☒ Brick	☐ GRP	☐ Arch	☐ Corbel	☐ Taper	☐ Side Entry
☒ Reducing Slab	☐ Segments	☐ No. of Landings	4 No. of Step Irons	☐ No. of Ladders			
8 No. of Regulating Brick Courses							

CONDITION INFORMATION (specific in remark)

	Cover	Shaft	Irons / Ladders	Chamber	Benching	Channel
OK	☒	☒	☒	☒	☒	☒
Needs attention	☐	☐	☐	☐	☐	☐
Urgent attention	☐	☐	☐	☐	☐	☐

Depth of Flow	mm	Depth of Silt	mm	Height of Surcharge from CL	mm

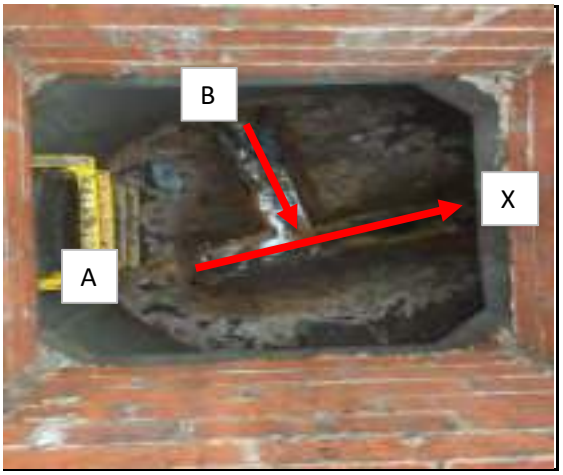
REMARKS

★ *See Overleaf for Key*

LOCATION SKETCH



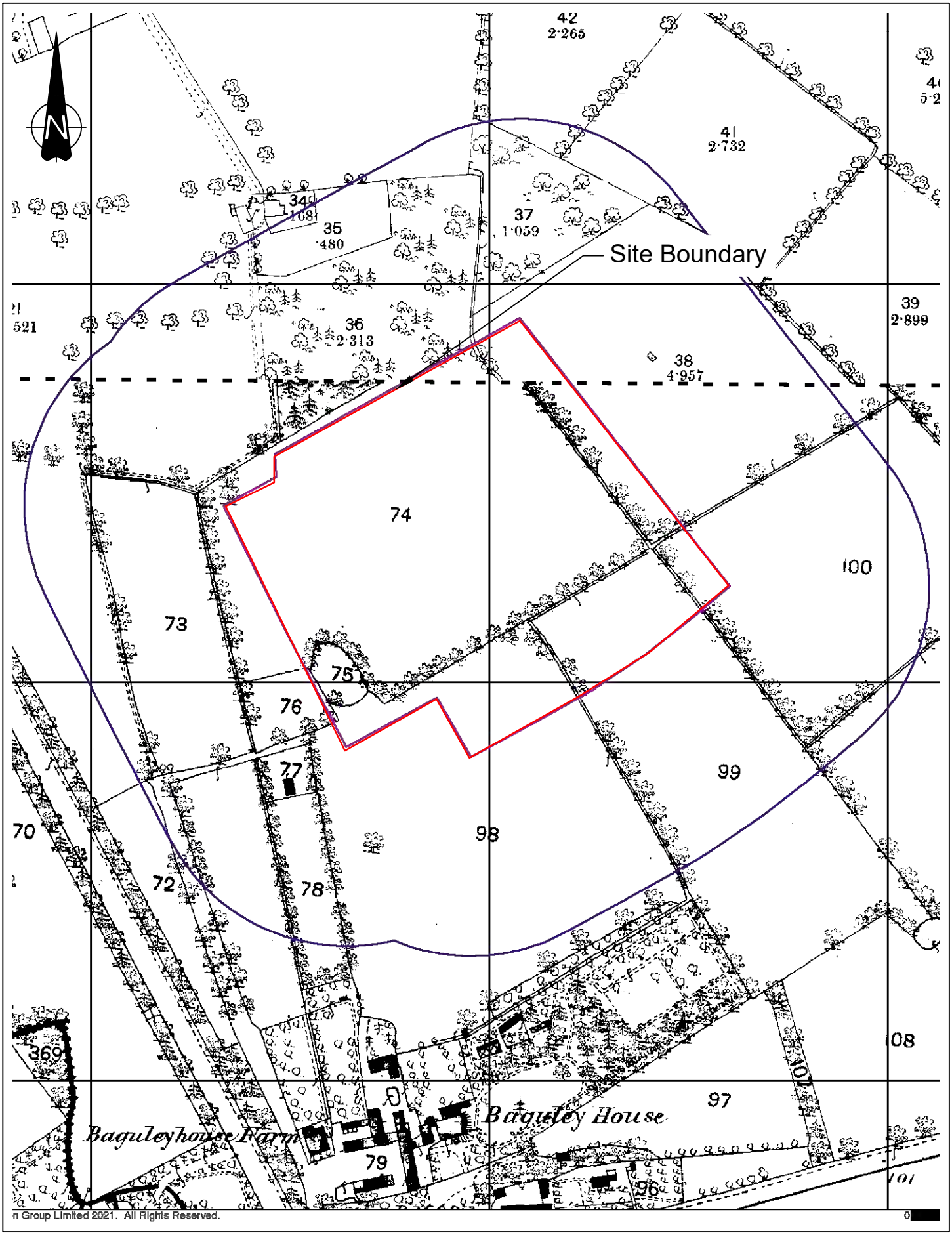
PLAN OF MANHOLE



STATUS	PU : Public	PR : Private	WC : Culverted Watercourse	} Applies to main outlet	
	24 : Section 24	HD : Highway Drain			
FUNCTION	F : Foul	C : Combined	S : Surface Water	} Applies to main outlet	
MANHOLE TYPE	IF : Infall	MH : Manhole	CP : Catchpit	CSO :Consented Sewer Overflow	
	LH : Lamphole	RE : Rodding Eye	SO : Storm Overflow	DS :Dual system Manhole	
	GU : Gully	OF : Outfall	SA : Soakaway	PS :Pumping Station	
COVER DUTY	L : Light Duty	M : Medium Duty	H : Heavy Duty		
SHAPE	C : Circular	E : Egg	R : Rectangular		
	S : Square	T : Trapezoidal	A : Arched		
	B : Barrel	H : Horseshoe (Inverted U)	U : U-shaped with flat top		
	X : Other (state in words)				

PIPE (OR LINING) MATERIAL	AK : Alkathene	AC : Asbestos Cement	BR : Brick
	CI : Cast Iron	SI : Spun (Grey) Iron	CO : Concrete
	CSB : Concrete Segments (Bolted)	CSU : Concrete Segments (Unbolted)	CC : Concrete Box Culvert
	DI : Ductile Iron	GRC : Glass Reinforced Concrete	GRP : Glass Reinforced Plastic
	PSC : Plastic/Steel Composite	PVC : Polyvinyl Chloride	PE : Polyethylene
	RPM : Reinforced Plastic Matrix	ST : Steel	VC : Vitrified Clay
	PP : Polypropylene	PF : Pitch Fibre	MAC : Masonry, Coursed
	MAR : Masonry, Randon Courses	XXX : Other (State in remarks)	

LINING	BL : Bitumen	RL : Resin	IS : Insituform
	CL : Cement	PI : Plastic	

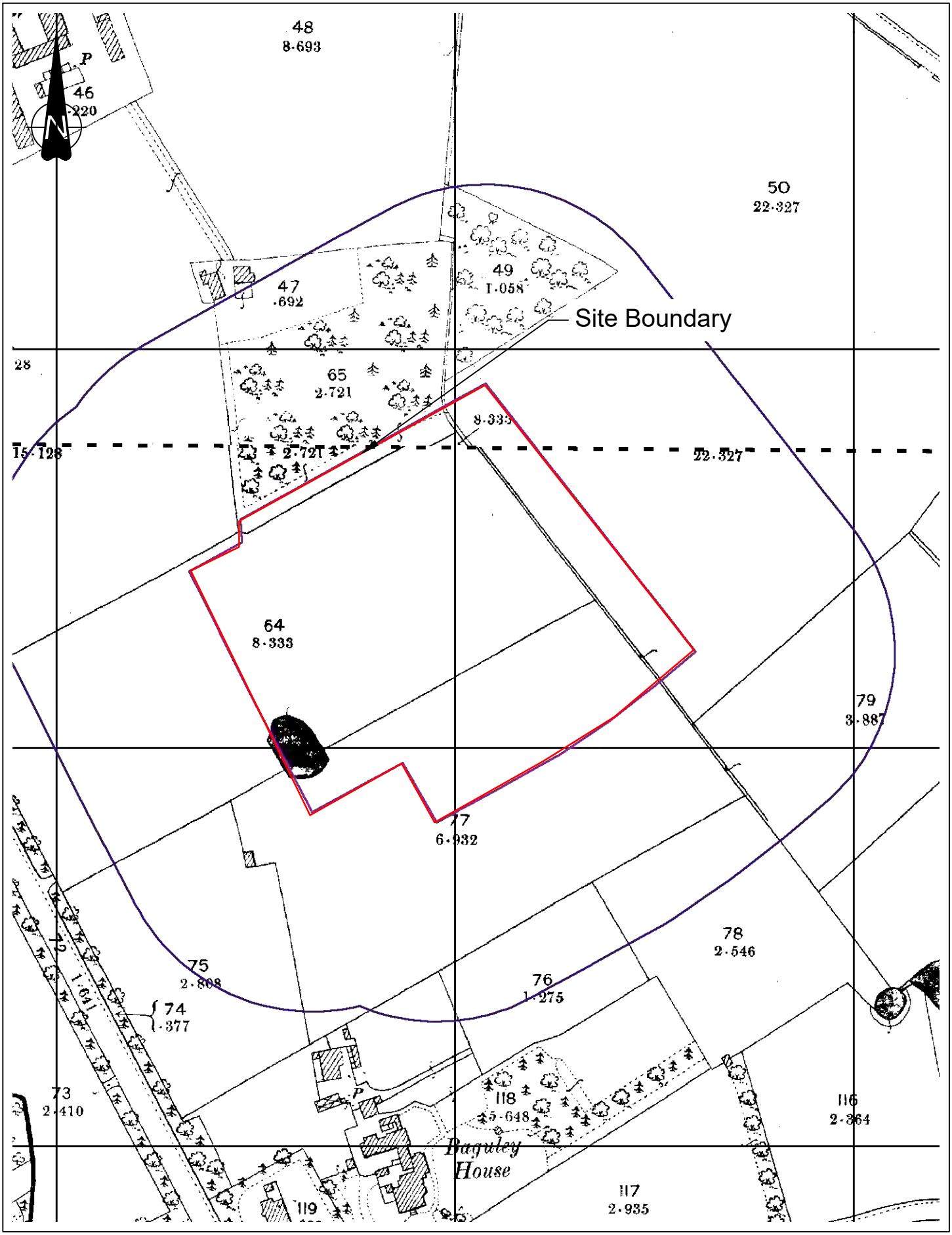


SCALE 1:2500@ A4

Figure Title

HISTORYS
1876 OS PLAN

FIGURE 3a

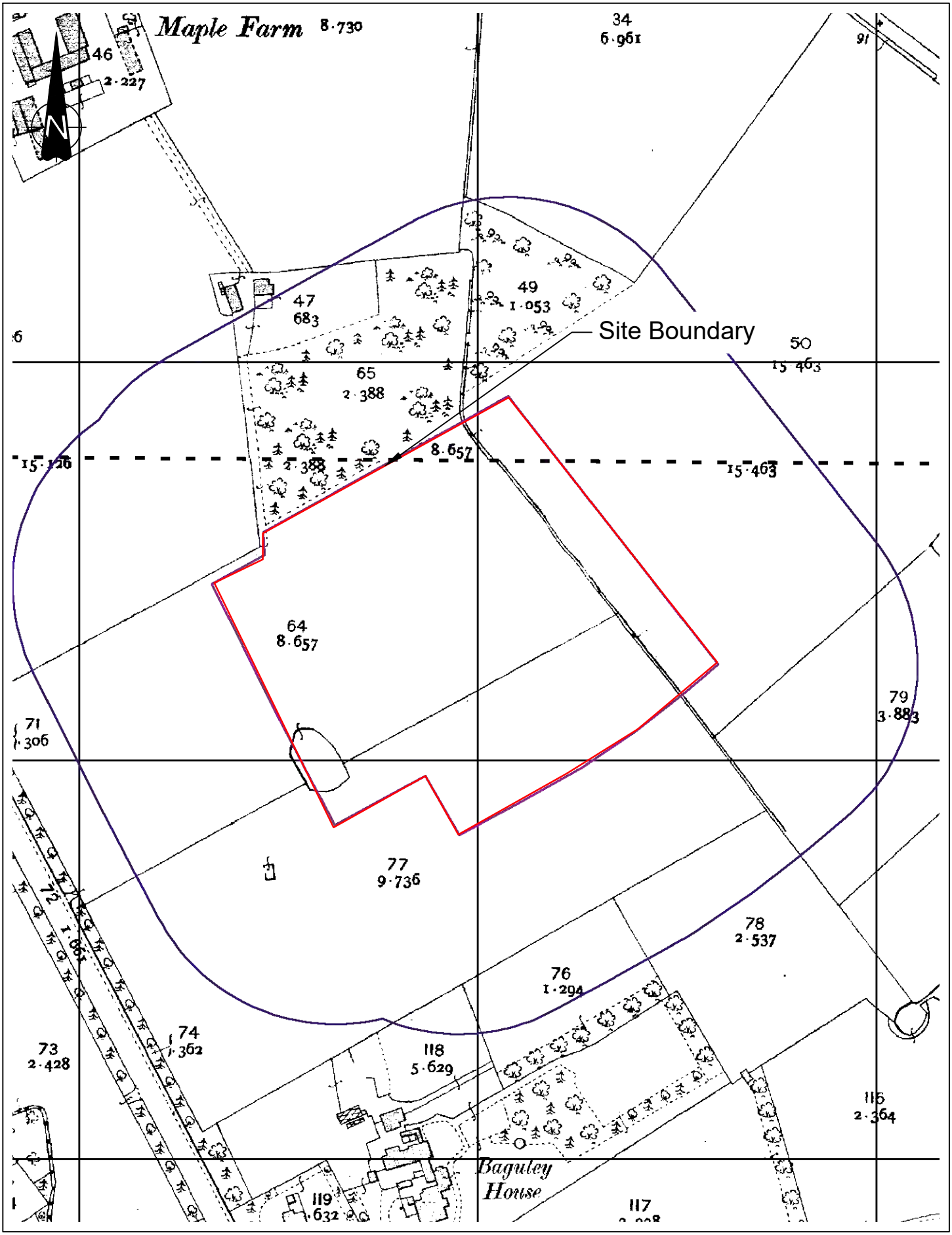


SCALE 1:2500@ A4

Figure Title

HISTORYS
1898 OS PLAN

FIGURE 3b

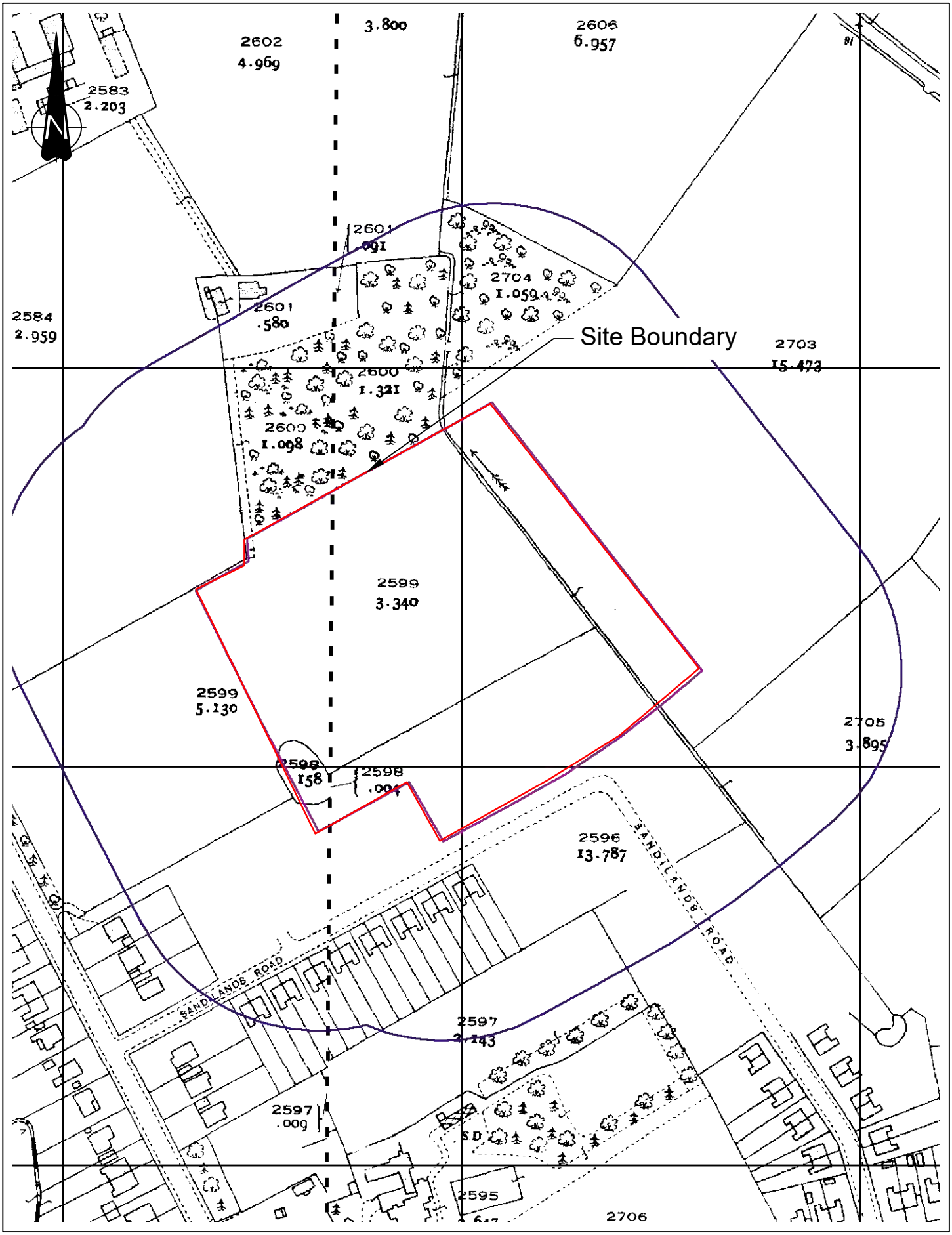


SCALE 1:2500@ A4

Figure Title

HISTORYS
1910 OS PLAN

FIGURE 3c

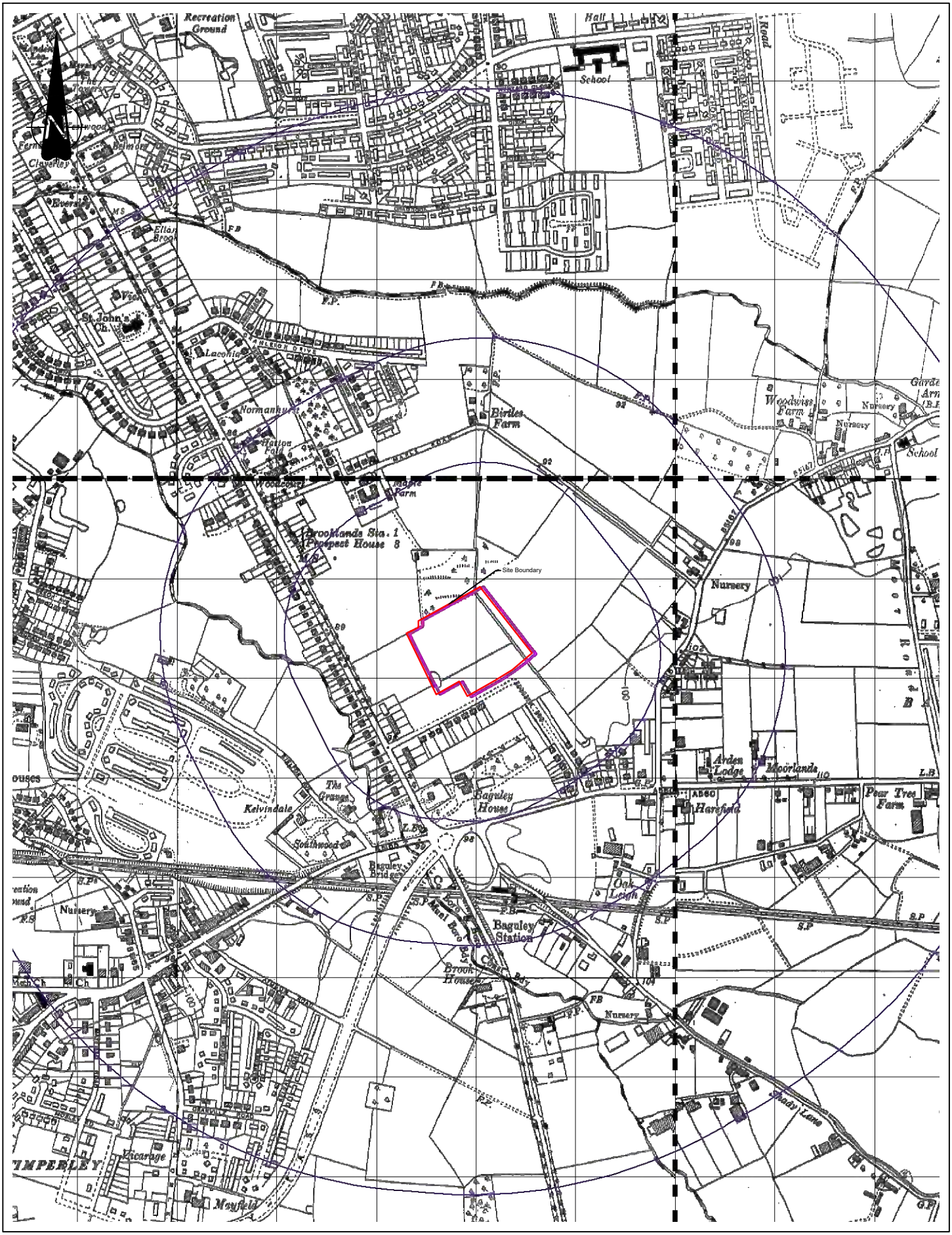


SCALE 1:2500@ A4

Figure Title

HISTORYS
1935 OS PLAN

FIGURE 3d

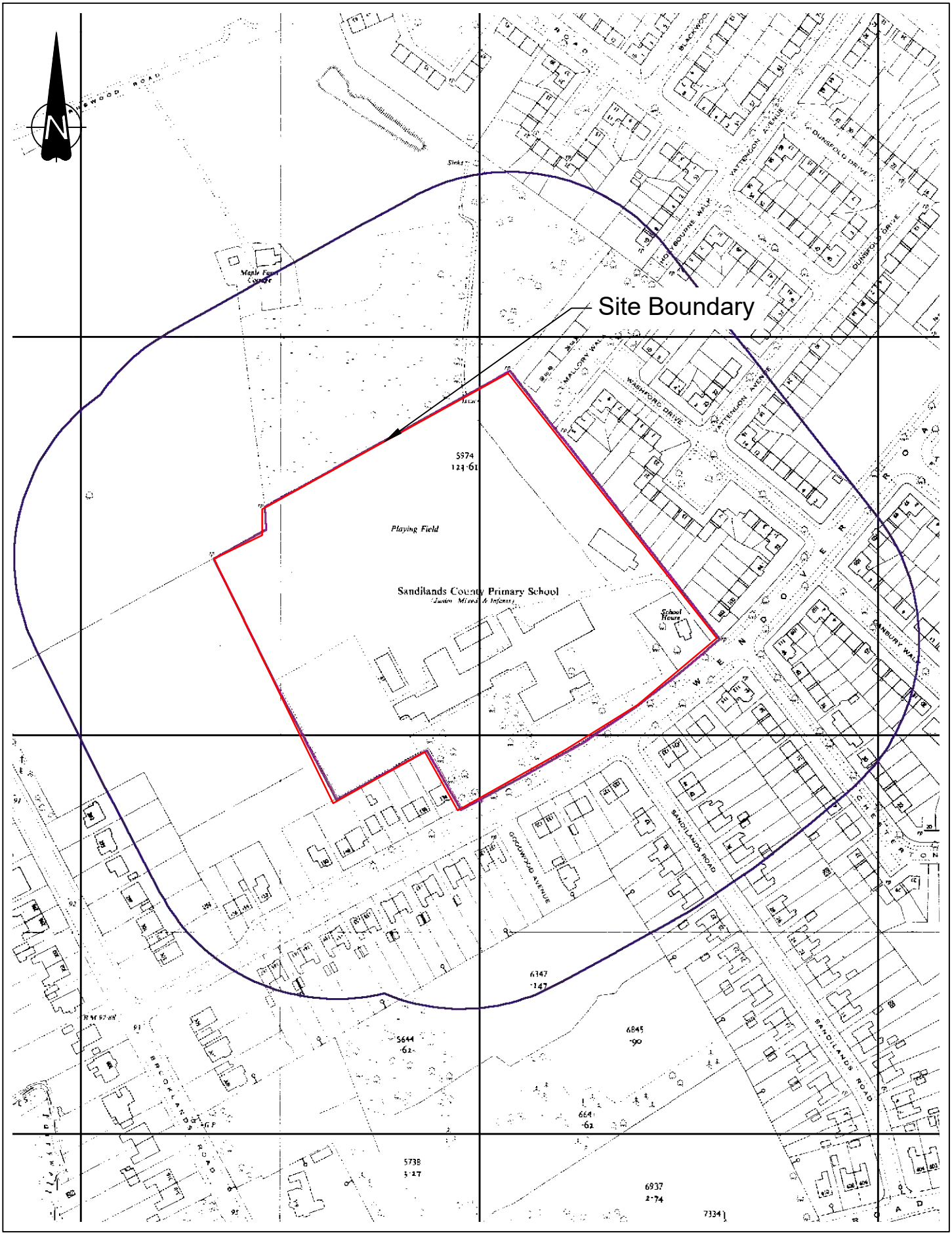


SCALE 1:10000@ A4

Figure Title

HISTORYS
1954 OS PLAN

FIGURE 3e

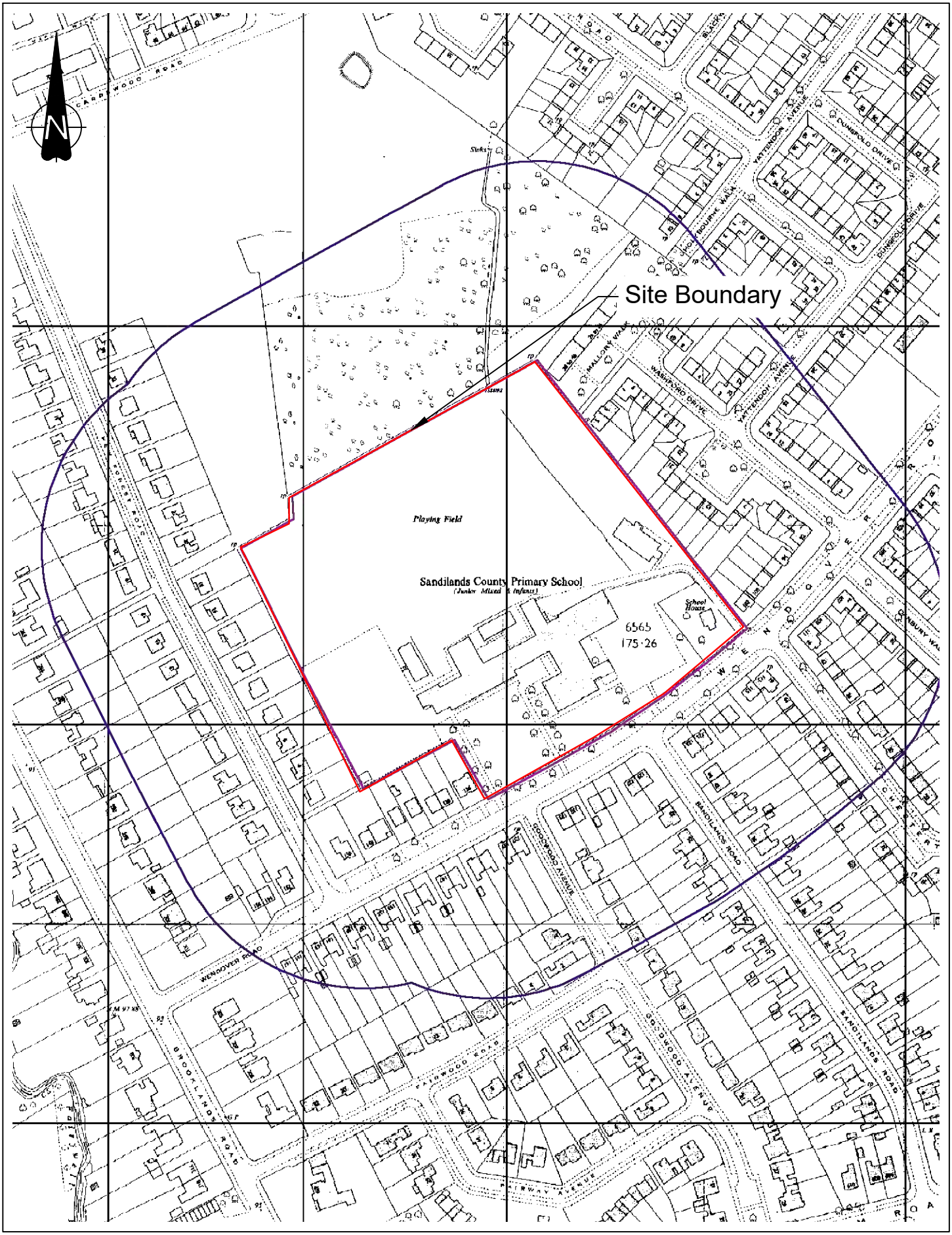


SCALE 1:2500@ A4

Figure Title

HISTORYS
1959 OS PLAN

FIGURE 3f

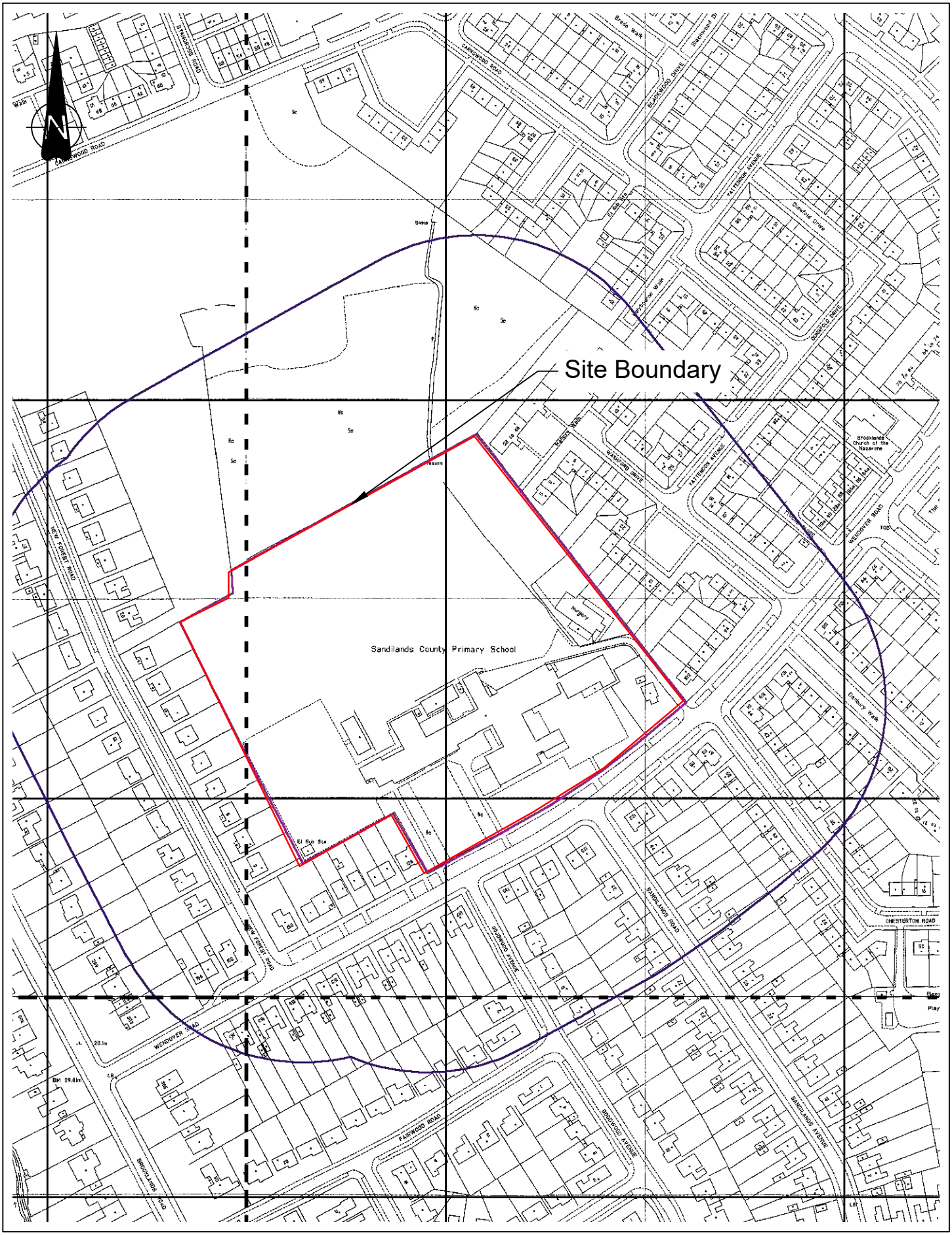


SCALE 1:2500@ A4

Figure Title

HISTORYS
1969 OS PLAN

FIGURE 3g



SCALE 1:2500@ A4

Figure Title

HISTORYS
1992 OS PLAN

FIGURE 3h

John Speers

From: wastewaterdeveloperservices@uuplc.co.uk
Sent: 15 December 2022 11:10
To: Jamie Rogers
Subject: PDE for: Sandilands Primary School UU Ref: 03183174

Good Morning Jamie,

Pre Development Enquiry for: Sandilands Primary School UU Reference Number : 03183174

For future reference we now have a new wastewater pre-development enquiry form designed to be easier and more user friendly which is available on our website via the following link:

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 3723223 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 300mm diameter public combined sewer within Wendover Road located to the South of your proposed development at an unrestricted rate.
Or
to the 225mm diameter public combined sewer within Wendover Road located to the Southeast of your proposed development at an unrestricted rate.

Please ensure all proposed manhole chambers cover levels and finished floor levels are higher than the receiving public sewer.

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 open ordinary watercourse located 1m Northeast of the proposed site.
We noted that the applicant mentioned that there are existing mature trees that can prevent reaching the watercourse, but this is not enough to justify discarding this option, the applicant needs to investigate discharging to the water course further and provide clear written evidence to support discarding this option.

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 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 300mm diameter public combined sewer within Wendover Road located South of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority.
The rate can be split between the 300mm and 225mm combined sewer.

United Utilities request that any agreed rate does not exceed 23l/s (anticipated QBar rate from the site impermeable areas only).

Please note these surface water sewers (300mm and 225mm) are subject to sewer surcharge according to our modelling data, therefore please submit your proposed finished floor levels for further assessment to understand if you site is at risk of surface water flooding from sewer surcharge.
Also please provide information on the diameter of the pipe leaving your site and connecting into the public surface water sewer.

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 pubic sewerage network under any circumstances

Existing Wastewater Assets Crossing the Site

We have reviewed our records and can confirm that there does not appear to be any charted public sewers located within the boundary of proposed development. However, due to the accuracy of the records and the public sewer transfer legislation in 2011, not all public sewers are shown on our records so we would ask that you proceed with caution and carry out your own site investigation works. If any uncharted sewers are identified while carrying out your works we would ask that you contact United Utilities at the earliest opportunity so that we can offer guidance and update our records.

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,

United Utilities
Water for the North West

Mohammed Aljafarawi
Developer Engineer
Developer Services & Metering
Customer Services
unitedutilities.com

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Appendix G – Pre & Post Development Impermeable Areas



REV	DATE	DESCRIPTION	BY	CHK	APP
P01	20.12.2022	PRELIMINARY ISSUE	JRS	JRS	PL

DRAWING STATUS:

PRELIMINARY

CLIENT:

TILBURY DOUGLAS

ARCHITECT:

ELLIS WILLIAMS ARCHITECTS

PROJECT:

SANDILANDS COMMUNITY
PRIMARY SCHOOL

TITLE:

PRE & POST DEVELOPMENT
IMPERMEABLE AREAS

STATUS:	PROJECT No.	PROJECT	ORIGINATOR	VOL/SYS	LEVEL	TYPE	ROLE	DRAWING No.	REV:
S2	222-171	SRP1034 - AJP - ZZ - 00 - SK -						**C - 0001**	**P01**

SCALE @ A1:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
N.T.S	JRS	JRS	PL	PL	MAY 2023

AJP consulting engineers
0151 227 1462 info@ajpltd.co.uk 91 Dale Street, Liverpool, L2 2ET

Appendix H – Brownfield Runoff Calculations

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)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.385	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	0.562	4-8	0.201

Total Area Contributing (ha) = 0.763

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
1.000	10.000	0.100	99.8	0.763	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	10.000	0.100	99.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	10.000	0.100	99.8	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)
1.000	50.00	5.11	27.200	0.763	0.0	0.0	0.0	1.57	111.2	103.3
1.001	50.00	5.21	27.100	0.763	0.0	0.0	0.0	1.57	111.2	103.3
1.002	50.00	5.32	27.000	0.763	0.0	0.0	0.0	1.57	111.2	103.3

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.763	0.763	0.763
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.763	0.763	0.763

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	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)	18.000	Storm Duration (mins)	30
Ratio R	0.381		

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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 Coeffiecient 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) 18.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.381 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) 2, 30, 100
Climate Change (%) 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	SW01	15 Winter	2	+0%					27.500	0.000	0.000
1.001	SW02	15 Winter	2	+0%					27.400	0.000	0.000
1.002	SW03	15 Winter	2	+0%					27.300	0.000	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	1.31		104.1	SURCHARGED*	
1.001	SW02	1.32		104.6	SURCHARGED*	
1.002	SW03	1.32		104.7	SURCHARGED*	

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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 Coeffiecient 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) 18.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.381 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) 2, 30, 100
Climate Change (%) 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	SW01	60 Winter	30	+0%					27.500	0.000	0.000
1.001	SW02	60 Winter	30	+0%					27.400	0.000	0.000
1.002	SW03	60 Winter	30	+0%					27.300	0.000	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	1.43		113.2	SURCHARGED*	
1.001	SW02	1.43		113.3	SURCHARGED*	
1.002	SW03	1.43		113.6	SURCHARGED*	

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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 Coeffiecient	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) 18.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.381 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)	2, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	SW01	15 Winter	100	+0%					27.500	0.000	0.000
1.001	SW02	15 Winter	100	+0%					27.400	0.000	0.000
1.002	SW03	15 Winter	100	+0%					27.300	0.000	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	2.70		214.3	SURCHARGED*	
1.001	SW02	2.69		213.4	SURCHARGED*	
1.002	SW03	2.70		214.2	SURCHARGED*	

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Appendix I – Preliminary Storage Assessment

Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 89 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	27.363	0.563	0.0	23.0	23.0	130.1	O K
30 min Summer	27.528	0.728	0.0	23.0	23.0	168.1	O K
60 min Summer	27.647	0.847	0.0	23.0	23.0	195.5	O K
120 min Summer	27.678	0.878	0.0	23.0	23.0	202.8	O K
180 min Summer	27.659	0.859	0.0	23.0	23.0	198.3	O K
240 min Summer	27.622	0.822	0.0	23.0	23.0	189.9	O K
360 min Summer	27.528	0.728	0.0	23.0	23.0	168.2	O K
480 min Summer	27.426	0.626	0.0	23.0	23.0	144.5	O K
600 min Summer	27.338	0.538	0.0	23.0	23.0	124.2	O K
720 min Summer	27.261	0.461	0.0	23.0	23.0	106.5	O K
960 min Summer	27.143	0.343	0.0	23.0	23.0	79.2	O K
1440 min Summer	27.021	0.221	0.0	22.2	22.2	51.0	O K
2160 min Summer	26.973	0.173	0.0	17.3	17.3	40.0	O K
2880 min Summer	26.949	0.149	0.0	14.0	14.0	34.5	O K
4320 min Summer	26.923	0.123	0.0	10.2	10.2	28.4	O K
5760 min Summer	26.907	0.107	0.0	8.1	8.1	24.8	O K
7200 min Summer	26.897	0.097	0.0	6.8	6.8	22.4	O K
8640 min Summer	26.889	0.089	0.0	5.9	5.9	20.7	O K
10080 min Summer	26.884	0.084	0.0	5.2	5.2	19.3	O K
15 min Winter	27.440	0.640	0.0	23.0	23.0	147.6	O K
30 min Winter	27.627	0.827	0.0	23.0	23.0	191.0	O K
60 min Winter	27.764	0.964	0.0	23.0	23.0	222.6	O K
120 min Winter	27.799	0.999	0.0	23.0	23.0	230.6	O K
180 min Winter	27.768	0.968	0.0	23.0	23.0	223.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	125.658	0.0	150.3	23
30 min Summer	83.214	0.0	199.2	36
60 min Summer	52.627	0.0	252.6	62
120 min Summer	32.231	0.0	309.5	98
180 min Summer	23.899	0.0	344.3	132
240 min Summer	19.224	0.0	369.3	166
360 min Summer	14.029	0.0	404.3	236
480 min Summer	11.206	0.0	430.6	298
600 min Summer	9.414	0.0	452.1	360
720 min Summer	8.161	0.0	470.3	420
960 min Summer	6.509	0.0	500.2	532
1440 min Summer	4.725	0.0	544.5	752
2160 min Summer	3.424	0.0	592.3	1108
2880 min Summer	2.721	0.0	627.7	1472
4320 min Summer	1.966	0.0	679.9	2204
5760 min Summer	1.560	0.0	719.6	2936
7200 min Summer	1.302	0.0	751.1	3672
8640 min Summer	1.123	0.0	777.4	4400
10080 min Summer	0.991	0.0	800.0	5136
15 min Winter	125.658	0.0	168.4	24
30 min Winter	83.214	0.0	223.2	36
60 min Winter	52.627	0.0	283.0	62
120 min Winter	32.231	0.0	346.7	104
180 min Winter	23.899	0.0	385.6	142

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Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control Σ (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
240 min Winter	27.714	0.914	0.0	23.0	23.0	211.0	O K
360 min Winter	27.577	0.777	0.0	23.0	23.0	179.4	O K
480 min Winter	27.416	0.616	0.0	23.0	23.0	142.3	O K
600 min Winter	27.282	0.482	0.0	23.0	23.0	111.2	O K
720 min Winter	27.174	0.374	0.0	23.0	23.0	86.3	O K
960 min Winter	27.040	0.240	0.0	22.4	22.4	55.3	O K
1440 min Winter	26.975	0.175	0.0	17.5	17.5	40.5	O K
2160 min Winter	26.941	0.141	0.0	12.8	12.8	32.7	O K
2880 min Winter	26.923	0.123	0.0	10.3	10.3	28.4	O K
4320 min Winter	26.902	0.102	0.0	7.5	7.5	23.5	O K
5760 min Winter	26.890	0.090	0.0	5.9	5.9	20.7	O K
7200 min Winter	26.881	0.081	0.0	4.9	4.9	18.7	O K
8640 min Winter	26.875	0.075	0.0	4.2	4.2	17.3	O K
10080 min Winter	26.870	0.070	0.0	3.8	3.8	16.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	19.224	0.0	413.6	180
360 min Winter	14.029	0.0	452.8	256
480 min Winter	11.206	0.0	482.3	320
600 min Winter	9.414	0.0	506.4	380
720 min Winter	8.161	0.0	526.8	434
960 min Winter	6.509	0.0	560.2	530
1440 min Winter	4.725	0.0	609.9	752
2160 min Winter	3.424	0.0	663.4	1112
2880 min Winter	2.721	0.0	703.0	1468
4320 min Winter	1.966	0.0	761.6	2200
5760 min Winter	1.560	0.0	806.0	2928
7200 min Winter	1.302	0.0	841.2	3648
8640 min Winter	1.123	0.0	870.8	4408
10080 min Winter	0.991	0.0	896.1	5064

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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)	18.000	Shortest Storm (mins)	15
Ratio R	0.384	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.641

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.214	4	8	0.214	8	12	0.213

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Model Details

Storage is Online Cover Level (m) 28.500

Cellular Storage Structure

Invert Level (m) 26.800 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	243.0	0.0	1.000	243.0	0.0	1.001	0.0	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0211-2300-1000-2300
Design Head (m)	1.000
Design Flow (l/s)	23.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	211
Invert Level (m)	26.800
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	23.0	Kick-Flo®	0.728	19.8
Flush-Flo™	0.351	23.0	Mean Flow over Head Range	-	19.2

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	7.2	0.800	20.7	2.000	32.0	4.000	44.8	7.000	58.7
0.200	20.4	1.000	23.0	2.200	33.5	4.500	47.4	7.500	60.7
0.300	22.9	1.200	25.1	2.400	35.0	5.000	49.9	8.000	62.6
0.400	22.9	1.400	27.0	2.600	36.4	5.500	52.2	8.500	64.5
0.500	22.5	1.600	28.8	3.000	39.0	6.000	54.5	9.000	66.3
0.600	21.9	1.800	30.5	3.500	42.0	6.500	56.6	9.500	68.1

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Appendix J – Outline Drainage Strategy & Surface Water Calcs

SITE COMMENTS

D1 EXISTING GRASS PLAY, HARD PLAY, NURSERY AND CARETAKERS PROPERTY AREAS TO REMAIN. EXISTING DRAINAGE TO REMAIN IN PLACE TO AVOID THE NEED FOR ANY NEW DRAINAGE OR WORKS IN THESE AREAS.

D2 ALL EXISTING DRAINAGE TO BE ABANDONED THAT CURRENTLY SERVES THE EXISTING SCHOOL IS TO REMAIN IN PLACE UNTIL THE NEW SCHOOL BUILDING IS IN USE AND THE OLD BUILDING IS BEING DEMOLISHED.

D3 ANY PROPOSED TREES WITHIN EXISTING PUBLIC SEWER EASEMENT AREA TO BE RELOCATED OUTSIDE OF REQUIRED EASEMENT TO ALLOW UNITED UTILITIES ACCESS FOR MAINTENANCE PURPOSES.

D4 CCTV SURVEYS INDICATE THAT THE EXISTING COMBINED WATER OUTFALL PIPELINE WHICH IS TO BE RE-USED IS HEAVILY SILTED AND HAS A RELATIVELY FLAT GRADIENT. ALLOWANCE TO BE MADE FOR REMEDIATION WORKS TO BE UNDERTAKEN TO JET, CLEAR AND MAKE GOOD THE EXISTING OUTFALL PIPELINE. SHOULD THE OUTFALL PIPELINE NOT BE SUITABLE FOR RE-USE THE PROPOSED RISING MAINS SHOULD DISCHARGE FURTHER ALONG THE EXISTING ACCESS ROAD, TO THE SOUTH-EAST CORNER OF THE SITE WHERE THEY WOULD DISCHARGE INTO A NEW PRIVATE COMBINED WATER MANHOLE PRIOR TO DISCHARGING VIA GRAVITY INTO THE EXISTING PUBLIC COMBINED WATER SEWER.

PROPOSED CELLULAR STORAGE TANK TO ACCOMMODATE VOLUME REQUIRED BY DCG TO ALLOW FOR EMERGENCY MAINTENACE OF THE SURFACE WATER PUMP. (5m x 16m x 1.075m DEEP) TOTAL VOLUME = 81.7m³ TANK INVERT LEVEL: 26.420mAOD TOP OF TANK LEVEL: 27.505mAOD

ASSUMED THAT ANY EXISTING DRAINAGE SERVING THE LANDSCAPED AREAS TO THE NORTH OF THE SITE TO REMAIN AND CONTINUE TO DISCHARGE AS PER THE EXISTING SCENARIO.

GRASS PLAY AREAS TO DRAIN AS PER EXISTING SCENARIO.

PROPOSED CELLULAR ATTENUATION TANK (5m x 16m x 1.075m DEEP) TOTAL VOLUME = 81.7m³ TANK INVERT LEVEL: 26.500mAOD TOP OF TANK LEVEL: 27.575mAOD

PROPOSED CELLULAR ATTENUATION TANK HAS A MINIMUM COVER OF 825mm TO TOP OF TANK. TANK SUPPLIER TO CONFIRM IF THIS IS SUITABLE OR IF A CONCRETE COVER SLAB IS REQUIRED FOR PROTECTION. TEMPORARY CONSTRUCTION TRAFFIC LOADING SHOULD ALSO BE CONSIDERED DURING THIS PROCESS.

PROPOSED CELLULAR STORAGE TANK HAS A MINIMUM COVER OF 825mm TO TOP OF TANK. TANK SUPPLIER TO CONFIRM IF THIS IS SUITABLE OR IF A CONCRETE COVER SLAB IS REQUIRED FOR PROTECTION. TEMPORARY CONSTRUCTION TRAFFIC LOADING SHOULD ALSO BE CONSIDERED DURING THIS PROCESS.

PROPOSED SW17 MANHOLE TO HAVE HIGH LEVEL OVERFLOW WITH NON-RETURN VALVE IN LOWER PIPE, TO ALLOW FOR HIGH LEVEL OVERFLOW INTO ADDITIONAL STORAGE TANK AS REQUIRED BY DCG. EXACT DETAILS TO BE CONFIRMED THROUGH DETAILED DESIGN PROCESS.

PROPOSED SURFACE WATER PUMP COMPOUND AREA. EXACT DETAILS OF COMPOUND AREA TO BE CONFIRMED. PUMP DISCHARGE RATE SET AT 23.0 L/s. ALL PUMP DETAILS TO BE CONFIRMED BY PUMP SUPPLIER.

LOCATION AND DEPTHS OF ALL EXISTING SERVICES TO BE IDENTIFIED AND CONFIRMED ON SITE PRIOR TO THE COMMENCEMENT OF ANY WORKS. ANY POTENTIAL CLASHES BETWEEN EXISTING SERVICES AND PROPOSED DRAINAGE TO BE HIGHLIGHTED TO ENGINEER PRIOR TO THE COMMENCEMENT OF ANY WORKS.

NEW 1500Ø PIPE FROM BREAK MH INTO BACK OF EXIST COMBINED MH - ALLOW FOR RE-BENCHING IF REQUIRED

Rising Mains to be kept below min depth advised in table within general notes - until connection CO1. Allow for 150mm concrete encasement to be extended around the rising main locally as it enters MH

SURFACE WATER RISING MAIN >>> DETAILS TBC

FOUL WATER RISING MAIN >>> DETAILS TBC

PROPOSED DRAINAGE CONNECTIONS TO DISCHARGE INTO EXISTING PUBLIC COMBINED WATER SEWER VIA AN EXISTING PRIVATE COMBINED WATER OUTFALL PIPEGAE.
SHOULD EXISTING OUTFALL PIPELINE NOT BE SUITABLE RISING MAINS WOULD NEED TO CONTINUE ALONG ACCESS ROAD TO A NEW PRIVATE COMBINED WATER MANHOLE WHICH WOULD THEN DISCHARGE VIA GRAVITY INTO THE EXISTING PUBLIC COMBINED WATER SEWER TO THE SOUTH-EAST CORNER OF THE SITE. PROPOSED CONNECTION IS ALSO SUBJECT TO DETAILED DRAINAGE DESIGN AND UNITED UTILITIES AND LLFA APPROVALS.

PROPOSED FOUL PACKAGE PUMP STATION. PACKAGE PUMP STATION TO BE SIZED TO ACCOMMODATE 24 HOUR STORAGE TO ALLOW FOR PUMP FAILURE/EMERGENCY MAINTENANCE PACKAGE PUMP CHAMBER DETAILS TO BE CONFIRMED ONCE FOUL FLOW RATES FROM THE PROPOSED BUILDING HAVE BEEN CONFIRMED.

CCTV SURVEYS INDICATE THAT THE EXISTING COMBINED WATER OUTFALL PIPELINE WHICH IS TO BE RE-USED IS HEAVILY SILTED AND HAS A RELATIVELY FLAT GRADIENT. ALLOWANCE TO BE MADE FOR REMEDIATION WORKS TO BE UNDERTAKEN TO JET, CLEAR AND MAKE GOOD THE EXISTING OUTFALL PIPELINE. SHOULD THE OUTFALL PIPELINE NOT BE SUITABLE FOR RE-USE THE PROPOSED RISING MAINS SHOULD DISCHARGE FURTHER ALONG THE EXISTING ACCESS ROAD, TO THE SOUTH-EAST CORNER OF THE SITE WHERE THEY WOULD DISCHARGE INTO A NEW PRIVATE COMBINED WATER MANHOLE PRIOR TO DISCHARGING VIA GRAVITY INTO THE EXISTING PUBLIC COMBINED WATER SEWER.

CARETAKERS PROPERTY AREA TO DRAIN AS PER EXISTING SCENARIO.

CCTV SURVEYS HAVE CONFIRMED THAT THE EXISTING COMBINED OUTFALL PIPELINES DISCHARGE INTO THE ADJACENT PUBLIC COMBINED WATER SEWERS.

ARCHITECT TO CONFIRM IF THRESHOLD DRAINAGE IS REQUIRED. GIVEN LEVEL ACCESS IT IS CURRENTLY ASSUMED THAT IT IS REQUIRED.

OUTLINE OF EXISTING SCHOOL BUILDINGS TO BE DEMOLISHED ONCE NEW BUILDING HAS BEEN CONSTRUCTED AND IS OPERATIONAL.

HARD PLAY AREA TO DRAIN AS PER EXISTING SCENARIO.

EXISTING PRIVATE DRAINAGE TO REMAIN IN PLACE AND IN USE UNTIL DEMOLITION OF EXISTING SCHOOL BUILDING. AFTER DEMOLITION OF EXISTING SCHOOL BUILDING PRIVATE DRAINAGE WITHIN PROPOSED SITE BOUNDARY CAN BE ABANDONED AND GRUBBED UP.

PROPOSED SITE BOUNDARY.

CCTV SURVEYS HAVE CONFIRMED THAT THE EXISTING COMBINED OUTFALL PIPELINES DISCHARGE INTO THE ADJACENT PUBLIC COMBINED WATER SEWERS.

MINIMUM OF 400mm GRANULAR DRAINAGE BLANKET BELOW AREAS OF PERMEABLE PAVING OR PERMEABLE MACADAM TO PROVIDE ADDITIONAL ATTENUATION STORAGE.

AREA OF NON-INFILTRATION PERMEABLE PAVING OR PERMEABLE MACADAM WITH PERFORATED UNDERDRAIN TO BE USED TO DRAIN ENTIRE CAR PARK AREA. THEREFORE, PROPOSED CAR PARK AREA TO CROSSFALL TO PERMEABLE AREAS.

PROPOSED FOOTPATH AREAS TO DRAIN INTO ADJACENT LANDSCAPING AREAS VIA EITHER FLUSH KERBS OR RAISED KERBS WITH GAPS, DUE TO MINIMAL AREA OF FOOTPATHS COMPARED TO THE LANDSCAPED AREAS, IT IS ASSUMED THAT NO POSITIVE DRAINAGE IS REQUIRED TO THESE AREAS.

Delkeries & Service access

Cycle shelter 10 cycles

Retained caretakers property

Outdoor canopy

Hard Outdoor PE, existing macadam surface retained

Existing cycle shelter

Car park

Grass mound

Grass mound

Grass mound

existing fencing retained

existing relocated gate

existing gate removed

WENDOVER ROAD

WENDOVER ROAD

GENERAL NOTES

1. SETTING OUT SHALL BE UNDERTAKEN USING ONLY THE INFORMATION GIVEN. DISTANCES SHOULD NOT BE SCALED FROM THIS DRAWING.
2. ALL SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH SEWERS FOR ADOPTION 7TH EDITION AND UNITED UTILITIES DETAILS & GUIDELINES.
3. THE MINIMUM GRAVITY PIPE DIAMETER UNDER ADOPTABLE HIGHWAYS SHALL BE 150mm
4. 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 RATES SHALL INCLUDE FOR DIG AROUND SERVICES WHERE NECESSARY. THE CONTRACTOR SHALL ADHERE TO THE CDM REGULATIONS AT ALL TIMES
5. 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
6. EXISTING FLOWS IN WATERCOURSES, SEWERS AND LAND DRAINS SHALL BE MAINTAINED AT ALL TIMES
7. ONLY TRAINED PERSONNEL SHALL BE PERMITTED TO ENTER CONFINED SPACES
8. 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
9. 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., NHBC OR THE NETWORK OPERATOR AS APPLICABLE.
10. WHERE "ULTRA RIB" UPVC PIPES (OR SIMILAR APPROVED) ARE USED IN ADOPTABLE DRAINAGE THEY SHALL STILL BE HANDLED AND LAID IN ACCORDANCE WITH THE SPECIFICATION AND GUIDANCE ISSUED BY THE HIGH PERFORMANCE PIPE ASSOCIATION.
11. A CLASS S 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.
12. SLAB LEVELS SHALL NOT BE VARIED WITHOUT REFERENCE TO THE ENGINEER FOR GUIDANCE
13. ALL GULLY CONNECTIONS TO BE 150mm VITRIFIED CLAY UNLESS NOTED OTHERWISE
14. ALL MANHOLE COVERS TO BE RECESSED TO ACCEPT FINISH AS DETAILED BY LANDSCAPE ARCHITECT
15. SLOW REST BENDS TO BE USED IN ALL LOCATIONS MADE UP FROM 2No. 45 DEG BENDS (600mm TO INVERT FROM FFL)
16. MANHOLE POSITIONS AND ACCESS COVERS TO BE ACCURATELY SET-OUT BY LANDSCAPE ARCHITECT TO SUIT EXTERNAL FINISHES
17. ALL DRAINS CAST THROUGH FOUNDATIONS TO HAVE ROCKER PIPES ON BOTH SIDES OF FOUNDATION
18. ALL POP UP POSITIONS TO BE CONFIRMED SET OUT DIMENSIONS TO BE AGREED & PROVIDED BY OTHERS
19. ALL FW DISCHARGE RATES TO BE CONFIRMED BY M&E DESIGNER
20. ALL SURFACE WATER COLLECTION FEATURES TO BE CONFIRMED BY THE LANDSCAPE ARCHITECT
21. STORAGE HAS BEEN PROVIDED IN A CELLULAR STORAGE TANK AND UP-SIZED MANHOLES AND PIPES.
22. EXISTING SEWER DEPTHS HAVE BEEN APPROXIMATED FROM LIMITED INFORMATION. NEW CONNECTIONS TO BE CONFIRMED PRIOR TO CONSTRUCTION OF ANY DRAINAGE WORKS.
23. LANDSCAPE ARCHITECT TO CONFIRM GULLY AND DRAINAGE CHANNEL LOCATIONS TO LANDSCAPED AREAS.
24. FOUL NETWORK TO BE CONFIRMED FOLLOWING CONFIRMATION OF BRANCH CONNECTION POINTS FROM BUILDING M&E DESIGNER
25. CCTV SURVEY OF EXISTING SITE DRAINAGE REQUIRED PRIOR TO THE COMMENCEMENT OF ANY WORKS STARTING ON SITE
26. MINIMUM COVER TO DRAINAGE SOFFIT LEVEL & ACCESS CHAMBERS ;

LANDSCAPING	TRAFFICKED AREAS	HIGHWAYS
0.600m	0.900m	1.200m

CLASS 'S' BEDDING AND SURROUND TO BE USED WHERE MINIMUM COVER IS ACHIEVED. WHERE MINIMUM COVER IS NOT ACHIEVED CLASS 'Z' BEDDING AND SURROUND (CONCRETE ENCASEMENT) IS TO BE USED.

LEGEND

- PROPOSED SURFACE WATER MANHOLE
- PROPOSED FOUL WATER MANHOLE
- PROPOSED ADOPTABLE COMBINED WATER MANHOLE
- PROPOSED SURFACE WATER PPIC
- PROPOSED FOUL WATER PPIC
- PROPOSED FOUL WATER DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED FOUL WATER RISING MAIN
- PROPOSED SURFACE WATER RISING MAIN
- ACO — PROPOSED LINEAR DRAINAGE (ACO) CHANNEL WITH ACCESS UNIT
- TD — PROPOSED THRESHOLD DRAIN
- PROPOSED CELLULAR ATTENUATION TANK
- VP — VENT PIPE
- PROPOSED AREA OF NON-INFILTRATION PERMEABLE PAVING/PERMEABLE MACADAM WITH PERFORATED UNDERDRAIN
- RE — PROPOSED RODDING EYE
- RG — PROPOSED ROAD GULLY
- YG — PROPOSED YARD GULLY
- EXISTING PRIVATE SURFACE WATER DRAINAGE TO REMAIN
- EXISTING PRIVATE FOUL WATER DRAINAGE TO REMAIN
- EXISTING PRIVATE COMBINED WATER DRAINAGE TO REMAIN
- EXISTING PRIVATE DRAINAGE TO BE ABANDONED (AFTER DEMOLITION OF EXISTING SCHOOL BUILDING)
- EXISTING PUBLIC (UNITED UTILITIES) COMBINED WATER DRAINAGE TO REMAIN
- EXISTING UNITED UTILITIES SEWER EASEMENT
- EXISTING BUILDING OUTLINE (TO BE DEMOLISHED ONCE NEW BUILDING IS IN USE)
- SITE BOUNDARY

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

ALL EXISTING DRAINAGE IS TO BE REMAIN LIVE UNTIL THE NEW SCHOOL BUILDING IS LIVE AND EXISTING BUILDINGS HAVE BEEN DEMOLISHED

ALL RWP/SVP/SS CONNECTIONS ARE TO BE PROVIDED BY OTHERS

ALL SS/SVP'S ARE TO HAVE RODDABLE ACCESS FROM ABOVE GROUND

ALL PPIC'S ARE TO BE 600Ø & MINIMUM 750mm DEEP UNLESS NOTED OTHERWISE

ARCHITECT TO CONFRM IF MANHOLE COVERS IN PAVED AREAS ARE TO BE RECESSED TO ACCEPT SURFACE FINISHES

ALL 'POP-UP' AND 'RWP' SETTING OUT IS PROVIDED BY THE ARCHITECT

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

REV	DATE	DESCRIPTION	BY	CHK	APP
P04	25.09.2023	RISING MAIN CONNECTION POINT AMMENDED AS CLOUDED	JJR	JRS	KOB
P03	12.07.2023	RIBA STAGE 4 ISSUE	JJR	JRS	KOB
P02	25.05.2023	RIBA STAGE 3 ISSUE	JRS	PL	KOB
P01	04.04.2023	PRELIMINARY ISSUE	MO	PL	KOB

DRAWING STATUS: **PRELIMINARY**

CLIENT: TILBURY DOUGLAS

ARCHITECT: ELLIS WILLIAMS ARCHITECTS

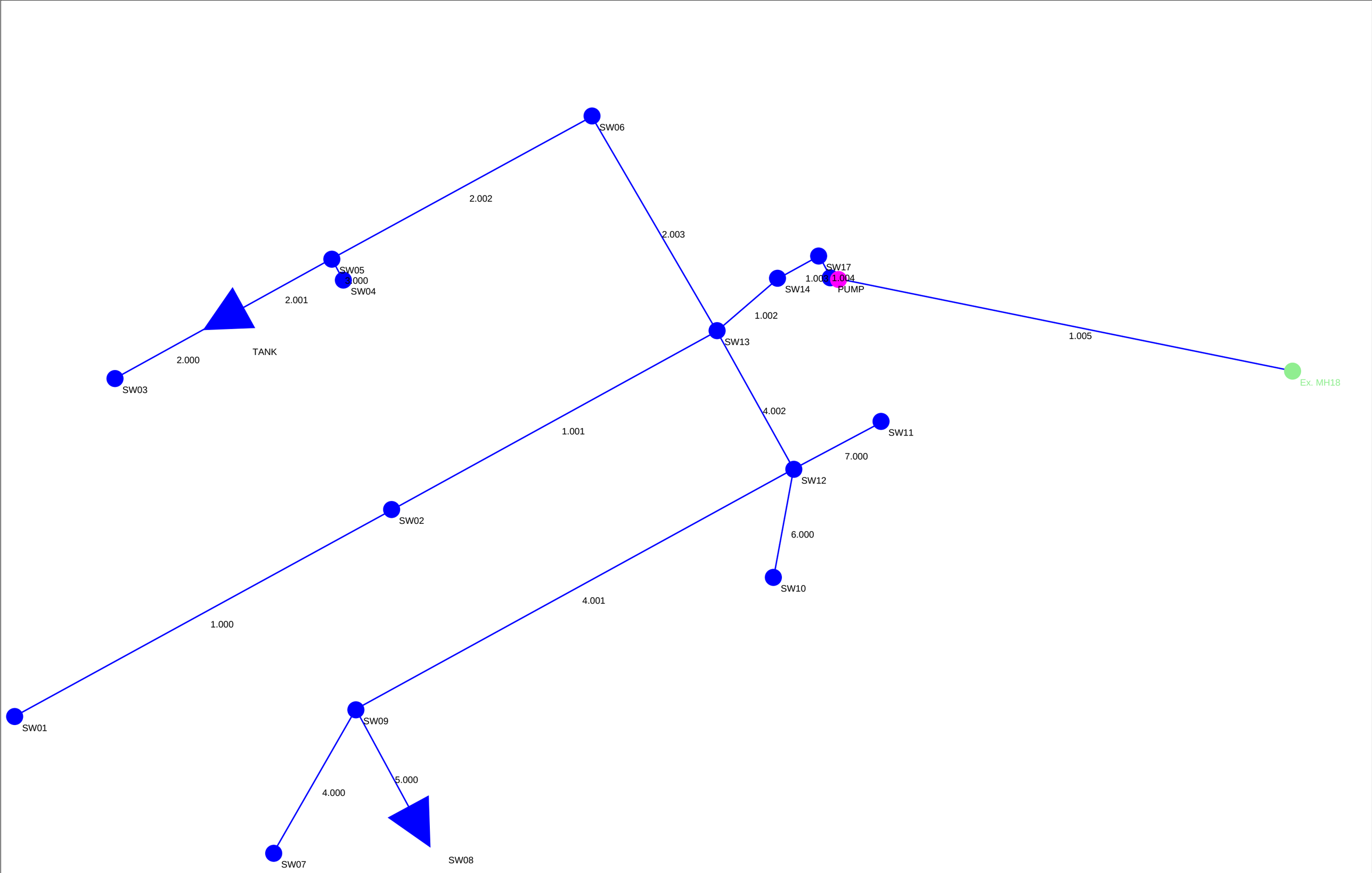
PROJECT: SANDILANDS COMMUNITY PRIMARY SCHOOL

TITLE: BELOW GROUND DRAINAGE OUTLINE DRAINAGE STRATEGY

STATUS:	PROJECT No.	PROJECT	ORIGINATOR	VOL/SYS	LEVEL	TYPE	ROLE	DRAWING No.	REV
S2	222-171	SRP1034	AJP	- ZZ	- 00	- D	-	C - 1000	P04

SCALE @ A0:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
1:200	LS	KB	PL	KOB	MARCH 2023

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SW06
2.002
2.003
SW05
3.000
SW04
2.001
TANK
2.000
SW03
SW17
1.003
1.004
PUMP
SW14
1.002
SW13
1.005
Ex. MH18
4.002
1.001
SW11
7.000
SW12
6.000
SW10
SW02
1.000
4.001
SW01
SW09
4.000
5.000
SW07
SW08

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)	30	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.380	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	0.248	4-8	0.176

Total Area Contributing (ha) = 0.424

Total Pipe Volume (m³) = 9.845

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
1.000	45.934	0.460	99.9	0.080	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	39.667	0.795	49.9	0.035	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	13.220	0.090	146.9	0.027	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	13.220	0.050	264.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	2.551	0.070	36.4	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.002	31.724	0.320	99.2	0.017	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.003	26.542	0.266	99.8	0.039	0.00	0.0	0.600	o	150	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)
1.000	50.00	5.76	27.120	0.080	0.0	0.0	0.0	1.01	17.8	10.8
1.001	50.00	6.22	26.660	0.115	0.0	0.0	0.0	1.43	25.2	15.6
2.000	50.00	5.27	26.590	0.027	0.0	0.0	0.0	0.83	14.6	3.7
2.001	50.00	5.63	26.500	0.027	0.0	0.0	0.0	0.61	10.8	3.7
3.000	50.00	5.03	27.450	0.000	0.0	0.0	0.0	1.67	29.6	0.0
2.002	50.00	6.15	26.450	0.044	0.0	0.0	0.0	1.01	17.8	6.0
2.003	50.00	6.59	26.130	0.083	0.0	0.0	0.0	1.01	17.8	11.2

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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
4.000	17.661	0.200	88.4	0.084	5.00	0.0	0.600	o	225	Pipe/Conduit	
5.000	14.238	0.175	81.2	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
4.001	53.370	0.550	97.0	0.024	0.00	0.0	0.600	o	225	Pipe/Conduit	
6.000	11.751	0.585	20.1	0.062	5.00	0.0	0.600	o	150	Pipe/Conduit	
7.000	10.626	0.534	19.9	0.009	5.00	0.0	0.600	o	150	Pipe/Conduit	
4.002	16.925	0.560	30.2	0.028	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	8.547	0.120	71.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	4.993	0.070	71.3	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	2.641	0.040	65.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	50.375	1.008	50.0	0.000	0.00	0.0	0.600	o	225	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)
4.000	50.00	5.21	27.100	0.084	0.0	0.0	0.0	1.39	55.3	11.4
5.000	50.00	5.21	27.150	0.000	0.0	0.0	0.0	1.12	19.7	0.0
4.001	50.00	5.88	26.900	0.108	0.0	0.0	0.0	1.33	52.8	14.6
6.000	50.00	5.09	27.010	0.062	0.0	0.0	0.0	2.26	39.9	8.4
7.000	50.00	5.08	26.960	0.009	0.0	0.0	0.0	2.27	40.1	1.2
4.002	50.00	6.00	26.350	0.207	0.0	0.0	0.0	2.39	95.0	28.0
1.002	50.00	6.68	25.790	0.405	0.0	0.0	0.0	1.55	61.7	54.8
1.003	50.00	6.73	25.670	0.424	0.0	0.0	0.0	1.55	61.6	57.4
1.004	50.00	6.76	25.600	0.424	0.0	0.0	0.0	1.62	64.4	57.4
1.005	50.00	7.21	25.560	0.424	0.0	0.0	0.0	1.85	73.7	57.4

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
SW01	28.470	1.350	Open Manhole	1500	1.000	27.120	150				
SW02	28.570	1.910	Open Manhole	1200	1.001	26.660	150	1.000	26.660	150	
SW03	28.420	1.830	Open Manhole	1200	2.000	26.590	150				
TANK	28.400	1.900	Open Manhole	1200	2.001	26.500	150	2.000	26.500	150	
SW04	28.500	1.050	Open Manhole	600	3.000	27.450	150				
SW05	28.430	1.980	Open Manhole	1200	2.002	26.450	150	2.001	26.450	150	
								3.000	27.380	150	930
SW06	28.500	2.370	Open Manhole	1200	2.003	26.130	150	2.002	26.130	150	
SW07	28.520	1.420	Open Manhole	1500	4.000	27.100	225				
SW08	28.550	1.400	Open Manhole	1500	5.000	27.150	150				
SW09	28.470	1.570	Open Manhole	1500	4.001	26.900	225	4.000	26.900	225	
								5.000	26.975	150	
SW10	28.480	1.470	Open Manhole	1500	6.000	27.010	150				
SW11	28.500	1.540	Open Manhole	1500	7.000	26.960	150				
SW12	28.590	2.240	Open Manhole	1200	4.002	26.350	225	4.001	26.350	225	
								6.000	26.425	150	
								7.000	26.426	150	1
SW13	28.550	2.760	Open Manhole	1200	1.002	25.790	225	1.001	25.865	150	
								2.003	25.864	150	
								4.002	25.790	225	
SW14	28.340	2.670	Open Manhole	1200	1.003	25.670	225	1.002	25.670	225	
SW17	28.340	2.740	Open Manhole	1200	1.004	25.600	225	1.003	25.600	225	
PUMP	28.890	3.330	Open Manhole	1800	1.005	25.560	225	1.004	25.560	225	
Ex. MH18	28.787	4.235	Open Manhole	1500		OUTFALL		1.005	24.552	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SW01	379556.388	389638.218	379556.388	389638.218	Required	
SW02	379596.648	389660.331	379596.648	389660.331	Required	
SW03	379567.103	389674.320	379567.103	389674.320	Required	
TANK	379578.684	389680.696	379578.684	389680.696	Required	
SW04	379591.496	389684.836	379591.496	389684.836	Required	
SW05	379590.265	389687.072	379590.265	389687.072	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SW06	379618.056	389702.371	379618.056	389702.371	Required	
SW07	379584.058	389623.608	379584.058	389623.608	Required	
SW08	379599.612	389626.414	379599.612	389626.414	Required	
SW09	379592.833	389638.935	379592.833	389638.935	Required	
SW10	379637.425	389653.083	379637.425	389653.083	Required	
SW11	379648.925	389669.744	379648.925	389669.744	Required	
SW12	379639.611	389664.629	379639.611	389664.629	Required	
SW13	379631.412	389679.435	379631.412	389679.435	Required	
SW14	379637.869	389685.035	379637.869	389685.035	Required	
SW17	379642.259	389687.413	379642.259	389687.413	Required	
PUMP	379643.501	389685.082	379643.501	389685.082	Required	
Ex. MH18	379692.879	389675.114			No Entry	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	SW01	28.470	27.120	1.200	Open Manhole	1500
1.001	o	150	SW02	28.570	26.660	1.760	Open Manhole	1200
2.000	o	150	SW03	28.420	26.590	1.680	Open Manhole	1200
2.001	o	150	TANK	28.400	26.500	1.750	Open Manhole	1200
3.000	o	150	SW04	28.500	27.450	0.900	Open Manhole	600
2.002	o	150	SW05	28.430	26.450	1.830	Open Manhole	1200
2.003	o	150	SW06	28.500	26.130	2.220	Open Manhole	1200
4.000	o	225	SW07	28.520	27.100	1.195	Open Manhole	1500
5.000	o	150	SW08	28.550	27.150	1.250	Open Manhole	1500
4.001	o	225	SW09	28.470	26.900	1.345	Open Manhole	1500
6.000	o	150	SW10	28.480	27.010	1.320	Open Manhole	1500
7.000	o	150	SW11	28.500	26.960	1.390	Open Manhole	1500
4.002	o	225	SW12	28.590	26.350	2.015	Open Manhole	1200
1.002	o	225	SW13	28.550	25.790	2.535	Open Manhole	1200
1.003	o	225	SW14	28.340	25.670	2.445	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	45.934	99.9	SW02	28.570	26.660	1.760	Open Manhole	1200
1.001	39.667	49.9	SW13	28.550	25.865	2.535	Open Manhole	1200
2.000	13.220	146.9	TANK	28.400	26.500	1.750	Open Manhole	1200
2.001	13.220	264.4	SW05	28.430	26.450	1.830	Open Manhole	1200
3.000	2.551	36.4	SW05	28.430	27.380	0.900	Open Manhole	1200
2.002	31.724	99.2	SW06	28.500	26.130	2.220	Open Manhole	1200
2.003	26.542	99.8	SW13	28.550	25.864	2.536	Open Manhole	1200
4.000	17.661	88.4	SW09	28.470	26.900	1.345	Open Manhole	1500
5.000	14.238	81.2	SW09	28.470	26.975	1.345	Open Manhole	1500
4.001	53.370	97.0	SW12	28.590	26.350	2.015	Open Manhole	1200
6.000	11.751	20.1	SW12	28.590	26.425	2.015	Open Manhole	1200
7.000	10.626	19.9	SW12	28.590	26.426	2.014	Open Manhole	1200
4.002	16.925	30.2	SW13	28.550	25.790	2.535	Open Manhole	1200
1.002	8.547	71.2	SW14	28.340	25.670	2.445	Open Manhole	1200
1.003	4.993	71.3	SW17	28.340	25.600	2.515	Open Manhole	1200

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.004	o	225	SW17	28.340	25.600	2.515	Open Manhole	1200
1.005	o	225	PUMP	28.890	25.560	3.105	Open Manhole	1800

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.004	2.641	65.4	PUMP	28.890	25.560	3.105	Open Manhole	1800
1.005	50.375	50.0	Ex. MH18	28.787	24.552	4.010	Open Manhole	1500

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.080	0.080	0.080
1.001	-	-	100	0.035	0.035	0.035
2.000	-	-	100	0.027	0.027	0.027
2.001	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.000	0.000	0.000
2.002	-	-	100	0.017	0.017	0.017
2.003	-	-	100	0.039	0.039	0.039
4.000	-	-	100	0.084	0.084	0.084
5.000	-	-	100	0.000	0.000	0.000
4.001	-	-	100	0.024	0.024	0.024
6.000	-	-	100	0.062	0.062	0.062
7.000	-	-	100	0.009	0.009	0.009
4.002	-	-	100	0.028	0.028	0.028
1.002	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.019	0.019	0.019
1.004	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.424	0.424	0.424

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)
1.005	Ex. MH18	28.787	24.552	26.897	1500	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	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 6
Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.380		

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Online Controls for Storm

Pump Manhole: PUMP, DS/PN: 1.005, Volume (m³): 8.5

Invert Level (m) 25.560

Depth (m)	Flow (l/s)
2.300	23.0000

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Storage Structures for Storm

Cellular Storage Manhole: TANK, DS/PN: 2.001

Invert Level (m) 26.500 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	95.0	0.0	1.075	95.0	0.0	1.076	0.0	0.0

Porous Car Park Manhole: SW08, DS/PN: 5.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.4
Membrane Percolation (mm/hr)	1000	Length (m)	47.0
Max Percolation (l/s)	57.4	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	27.950	Cap Volume Depth (m)	0.400

Time Area Diagram for Green Roof at Pipe Number 1.000 (Storm)

Area (m³) 323 Evaporation (mm/day) 3
Depression Storage (mm) 5 Decay Coefficient 0.050

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.005870	32	36	0.001185	64	68	0.000239	96	100	0.000048
4	8	0.004806	36	40	0.000970	68	72	0.000196	100	104	0.000040
8	12	0.003934	40	44	0.000794	72	76	0.000160	104	108	0.000032
12	16	0.003221	44	48	0.000650	76	80	0.000131	108	112	0.000027
16	20	0.002637	48	52	0.000532	80	84	0.000108	112	116	0.000022
20	24	0.002159	52	56	0.000436	84	88	0.000088	116	120	0.000018
24	28	0.001768	56	60	0.000357	88	92	0.000072			
28	32	0.001447	60	64	0.000292	92	96	0.000059			

Time Area Diagram for Green Roof at Pipe Number 1.001 (Storm)

Area (m³) 307 Evaporation (mm/day) 3
Depression Storage (mm) 5 Decay Coefficient 0.050

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.005579	32	36	0.001126	64	68	0.000227	96	100	0.000046
4	8	0.004568	36	40	0.000922	68	72	0.000186	100	104	0.000038
8	12	0.003740	40	44	0.000755	72	76	0.000152	104	108	0.000031
12	16	0.003062	44	48	0.000618	76	80	0.000125	108	112	0.000025
16	20	0.002507	48	52	0.000506	80	84	0.000102	112	116	0.000021
20	24	0.002052	52	56	0.000414	84	88	0.000084	116	120	0.000017
24	28	0.001680	56	60	0.000339	88	92	0.000068			
28	32	0.001376	60	64	0.000278	92	96	0.000056			

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Time Area Diagram for Green Roof at Pipe Number 2.000 (Storm)

Area (m³) 272 Evaporation (mm/day) 3
Depression Storage (mm) 5 Decay Coefficient 0.050

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.004943	32	36	0.000998	64	68	0.000201	96	100	0.000041
4	8	0.004047	36	40	0.000817	68	72	0.000165	100	104	0.000033
8	12	0.003313	40	44	0.000669	72	76	0.000135	104	108	0.000027
12	16	0.002713	44	48	0.000548	76	80	0.000111	108	112	0.000022
16	20	0.002221	48	52	0.000448	80	84	0.000091	112	116	0.000018
20	24	0.001818	52	56	0.000367	84	88	0.000074	116	120	0.000015
24	28	0.001489	56	60	0.000301	88	92	0.000061			
28	32	0.001219	60	64	0.000246	92	96	0.000050			

Time Area Diagram for Green Roof at Pipe Number 3.000 (Storm)

Area (m³) 340 Evaporation (mm/day) 3
Depression Storage (mm) 5 Decay Coefficient 0.050

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.006178	32	36	0.001247	64	68	0.000252	96	100	0.000051
4	8	0.005059	36	40	0.001021	68	72	0.000206	100	104	0.000042
8	12	0.004142	40	44	0.000836	72	76	0.000169	104	108	0.000034
12	16	0.003391	44	48	0.000685	76	80	0.000138	108	112	0.000028
16	20	0.002776	48	52	0.000560	80	84	0.000113	112	116	0.000023
20	24	0.002273	52	56	0.000459	84	88	0.000093	116	120	0.000019
24	28	0.001861	56	60	0.000376	88	92	0.000076			
28	32	0.001524	60	64	0.000308	92	96	0.000062			

Time Area Diagram for Green Roof at Pipe Number 2.003 (Storm)

Area (m³) 111 Evaporation (mm/day) 3
Depression Storage (mm) 5 Decay Coefficient 0.050

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.002017	32	36	0.000407	64	68	0.000082	96	100	0.000017
4	8	0.001651	36	40	0.000333	68	72	0.000067	100	104	0.000014
8	12	0.001352	40	44	0.000273	72	76	0.000055	104	108	0.000011
12	16	0.001107	44	48	0.000223	76	80	0.000045	108	112	0.000009
16	20	0.000906	48	52	0.000183	80	84	0.000037	112	116	0.000007
20	24	0.000742	52	56	0.000150	84	88	0.000030	116	120	0.000006
24	28	0.000608	56	60	0.000123	88	92	0.000025			
28	32	0.000497	60	64	0.000100	92	96	0.000020			

Time Area Diagram at Pipe Number 5.000 for Storm

Total Area (ha) 0.089

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.030	4	8	0.030	8	12	0.029

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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 Coeffiecient 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 6
Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.380 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) 2, 30, 100
Climate Change (%) 0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	SW01	60 Winter	2	+0%	30/15 Winter				27.148	-0.122	0.000
1.001	SW02	30 Winter	2	+0%	2/30 Winter				26.878	0.068	0.000
2.000	SW03	60 Winter	2	+0%	30/30 Summer				26.620	-0.120	0.000
2.001	TANK	60 Winter	2	+0%	30/15 Summer				26.589	-0.061	0.000
3.000	SW04	60 Winter	2	+0%					27.481	-0.119	0.000
2.002	SW05	30 Winter	2	+0%	2/15 Summer				26.702	0.102	0.000
2.003	SW06	30 Winter	2	+0%	2/15 Summer				26.797	0.516	0.000
4.000	SW07	15 Winter	2	+0%	30/15 Summer				27.180	-0.145	0.000
5.000	SW08	15 Winter	2	+0%	30/15 Summer				27.223	-0.077	0.000
4.001	SW09	15 Winter	2	+0%	30/15 Summer				27.010	-0.115	0.000
6.000	SW10	15 Winter	2	+0%	30/15 Summer				27.063	-0.097	0.000
7.000	SW11	15 Winter	2	+0%	30/15 Summer				26.979	-0.131	0.000
4.002	SW12	30 Winter	2	+0%	2/15 Summer				26.919	0.344	0.000
1.002	SW13	30 Winter	2	+0%	2/15 Summer				26.882	0.867	0.000
1.003	SW14	30 Winter	2	+0%	2/15 Summer				26.869	0.974	0.000
1.004	SW17	30 Winter	2	+0%	2/15 Summer				26.859	1.034	0.000
1.005	PUMP	30 Winter	2	+0%	2/15 Summer				26.853	1.068	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	0.08		1.3	OK	
1.001	SW02	0.11		2.7	SURCHARGED	
2.000	SW03	0.09		1.2	OK	
2.001	TANK	0.47		4.6	OK	
3.000	SW04	0.09		1.5	OK	
2.002	SW05	0.25		4.3	SURCHARGED	
2.003	SW06	0.30		5.0	SURCHARGED	
4.000	SW07	0.27		13.3	OK	
5.000	SW08	0.48		8.7	OK	
4.001	SW09	0.46		23.5	OK	

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
6.000	SW10	0.27		9.8	OK	
7.000	SW11	0.04		1.4	OK	
4.002	SW12	0.32		27.0	SURCHARGED	
1.002	SW13	0.35		17.2	SURCHARGED	
1.003	SW14	0.45		16.7	SURCHARGED	
1.004	SW17	0.50		14.9	SURCHARGED	
1.005	PUMP	0.18		12.9	SURCHARGED	

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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 Coeffiecient 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 6
Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.380 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) 2, 30, 100
Climate Change (%) 0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	SW01	30 Winter	30	+0%	30/15 Winter				27.470	0.200	0.000
1.001	SW02	30 Winter	30	+0%	2/30 Winter				27.448	0.638	0.000
2.000	SW03	120 Winter	30	+0%	30/30 Summer				26.909	0.169	0.000
2.001	TANK	120 Winter	30	+0%	30/15 Summer				26.905	0.255	0.000
3.000	SW04	30 Winter	30	+0%					27.495	-0.105	0.000
2.002	SW05	120 Winter	30	+0%	2/15 Summer				26.931	0.331	0.000
2.003	SW06	60 Winter	30	+0%	2/15 Summer				27.173	0.893	0.000
4.000	SW07	30 Winter	30	+0%	30/15 Summer				27.619	0.294	0.000
5.000	SW08	30 Winter	30	+0%	30/15 Summer				27.719	0.419	0.000
4.001	SW09	30 Winter	30	+0%	30/15 Summer				27.602	0.477	0.000
6.000	SW10	30 Winter	30	+0%	30/15 Summer				27.497	0.337	0.000
7.000	SW11	30 Winter	30	+0%	30/15 Summer				27.484	0.374	0.000
4.002	SW12	30 Winter	30	+0%	2/15 Summer				27.482	0.907	0.000
1.002	SW13	30 Winter	30	+0%	2/15 Summer				27.414	1.399	0.000
1.003	SW14	30 Winter	30	+0%	2/15 Summer				27.394	1.499	0.000
1.004	SW17	30 Winter	30	+0%	2/15 Summer				27.381	1.556	0.000
1.005	PUMP	30 Winter	30	+0%	2/15 Summer				27.372	1.587	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	0.22		3.7	SURCHARGED	
1.001	SW02	0.29		7.0	SURCHARGED	
2.000	SW03	0.13		1.8	SURCHARGED	
2.001	TANK	0.82		8.1	SURCHARGED	
3.000	SW04	0.19		3.1	OK	
2.002	SW05	0.49		8.4	SURCHARGED	
2.003	SW06	0.50		8.5	SURCHARGED	
4.000	SW07	0.37		18.2	SURCHARGED	
5.000	SW08	0.82		14.8	SURCHARGED	
4.001	SW09	0.59		29.8	SURCHARGED	

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
6.000	SW10	0.37		13.5	SURCHARGED	
7.000	SW11	0.05		1.9	SURCHARGED	
4.002	SW12	0.45		38.0	SURCHARGED	
1.002	SW13	0.46		22.7	SURCHARGED	
1.003	SW14	0.62		23.0	SURCHARGED	
1.004	SW17	0.66		19.8	SURCHARGED	
1.005	PUMP	0.26		18.1	SURCHARGED	

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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 Coeffiecient 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 6
Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.380 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) 2, 30, 100
Climate Change (%) 0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	SW01	60 Winter	100	+45%	30/15 Winter				28.358	1.088	0.000
1.001	SW02	60 Winter	100	+45%	2/30 Winter				28.315	1.505	0.000
2.000	SW03	120 Winter	100	+45%	30/30 Summer				27.524	0.784	0.000
2.001	TANK	120 Winter	100	+45%	30/15 Summer				27.519	0.869	0.000
3.000	SW04	120 Winter	100	+45%					27.562	-0.038	0.000
2.002	SW05	120 Winter	100	+45%	2/15 Summer				27.559	0.959	0.000
2.003	SW06	60 Winter	100	+45%	2/15 Summer				27.817	1.537	0.000
4.000	SW07	30 Winter	100	+45%	30/15 Summer				28.373	1.048	0.000
5.000	SW08	60 Winter	100	+45%	30/15 Summer				28.347	1.047	0.000
4.001	SW09	30 Winter	100	+45%	30/15 Summer				28.332	1.207	0.000
6.000	SW10	30 Winter	100	+45%	30/15 Summer				28.423	1.263	0.000
7.000	SW11	30 Winter	100	+45%	30/15 Summer				28.298	1.188	0.000
4.002	SW12	30 Winter	100	+45%	2/15 Summer				28.292	1.717	0.000
1.002	SW13	30 Winter	100	+45%	2/15 Summer				28.197	2.182	0.000
1.003	SW14	30 Winter	100	+45%	2/15 Summer				28.174	2.279	0.000
1.004	SW17	30 Winter	100	+45%	2/15 Summer				28.156	2.331	0.000
1.005	PUMP	30 Winter	100	+45%	2/15 Summer				28.142	2.357	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	0.31		5.3	FLOOD RISK	
1.001	SW02	0.42		10.2	FLOOD RISK	
2.000	SW03	0.24		3.3	SURCHARGED	
2.001	TANK	1.08		10.7	SURCHARGED	
3.000	SW04	0.28		4.7	OK	
2.002	SW05	0.64		11.0	SURCHARGED	
2.003	SW06	0.63		10.7	SURCHARGED	
4.000	SW07	0.64		31.4	FLOOD RISK	
5.000	SW08	1.17		21.2	FLOOD RISK	
4.001	SW09	0.64		32.3	FLOOD RISK	

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
6.000	SW10	0.54		19.5	FLOOD RISK	
7.000	SW11	0.06		2.2	FLOOD RISK	
4.002	SW12	0.65		55.0	FLOOD RISK	
1.002	SW13	0.56		27.5	SURCHARGED	
1.003	SW14	0.85		31.7	FLOOD RISK	
1.004	SW17	0.96		28.6	FLOOD RISK	
1.005	PUMP	0.33		23.0	SURCHARGED	

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