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Greenway Academy

Flood Risk Assessment and Drainage Strategy

For
Morgan Sindall Construction

Project No.
14500

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1.0 EXECUTIVE SUMMARY

CampbellReith has produced this Flood Risk Assessment (FRA) and Drainage Strategy to support a planning application for the proposed educational development at Greenway School. The proposed development entails the construction of a new two-storey school building, followed by the demolition of an existing school building. The development also consists of construction of a new MUGA, parking spaces and associated hard and soft landscaping.

Existing flood risk to the site from a range of sources is deemed to be low or very low. Sources of flooding assessed include fluvial, tidal, surface Water, groundwater, sewer and artificial.

The geology of the site indicates the underlying bedrock of the site as Upper Tunbridge Wells Sands Differentiated (Weathered).

There is an existing surface water drainage system and separate foul water drainage system located on the site. The foul water drainage system currently drains to the Southern Water foul sewer which runs beneath the site at approximately 7.8mbgl and the surface water system drains to a public sewer to the south east of the site beneath Greenway Road.

The proposed surface water drainage strategy seeks to utilise a combination of Sustainable Drainage Systems such as permeable paving, swales, basins, green roof areas and geocellular attenuation tanks. A portion of the existing foul drainage is to be retained and will continue to drain the existing nursery which is also to be retained. This will also serve as a connection point for new proposed foul water system which will serve the new building. The existing surface water drainage is to be removed in its entirety and replaced with the proposed design in order to accommodate the new school as well as the additional attenuation quantities based on the updated catchment.

The proposed drainage strategy will not increase flood risk on or off the site for the lifetime of the development.

2.0 INTRODUCTION

2.1 Brief

2.1.1 CampbellReith has been commissioned by Morgan Sindall Construction to prepare a Flood Risk Assessment (FRA) in accordance with the National Planning Policy Framework, to inform on any constraints with respect to flooding to or from the educational development at Greenway Academy, Greenway, Horsham, RH12 2JS. This is regarding the proposed re-development at Greenway Academy, herein referred to as 'the site'. The site location is contained in Appendix 1.

2.1.2 This assessment is a qualitative report and has been based on readily available information.

2.1.3 The FRA has been prepared in support of a forthcoming Planning Application for the above proposed development.

2.2 Project Overview

2.2.1 The current proposal for this site consists of the demolition of the existing school building and the construction of a new L-shaped two-story building with an attached single-storey element. One existing teaching block will be retained. There is also an existing Nursery school building on site which is outside of the scope of the project. The scheme also comprises of hard and soft outdoor landscaping, access roads and parking, as well as a MUGA and soft play areas.

2.3 Aims and Objectives

2.3.1 This report has been prepared in accordance with the National Planning Policy Framework (NPPF) and the accompanying Planning Practice Guidance (PPG).

2.3.2 This FRA aims to identify the sources of flooding related to the site whilst demonstrating the feasibility of the Educational development and how residual risks, if any, could be managed.

2.3.3 The objectives of this FRA are to:

- Establish whether the site is likely to be affected by current or future flooding from any source;
- Establish whether proposed future development will increase flood risk elsewhere;
- Establish whether the measures proposed to deal with these effects and risks are appropriate;
- Ensure the evidence to satisfy the Local Planning Authority's (LPA) (if necessary) Sequential Test, and;
- Establish whether the Lead Local Flood Authority (LLFA) has records of flood risk on the site and within the surrounding area;
- Present the findings of the assessment through a site constraints plan (if applicable)
- Demonstrate surface water can be managed on site by preparing an illustrative surface water drainage strategy.

3.0 PLANNING POLICY

3.1 National Planning Policy Framework (NPPF)

3.1.1 The NPPF as revised in December 2024 with further amendments made in February 2025 sets out the government's national planning policies to protect people and property from flooding from either now or in the future which all Local Planning Authorities (LPAs) are expected to follow. There are three main steps which should be followed to ensure that the risk of flooding from development is minimised; assess the flood risk, avoid flood risk and manage and mitigate the flood risk.

3.1.2 The NPPF recommends that new development adopts a sequential, flood risk-based approach to the location of development, taking into account climate change and its impact to or by current or future flood risk. Subject to the type of development proposed and the relative flood zone (Zone 1 being the least risk and Zone 3b the greatest risk) in which the development site is located, there can be a requirement for a sequential test and an exception test.

3.1.3 The aim of the sequential test is to steer development to areas considered to be at the lowest risk from sources of flooding. If this is not possible then the exception test would be required demonstrating that the development would provide wider sustainability benefits to the community that would outweigh the flood risk and that the development would be safe for its lifetime taking into account the vulnerability of the users without increasing flood risk elsewhere and where possible reducing the current risk of flooding.

3.1.4 The NPPF also states that major developments should incorporate sustainable drainage systems (SuDS) unless there is clear evidence that this would be inappropriate.

3.2 Flood Risk and Coastal Change Planning Practice Guidance (PPG)

3.2.1 A FRA is required when developments are:

- Located within a Flood Zone 2 or 3 including minor development and change of use;
- More than 1 hectare (ha) in a Flood Zone 1;
- Less than 1 ha in a Flood Zone 1, including a change of use in development type to a more vulnerable class (for example from commercial to residential), where they could be affected by sources of flooding other than rivers and sea (for example surface water, reservoirs); or
- In an area within a Flood Zone 1 which has critical drainage problems as notified by the Environment Agency (EA).

3.2.2 Annex 3 of NPPF defines the various flood risk vulnerability classifications and identifies the different types of development within each category. Table 2.1 on the following page summarises the flood risk vulnerability and incompatibility as extracted from Paragraph 079 (Table 2) of the PPG in relation to the above flood zones.

Table 3.1: Flood Vulnerability and Flood Zone 'Incompatibility' Table

Flood Zones	Flood Risk Vulnerability Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test Required	✓	✓	✓
Zone 3a†	Exception Test required†	×	Exception Test Required	✓	✓
Zone 3b*	Exception Test required*	×	×	×	✓*

Key ✓Development is appropriate.

× Development should not be permitted.

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

* In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere.

3.3 Roles and Responsibilities

3.3.1 The EA are a statutory consultee for planning applications. The EA are responsible for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea.

3.3.2 The roles of the LLFAs were established following the Flood Risk Regulations (2009) and the Flood and Water Management Act (2010). They are responsible for developing, maintaining and applying a strategy for local flood risk management in their areas and maintaining a register of flood risk assets. They also have lead responsibility for managing the risk of flooding from surface water, groundwater and ordinary watercourses.

3.4 Climate Change

3.4.1 The NPPF sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change. The EA provide guidance on the climate change allowances which should be considered when assessing the future risk of flooding.

3.4.2 EA has produced a range of climate change allowances to be applied to the peak river flow and rainfall intensity based upon the river basin management catchment. Management catchments are sub-catchments of river basin districts. The site is located in the Arun and Western Streams Management Catchment within the South East River Basin District. Table 3.2 shows the anticipated changes to peak flow, which should be considered for the area.

3.4.3 The range of allowances is based upon a statistical analysis above the 50th percentile which is regarded as being the central category. The higher central is based upon the 70th percentile and the upper end is based on the 95th percentile.

Table 3.2: Peak River flow allowances by Arun and Western Streams Management Catchment within the South East river basin district (use 1961 to 1990 baseline)

Allowance Category	Total Potential Change Anticipated For The '2020s' (2015 to 2039)	Total Potential Change Anticipated For The '2050s' (2040 to 2069)	Total Potential Change Anticipated For The "2080s" (2070 to 2115)
Central	11%	13%	25%
Higher central	16%	19%	36%
Upper end	27%	36%	64%

3.4.4 Climate change allowances should be applied to the peak rainfall intensities. EA has produced updated rainfall allowances for both 1% and 3.3% annual exceedance rainfall events for each Management Catchment. Table 3.3 and Table 3.4 show the anticipated change in extreme rainfall intensity in small and urban catchments. The upper end allowances for both the 1% and 3.3% annual exceedance probability events should be applied for Flood Risk Assessments to assess the range of impact.

Table 3.3: EA Peak Rainfall Intensities (3.3% annual exceedance probability)

	Total Potential Change Anticipated For The '2050s' (2040 to 2069)	Total Potential Change Anticipated For The "2080s" (2070 to 2115)
Central	20%	25%
Upper end	35%	40%

Table 3.4: EA Peak Rainfall Intensities (1% annual exceedance probability)

	Total Potential Change Anticipated For The '2050s' (2040 to 2069)	Total Potential Change Anticipated For The "2080s" (2070 to 2115)
Central	20%	25%
Upper end	45%	45%

4.0 LOCAL POLICIES AND GUIDANCE

4.1.1 The following documents have been reviewed to inform this assessment:

- Horsham District Council (November 2015) Planning Framework (Local Plan)
- Horsham District (2007) Core Strategy
- Horsham District (September 2024) Strategic Flood Risk Assessment (SFRA)
- West Sussex County Council (May 2011) Preliminary Flood Risk Assessment (PFRA)
- West Sussex County Council (November 2018) Surface Water Management Plan (SWMP)
- West Sussex County Council (July 2025) Local Flood Risk Management Strategy (LFRMS)

4.2 Local Flood Risk Policy

4.2.1 The site is within the jurisdiction of Horsham District Council (HDC) and West Sussex County Council (WSCC). Horsham District Council is responsible for the local plan

4.2.2 The following policies should be considered when assessing flood risk and surface water management of the site:

- Policy 38 - Flooding
- Policies 1-6 – Drainage Strategy Requirements
- Policies 7-10 – Drainage Strategy Expectations

4.2.3 Policy 38 states that: *'To ensure development does not increase flood risk, developments will also be required to incorporate measures such as Sustainable Drainage Systems (SuDS) to help manage flood risk'.*

4.3 Strategic Flood Risk Assessment

4.3.1 A Level 1 SFRA was prepared by AECOM for Horsham District Council in September 2024. The following sources of flood risk were identified within the study area:

- Fluvial
- Tidal
- Surface Water
- Groundwater
- Sewer
- Artificial Sources

4.3.2 Reference any applicable maps and extracts in Appendix 2.

4.4 Preliminary Flood Risk Assessment (PFRA)

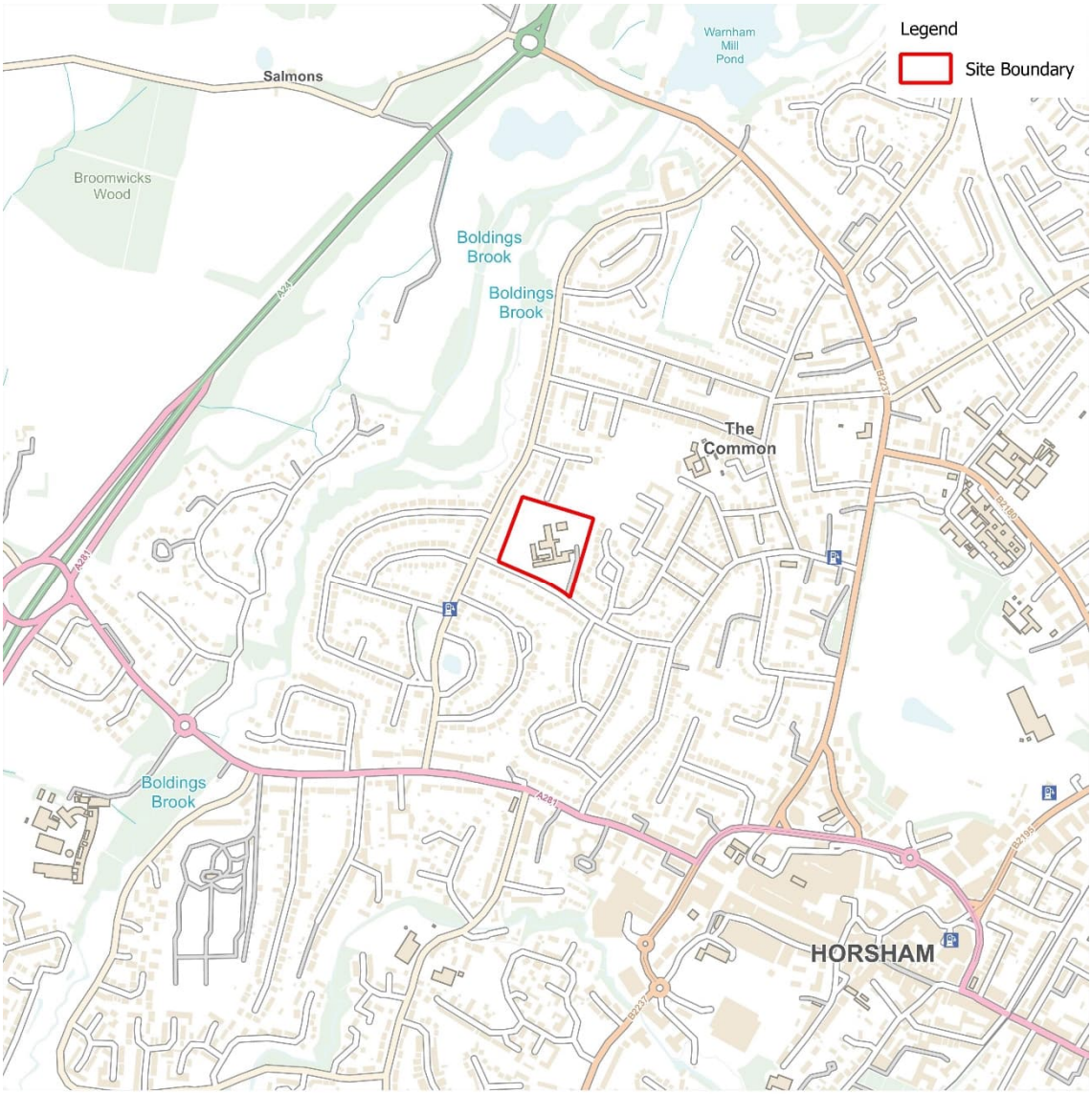
4.4.1 West Sussex County Council (WSCC) prepared a PFRA in May 2011 to assist in its duties as LLFA to manage local flood risk and deliver the requirements of the Flood Regulations. The PFRA provides a high-level overview of flood risk from a variety and combination of sources.

4.4.2 The report and the data collected are to be used to identify local flood risk areas where further information is required to better determine and understand local flood risk across Horsham and the wider area.

5.0 SITE CONTEXT

5.1 Site Location

5.1.1 The site is located at Greenway Academy, Greenway, Horsham as illustrated in Figure 4.1 below. The nearest postcode for the site is RH12 2JS and the National Grid Reference for the approximate centre of the site is 516579E, 131384N.



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Figure 5.1: Site Boundary

5.1.2 Horsham District Council are the Local Planning Authority (LPA) for the site and West Sussex County Council act as the LLFA for the area.

5.1.3 The existing site is located within the city of Horsham, approximately 31 miles south-south-west of London, 18.5 miles north-west of Brighton and 26 miles north-east of Chichester. The site is bound to the south by Greenway Road, which is then accompanied by residential development, the north-east by Horsham Trinity Cricket Club and then residential developments surround the remaining site boundaries.

5.1.4 The site is approximately 750m west of the A24 which continues in a Northern and Southern direction connecting surrounding villages. The wider area generally comprises of smaller residential villages and countryside however, is in medium proximity to the town of Crawley and London Gatwick Airport.

5.2 Site History

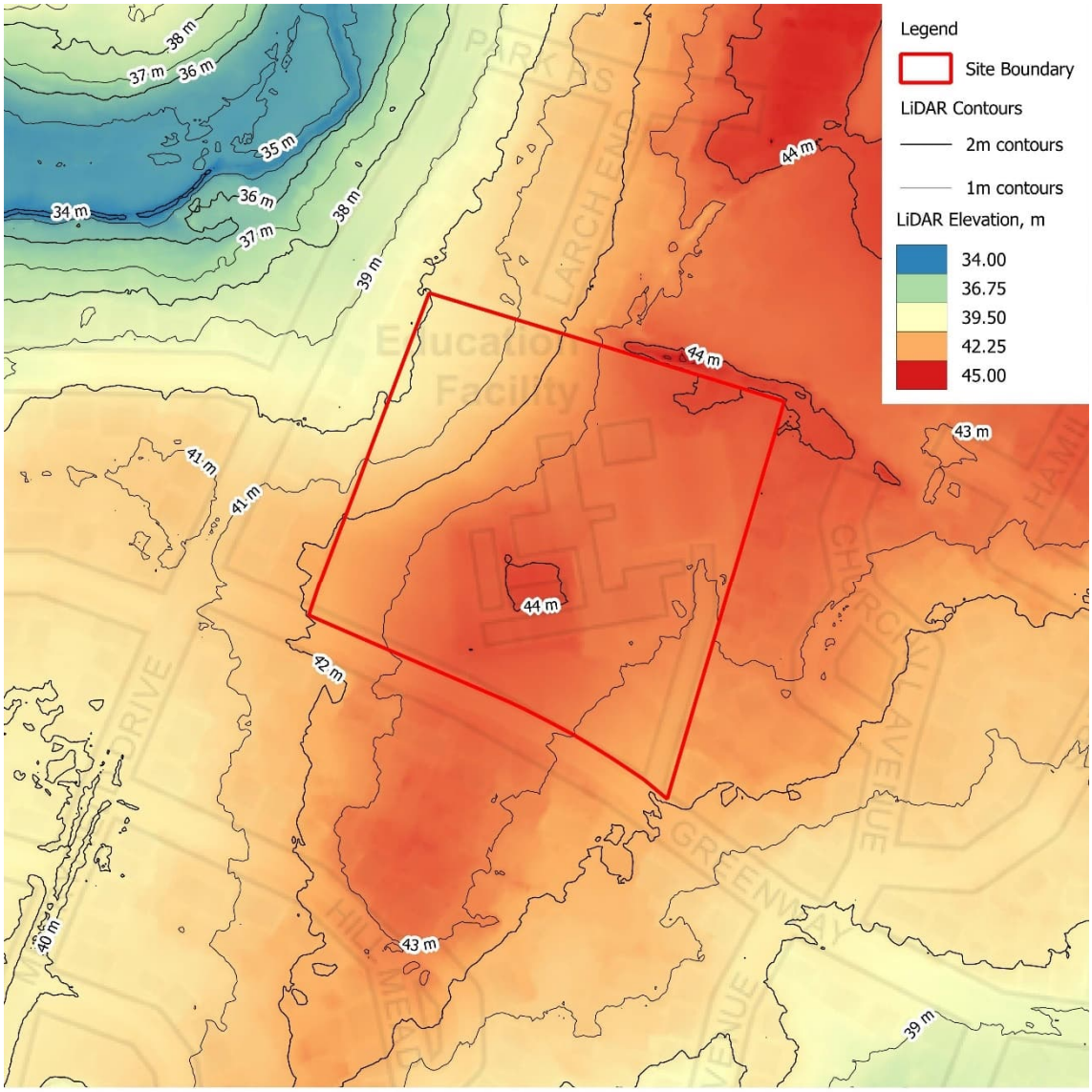
5.2.1 The earliest available data indicated that the site was undeveloped and was mostly featureless apart from mild tree coverage, assumed to be a filed/open space. The earliest sign of development is seen to be from the early 1960's with a layout which mostly resembles the current school arrangement apart from some minor extensions/developments spanning from the 1970's to around 2006.

5.3 Topography

5.3.1 Lidar data has been obtained as part of this assessment and is shown in Figure 4.2 below.

5.3.2 A topographical survey was undertaken by Central Alliance Survey in August 2021 (ref: 3.1 SRP1029 Topographical Survey) and is contained in Appendix 3.

5.3.3 Available data indicates that the site generally sits between 40m-44m AOD with a shallow gradient falling primarily in the north-westerly direction. There is a low point towards the north-west of the site (~40m AOD) and a high point within the north-east corner as well as the centre of the site (~44m AOD).



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Figure 5.2: Lidar Data

5.4 Geology

5.4.1 The British Geological Survey (BGS) Online Geology Viewer[1] notes the underlain bedrock for the site as Upper Tunbridge Wells Sand Formation (Valanginian Age) and notes that there are no recorded superficial deposits.

5.4.2 Ground Investigations were undertaken by RSK In December 2021 and are contained in Appendix 4. The investigations confirmed the expected geology and have been summarised in Table 5.1.

[1] British Geological Survey (BGS) Online Geology http://mapapps.bgs.ac.uk/geologyofbritain/home.html

Table 5.1: Site Geology

Strata	Expected Thickness (m)	General Description
Hardstanding cover (Tarmac and/or concrete)	0.04 to 0.25	N/A
Topsoil	0.2 to 0.34	N/A
Made Ground	0.25 to 0.90	Generally comprised as a cohesive soil with a minor proportion of granular material with rare brick and charcoal.
Upper Tunbridge Wells Sand undifferentiated (Weathered)	1.10 to 5.80	Comprised of a firm greyish brown silty clay, which transitioned to stiff and then very stiff with depth.

5.5 Hydrology

5.5.1 A desk-study review of ordnance survey mapping notes no surface water bodies on-site.

5.5.2 Boldings Brook is the closest EA Main River to the site, and it flows in a primarily southerly direction eventually joining other rivers as it leaves the Horsham area. It lies approximately 100m to 250m away from the site. The 'River Arun' is also located around 0.8km south of the site and flows primarily in the southerly direction.

5.6 Hydrogeology

5.6.1 The site is not located on a Source Protection Zone (SPZ).

5.6.2 The site is situated above a secondary A aquifer. The superficial deposits are classified as unproductive. The groundwater vulnerability for the site is high with the majority of the site sitting in a high-risk zone with only a minor area of the east in an unproductive zone.

5.6.3 A ground investigation was undertaken by RSK Geosciences with results compiled in report reference: '3.1 SRP1029 Geotechnical and Geo-environmental Investigation' contained in Appendix 4. The groundwater monitoring was conducted in December 2021; groundwater was encountered in 2 of 8 monitoring installations at approximately 5mbgl then further rising to 4.5mbgl. From these results groundwater is thought to be in small and intermittent sections throughout the site.

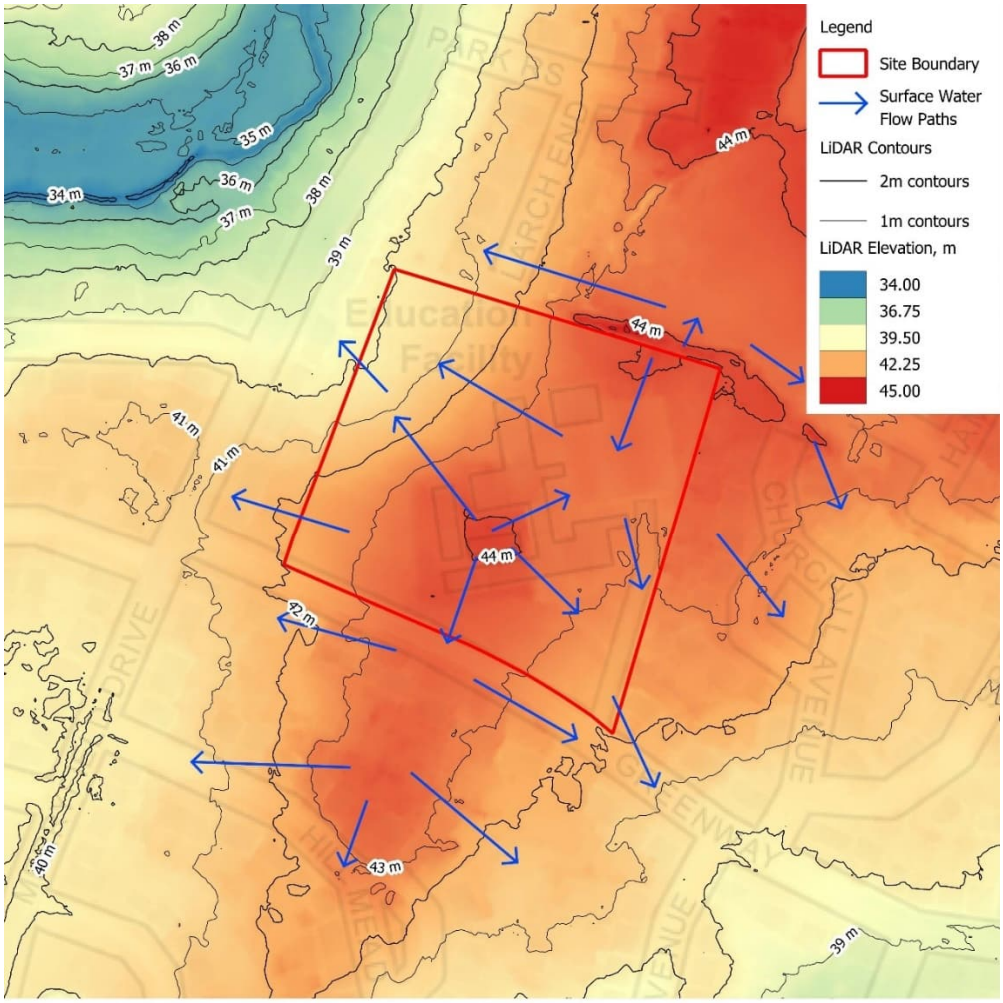
5.7 Existing Site Drainage

5.7.1 Southern Water are the incumbent sewerage utility provider for the area. A review of the Southern Water's Records, contained in Appendix 5, confirms that a public foul sewer runs beneath the site from north to south along the western side of the existing school building (Southern Water Manholes Ref: 5404, 5402 & 5301). The sewer is approximately 7.8 meters

below ground level and is 300mm in diameter. It should be noted that due to the location of the existing sewer and the new proposed location for the school, the proposed school building does have a minor encroachment into the sewer's easement. Levels, sewer dimensions and building agreements are to be confirmed and discussed with Southern Water.

5.7.2 Further review shows multiple potential public surface water connections just past the southern side of the site boundary. Specifically, these sewers lie beneath 'Greenway Road'. No information on the invert level or size of these sewers has been provided within the sewer records. There are no known existing public surface water sewers within the extents of the site. From Southern Water mapping the closest public surface water sewer is beneath Greenway Road to the south of the site. Two separate 1500mm diameter sewers run to the east and west of the site connecting into the wider public sewer network (Southern Water head of run manhole reference: 5252 & 5351 respectively).

5.7.3 The natural surface water flow paths have been devised from reviewing the available Lidar and topographical data and are shown on Figure 5.3 below.



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Figure 5.3: Surface Water Flow Paths

5.7.4 The greenfield runoff rates for the site were calculated using the FEH method and are summarised in Table 4.2.

Table 5.2: Greenfield runoff rates

Storm Event	Greenfield Runoff Rate (litres/second/ha)
Qbar	3.803
1 in 1 Year	3.233
1 in 30 year	8.747
1 in 100 Year	12.132

6.0 EXISTING FLOOD RISK TO THE SITE

6.1 Fluvial Flood Risk

6.1.1 The EA Flood Zone Map shows the site is located within a Flood Zone 1 as shown in Figure 5.1. The EA defines Flood Zones from rivers or the sea in Paragraph 078 (Table 1) of the PPG, description for Flood Zone 1 is as follows:

- Flood Zone 1 (Low Probability): Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2, 3a and 3b).



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Figure 6.1: Environment Agency Flood Zones

6.1.2 The risk of fluvial flooding is deemed low as the site is within Flood Zone 1 therefore 1 in 1000 annual chance of fluvial flooding occurring.

6.2 Tidal Flood Risk

6.2.1 The site is located within a Flood Zone 1. Therefore, the probability of tidal flooding affecting the site is low.

6.3 Flood Alert Area

6.3.1 The site does not fall within a flood alert or flood warning area.

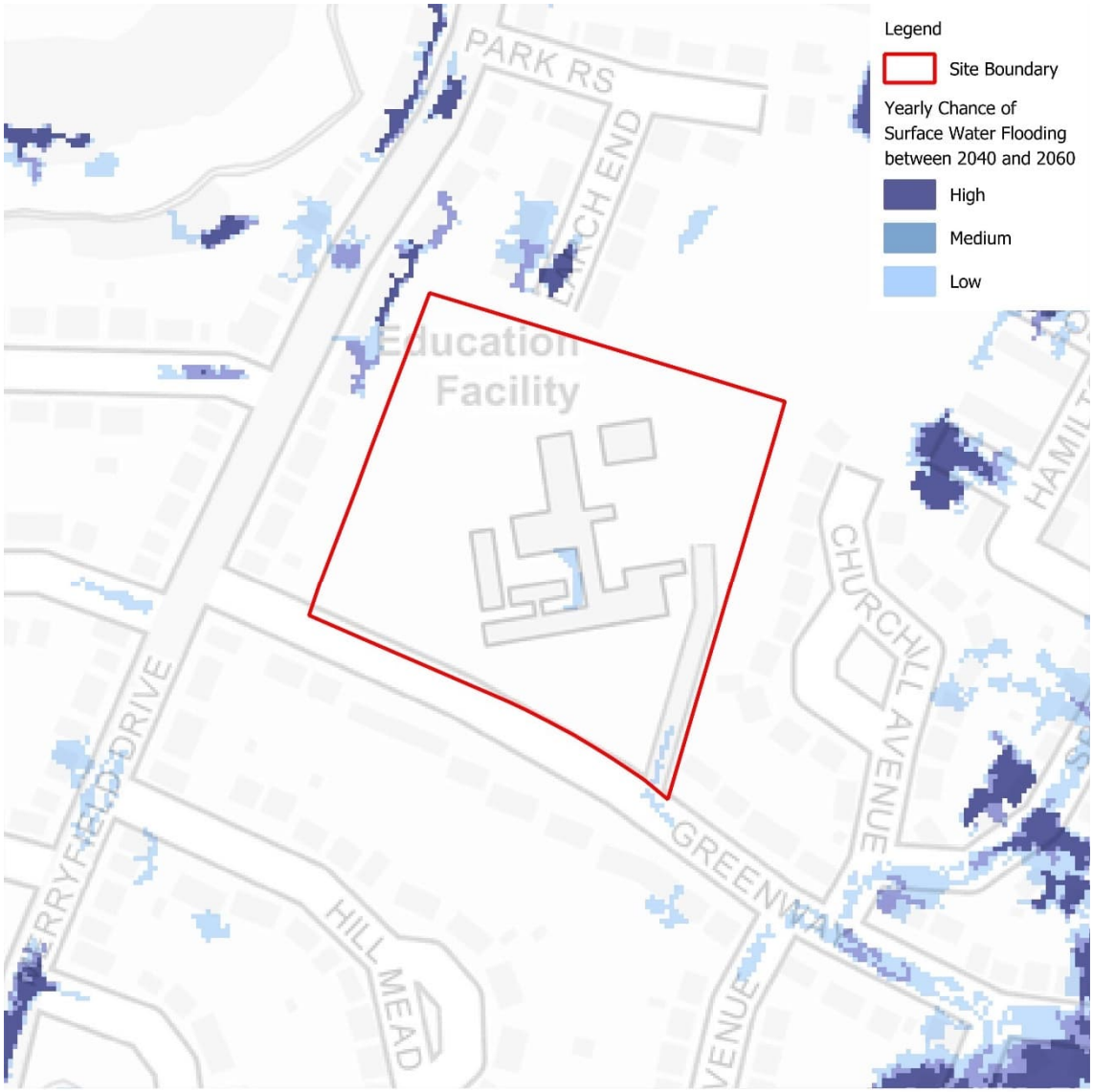
6.4 Surface Water Flood Risk

6.4.1 The EA classify surface water flood risk as follows:

- VERY LOW – the area has a chance of surface water flooding of less than 0.1%
- LOW – the area has a chance of surface water flooding of between 0.1% and 1%
- MEDIUM – the area has a chance of surface water flooding of between 1% and 3.3%
- HIGH - the area has a chance of surface water flooding of greater than 3.3%

6.4.2 The EA's Risk of Flooding from Surface Water (RoFSW) map is presented in Figure 6.2.

6.4.3 The EA's flood map for surface water shows that there are small areas on the site at low risk from surface water flooding however primarily the sites risk of surface water flooding is deemed to be very low. The site mostly sits on a higher elevation when compared to the surrounding areas therefore reducing the chance of runoff accumulating on site.



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Figure 6.1: EA Updated Flood Map for Surface Water

6.5 Groundwater Flood Risk

6.5.1 The bedrock geology of the site is Tunbridge Wells Sandstone and is likely permeable in nature.

6.5.2 Groundwater monitoring was conducted in December 2021; groundwater was encountered in 2 of 8 monitoring installations at a depth of 5mbgl rising to 4.5mbgl for both. Groundwater is assumed to be in 'pockets' of the site and is not assumed to be a large portion of the site.

6.5.3 The risk of groundwater flooding is deemed to be low. It is also necessary to note that the risk of groundwater flooding is highly variable and heavily dependent upon local conditions at any particular time.

6.5.4 A review of the SFRA confirms low groundwater risk.

6.6 Sewer Flood Risk

6.6.1 A review of available information indicates a low risk of sewer flooding within the site. In the even of disruption to the 300mm foul sewer running beneath the site there is a potential for some localised flooding however this is minimised due to the depth of the sewer.

6.6.2 The risk of sewer flooding for the proposed development is deemed as being low.

6.7 Artificial Flood Risk

6.7.1 Information available from the EA for risk of inundation from reservoirs indicates that the site is at very low risk from flooding due to reservoirs.

6.8 Flood Risk Summary

Table 6.2: summary of existing flood risk

Flood Risk	Level of Risk
Fluvial	Very Low
Tidal	Very Low
Surface Water	Low
Groundwater	Low
Sewer	Low
Artificial	Very Low

6.9 Climate Change Impact

6.9.1 Climate change must be considered as an integral part of any site-specific FRA in order to minimise the impact of future flooding and allow adequate consideration for resilience to alleviate the burden on potential future users of the proposed development. Allowances have been made in accordance with Section 3.4.

7.0 DEVELOPMENT PROPOSALS

7.1 Proposed Development Description

7.1.1 The new development is located to the west of the existing school buildings; the development consists of a new school building which will have both single and two-story segments. Once built the existing school building is to be demolished and hard and soft outdoor landscaping is to replace it, a proposed MUGA, soft landscape playing field, access roads and parking spaces are to take its place.

7.1.2 The proposed development masterplan is contained in Appendix 6.

7.1.3 The expected lifetime of the development is 100 years.

7.2 Vulnerability of Development

7.2.1 Annex 3 of NPPF defines the different categories of development in terms of flood risk vulnerability. A primary school is classified as more vulnerable in terms of flood risk.

7.2.2 The yearly chance of flooding is considered to be low for surface water flooding and a very low for flooding from rivers and the sea. The yearly chance of flooding does not significantly increase between 2040 and 2060.

7.3 Urban Creep Allowance

7.3.1 New developments should factor in the effect urban creep. This is the increase in impermeable area on developments due to conservatories/extensions/driveways etc.

7.3.2 However, urban creep is not applicable to non-residential properties or flats and apartment blocks and so has therefore not been considered for the purposes of this assessment.

7.4 Sequential Test

7.4.1 This FRA has not undertaken a review to support the sequential test. A sequential test is not considered necessary or appropriate given the proposed development is a redevelopment of a pre-existing educational development.

8.0 SURFACE WATER MANAGEMENT

8.1 Overview

8.1.1 The surface water drainage system has been designed in accordance with the NPPF and the accompanying Guidance and Technical Standards for SuDS. It also complies with the requirements under Building Regulations Part H and is compliant with the LLFA supplementary drainage requirements under the document titled "West Sussex Policy for Management of Surface Water"

8.1.2 In line with the SuDS hierarchy under paragraph 56 of the PPG, surface water should be managed by:

1. Reuse to the maximum extent that is practical – where it is safe and acceptable to do so
2. Discharge to watercourses
3. Discharge to surface water sewer, highway drain or another drainage system
4. Discharge to combined sewers (last resort)

8.2 Site Constraints

8.2.1 A review of the site characteristics has informed the following site constraints:

- The site is an active school and is to remain functional throughout the construction of the scheme. All construction works will therefore need to be undertaken in phases to maintain as far as possible normal day to day running of the school. Where necessary the use of existing drainage will be used to temporarily drain the site.
- The site has a Southern Water foul sewer which runs beneath the site at an approximate depth of 7.8mbgl. Due to the depth of the sewer, any new connection to the sewer is to be avoided due to risks associated with deep excavations. Furthermore, risks associated with constructing near or on the sewer is to be avoided by ensuring the proposed building any associated drainage infrastructure is located out of the 4m easement of the sewer as far as possible. And where required private drainage should cross the sewer diagonally and manholes located directly above the sewer should be avoided.
- The existing site levels are relatively flat, with the north-west corner of the site being the low point within the site. Due to the layout of the site, construction sequencing, and site levels, the location of the western attenuation tank are required to be located in proximity (3m) to the proposed building. Site levels also have to be lifted to ensure sufficient cover over the attenuation feature and the system to function hydraulically.

8.3 Existing and Proposed Impermeable and Permeable Areas

8.3.1 The existing and proposed impermeable and permeable areas are presented in Table 8.1.

Table 8.1: Existing and Proposed Impermeable and Permeable Areas

	Permeable (ha)	Impermeable (ha)
Existing	1.56	0.96
Proposed	1.66	0.87

8.4 Proposed Surface Water Runoff Rates

8.4.1 As previously mentioned in 5.7.4. the surface water catchment has been analysed and the Greenfield runoff rate (Qbar) calculated. The proposed discharge rates for the development should be restricted to Qbar at 7L/s based on 1.85ha of catchment area contributing to the surface water drainage system. The proposed discharge rate will be split across two separate surface water drainage networks which will both ultimately discharge into public surface water sewers beneath Greenway road at 3.5L/s and 3.5L/s for the eastern and western outfalls respectively.

8.5 Surface Water Volume

8.5.1 The proposed site surface water drainage network has been modelled in Autodesk's Infodrainage software and has been utilised to calculate pipe sizes and general surface water attenuation requirements needed to achieve the aforementioned surface water discharge rate. For a discharge rate of 7 l/s, approximately 380m^3 of surface water storage is required across the site for a 1 in 100 year plus climate change rainfall event.

8.6 SuDS Strategy

8.6.1 The proposed drainage strategy layout presented in Appendix I, illustrates the SuDS features proposed to manage the surface water runoff from the site.

8.6.2 The surface water drainage strategy aims to control runoff from impermeable areas at source and attenuate through SuDS features.

8.6.3 Infiltration is considered to be unviable on this development due to low infiltration capacity of the underlying soil. Records from Southern Water show two surface water public sewers at the south-east and south-west corners of the site beneath an adjacent public road. In the absence of any water bodies suitable to connect the drainage into and considering the site surface water drainage strategy already connects into the public sewer it is proposed that the site will outfall to both of these sewers. The new western surface water network will outfall via a new connection into Southern Water manhole ref 4253 whereas the new eastern network will utilise an existing surface water connection located within the site boundary beneath the entrance road into the school.

8.6.4 The following SuDS features have been considered within the proposed surface water drainage strategy:

- Permeable paving;
- Green roof;
- Attenuation Tanks;

- Attenuation Basin;
- Swale

8.6.5 Rainfall falling on the proposed school building upper roof will be intercepted by a green roof system which will provide both water quality improvements and slow flows down at source prior to discharge into the below ground surface water drainage system. As runoff percolates down through the green roof system, it will ultimately discharge via rainwater downpipes into the below ground piped system running around the perimeter of the school building.

8.6.6 Permeable pavement systems are to be installed where possible around the proposed building, within the carpark and MUGA, to provide interception and treatment of surface water runoff. The subbase beneath permeable pavements will also be used to attenuate flows at source which will allow the size of the downstream attenuation tanks to be optimised during detailed design.

8.6.7 Two separate attenuation tanks have been proposed for this site, one for each outfall. The tank on the west side of the site sits immediately adjacent to the proposed building on its northwestern edge and discharges into Southern Water Manhole 4253 via a flow control manhole located immediately downstream of the tank. The tank has an approximate area of 179m^2 and a depth of 1.2m. The tank provides a total attenuation volume of 205m^3 based on 95% void ratio

8.6.8 The flow control manhole ref SW MH 7 located downstream of the western attenuation tank restricts flows to a maximum of 3.5 l/s for all storm events up to and including the 1 in 100year plus CC event.

8.6.9 The eastern attenuation tank has an approximate area of 150m^2 and a depth of 1.2m. The tank provides a total attenuation volume of 171m^3 based on 95% void ratio. The attenuation tank is located immediately beneath a proposed dry detention basin which is hydraulically link to the underlying tank. During larger storm events the tank will surcharge upwards and begin to fill the basin. This has allowed the size of the underlying tank to be kept to a minimum with any additional storage requirements being provided in the above ground basin. The inclusion of the basin adds further amenity and biodiversity benefit to the SuDS scheme proposed for the site as it will also provide water quality improvements as well as providing interception for any runoff which enters the basin directly from any adjacent impermeable areas.

8.6.10 The basin has an approximate area of 423m^2 and a depth of 1.15m. The total volume of the basin is circa 376m^3, however due to the level of the basin in relation to the surrounding site the basin will not be able to be fully utilised to 100% of its capacity.

8.6.11 The flow control manhole ref SW MH 30 located downstream of the south-eastern attenuation tank restricts flows to a maximum of 3.5 l/s for all storm events up to and including the 1 in 100year plus CC event.

8.6.12 A swale system has also been implemented further upstream within the eastern network to capture runoff from the site access road, this in turn will help to reduce peak discharge rates and improve the water quality prior to entering the main below ground drainage system.

8.6.13 The proposed surface water drainage system across the scheme can effectively control all runoff generated within the site and maintain pre-development Greenfield runoff rates, without increasing flood risk elsewhere.

8.6.14 The maintenance of SuDS is vital ensuring that they work as efficiently as they set out to do and is discussed in Chapter 10.

8.7 Surface Water Quality

8.7.1 The SuDS components within the surface water drainage strategy have been designed in accordance with the guidance set-out in the SuDS Manual.

8.7.2 Treatment within SuDS components is essential for frequent low intensity and duration rainfall events, where urban contaminants are being mobilised and washed off urban surfaces and the aggregated contribution to the total pollutant load to the receiving surface water body is potentially high. For rainfall events greater than the 1 in 1 return period, the pollutants become diluted and the environmental risks will be reduced which means that the SuDS treatment process becomes less crucial. Treatment effectiveness is strongly linked to the hydraulic control of runoff, in particular velocity control and retention time.

8.7.3 Table 26.2 of the CIRIA SuDS Manual provides the pollution hazard indices for different land use classifications as shown in the table below.

Table 8.2: CIRIA Pollution hazard indices for different land use classifications

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-carbons
Commercial/Industrial Roofs	Low	0.3	0.2	0.05
Individual property driveways, residential car parks, low traffic roads, car parks with infrequent change	Low	0.5	0.4	0.4

8.7.4 Taking into account the proposed land use, the level of pollution associated with the proposed development is regarded as Low.

8.7.5 Table 8.3 below summarises the treatment efficiency of different SuDS components discharging to surface waters as detailed in Chapter 26 of the SuDS Manual.

Table 8.3: CIRIA Indicative SuDS Mitigation Indices for Discharges to surface water

	Mitigation Indicies		
Type of SuDS Component	Total Suspended Solids (TSS)	Metals	Hydro-Carbons
Swale	0.5	0.6	0.6
Permeable Pavement	0.7	0.6	0.7
Detention Basin	0.5	0.5	0.6

8.7.6 Where multiple drainage features are used, the efficiency of the secondary system to treat water is reduced. By using a swale discharging into a detention basin the combined mitigation indices is as follows:

	Mitigation Indices	Total Mitigation
TSS	0.5 + 0.5(0.5)	0.75
Metals	0.6 + 0.5(0.5)	0.85
Hydrocarbons	0.6 + 0.5(0.6)	0.90

Table 8.4 Mitigation Indices for Proposed Combined Drainage System

8.7.7 A two-part treatment train is provided on the eastern system where swale or permeable paving is used along with a detention basin. Table 8.4 shows the mitigation indices provided by a treatment train involving swale and detention basin.

8.7.8 It should be noted that the proposed drainage design does not discharge runoff directly into the detention basin, and that surface water will only surcharge into the detention basin in the event of a 1 in 100 year event. Therefore, the treatment provided by the detention basin may not be utilised fully in the event of a 1 in 30 year event. Subject to further design, surface water may be directed to the basin via ACO inlet, prior to discharge into attenuation tank.

8.7.9 However, the permeable paving and swale provided within the single treatment system will still provide sufficient mitigation to the pollutants expected on this development, as shown on Table 8.2 and Table 8.3.

8.8 Foul Water Strategy

8.8.1 A new foul water drainage system has been proposed for the new building as well as some minor modifications to sections of the existing foul sewers which will maintain the foul connection to the existing nursery building. (refer to drawings SRP1029-CRH-00-EX-D-C-5500)

8.8.2 The proposed foul water drainage system has been configured to rationalise the connection to the deep foul sewer that runs beneath the western centre of the site. It incorporates the

drainage requirements of the new building and ensures that the retained building is still able to be sufficiently drained.

8.8.3 The site currently outfalls to a public sewer which runs beneath the site at approximately 7m below ground level, this in turn raises concerns due to the feasibility of connecting directly into the sewer hence our proposed design incorporating the two foul systems to discharge into the sewer via a shallower existing private manhole.

8.8.4 Following guidance within the Sewerage Sector Design and Construction Guidance (DCG), and BS EN 12056-2:2000, the Flows and Loads tables have been used to calculate a total peak foul flow rate of 3.09 l/s for the school. This is based on a population number of 450 pupil/ staff members.

8.8.5 A 150mm diameter pipe laid at minimum gradient to achieve self-cleansing velocity has a carrying capacity in excess of 13l/s and as such will be suitable for use across the site. A S106 application for an indirect connection to the public sewer will need to be submitted and approved by Southern Water prior to construction on the proposed development.

8.8.6 The foul water strategy and calculations are presented in the Proposed Drainage Strategy and is contained in Appendix 7.

9.0 FLOOD RISK FROM THE PROPOSED DEVELOPMENT

9.1 Fluvial Flood Risk

9.1.1 The proposed development is wholly located within Flood Zone 1. Surface water runoff from the proposed development is to be intercepted at source where possible via permeable paving, green roof areas, swale and basin features prior to discharge to the two outfall locations into the public sewers. The proposed development is unlikely to increase the fluvial flood risk to the site.

9.2 Tidal Flood Risk

9.2.1 The proposed development is unlikely to increase the tidal flood risk to the site.

9.3 Surface Water Flood Risk

9.3.1 The redevelopment generally sits in an area currently at low to very low risk of flooding from surface water sources, with a very small area at the centre of the site being noted as a low risk from surface water flooding.

9.3.2 There is a slight increase in impermeable area within the site however the proposed drainage strategy has been designed to easily accommodate for this increase especially when all of the additional permeable paving provided is taken into consideration

9.3.3 Therefore, the proposed development in unlikely to increase the surface water flood risk.

9.4 Groundwater Flood Risk

9.4.1 The site has a low groundwater flood risk, groundwater monitoring was conducted in December 2021, groundwater was encountered in 2 of 8 monitoring installations at a depth of around 5mbgl.

9.4.2 The proposed development is unlikely to increase the groundwater flood risk to the site.

9.5 Sewer Flood Risk

9.5.1 The proposed development is unlikely to increase the sewer flood risk to the site.

9.6 Artificial Flood Risk

9.6.1 The proposed development is unlikely to increase the artificial flood risk to the site.

9.7 Climate Change Impact

9.7.1 The impact of climate change has been adequately factored into the proposed drainage design in line with all current best practice and guidance.

10.0 SCHEDUCLE OF MAINTENANCE

10.1 Introduction

10.1.1 The maintenance of SuDS features is vital ensuring that they work as efficiently as they set out to do. Maintenance activities can be broadly defined as:

- Regular maintenance – basic tasks carried out regularly;
- Occasional maintenance – tasks that are required periodically but on a much less frequent basis; and
- Remedial maintenance – tasks required when a fault needs rectifying and often includes unforeseen events.

10.1.2 Maintenance requirements for each SuDS feature has been outlined below.

10.2 Filter Drains

Construction

10.2.1 During construction it is important to prevent muddy water from flowing into the system. Where possible, construction should be undertaken during dry periods. The filter drains should be constructed with adequate fall to ensure the area drains efficiently. During construction the contractor must ensure the designed width and depth are correct and the geotextile has the specified porosity.

Maintenance Schedule

10.2.2 The table below shows the operation and maintenance requirements for filter drains, taken from the CIRIA C753 SuDS Manual.

Table 10.1: Operation and maintenance requirements for filter drains (CIRIA C753, 2015)

Maintenance Schedule	Required Actions	Typical Frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage.	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly

Maintenance Schedule	Required Actions	Typical Frequency
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional maintenance	Remove or control tree roots when they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	Clear perforate pipework or blockages	As required

10.3 Swales

Construction

10.3.1 Construction vehicles and equipment not directly involved in the construction of the rills and swales should be kept away from these areas. Excavations for the swales should aim to be undertaken in times of dry weather, when possible, to prevent mobilisation of sediments from exposed surfaces. Exposed surfaces after rill or swale excavations should be stabilised as soon as possible with grass seed and straw mulch. Perimeter controls should be installed prior to construction to protect watercourses.

Maintenance Schedule

10.3.2 The table below shows the operation and maintenance requirements for the swale, taken from the CIRIA C753 SuDS Manual.

Table 10.2: Operation and maintenance requirements for swales (CIRIA C753, 2015)

Maintenance Schedule	Required Actions	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass - to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly

Maintenance Schedule	Required Actions	Typical Frequency
	Inspect inlets for silt accumulation, establish appropriate silt removal frequencies	Half yearly
	Inspect check dams for blockages and failure.	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

10.4 Permeable Paving

Construction

10.4.1 Construction vehicles and equipment not directly involved in the construction of the pervious pavements will be kept away from these areas. Silt fences, staged excavation works and temporary drainage swales/bunds to divert runoff away from exposed areas will be utilised, as appropriate, to manage the risks associated with, and to intercept the discharge of sediment laden runoff. Landscaping activities will be carefully designed and carried out to prevent deposition of topsoil, turf and other materials on the surface of the pavement. Infiltration surfaces will not be compacted and will be protected at all times. Excavations for the pervious pavement installation should aim to be undertaken in times of dry weather, when possible, to prevent mobilisation of sediments from exposed surfaces during rainfall events. Surfaces exposed as part of the pervious paving installation works should be stabilised as soon as possible. Perimeter controls should be installed prior to construction to protect watercourses.

Maintenance Schedule

10.4.2 The table below shows the operation and maintenance requirements for the pervious pavements which are in accordance with the CIRIA C753 SuDS Manual.

Table 10.3: Operation and maintenance requirements for pervious pavements (CIRIA C753, 2015)

Maintenance Schedule	Required Actions	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 surfaces from adjacent impervious areas as these areas are 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 onto 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 hrs after large storms in first six months
	Assess silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

10.5 Detention Basins

Construction

10.5.1 Construction vehicles and equipment not directly involved in the construction of the detention basin will be kept away from these areas. Silt fences, staged excavation works and temporary drainage swales/bunds to divert runoff away from exposed areas will be utilised, as appropriate, to manage the risks associated with, and to intercept the discharge of, sediment laden runoff prior to its discharge to nearby watercourses. Excavations for the detention basin should aim to be undertaken in times of dry weather when possible, to prevent mobilisation of sediments, during rainfall events. Surfaces exposed as part of the detention basin construction should be stabilised as soon as possible, by the use of hydroseeding or an alternative approved approach. Perimeter controls should be installed prior to construction to protect watercourses. Perimeter controls should be installed prior to construction to protect watercourses.

Maintenance Schedule

10.5.2 The table below shows the operation and maintenance requirements for the detention basins, taken from the CIRIA C753 SuDS Manual.

Table 10.3: Operation and maintenance requirements for detention basins (CIRIA C753, 2015)

Maintenance Schedule	Required Actions	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass - public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc. for evidence of blockage and/or physical damage	Monthly
	Inspect silt accumulation rates in the detention basin and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices, e.g. penstocks	Half yearly

Maintenance Schedule	Required Actions	Typical Frequency
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay.	Every 1-5 years, or as required
	Remove sediment and planting from one quadrant of the main body of detention basins without sediment forebays.	Every 5 years, or as required
Occasional maintenance	Remove sediment from the main body of big detention basins when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, e.g. every 25-50 years
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate detention basin when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair/rehabilitate inlets, outlets and overflows.	As required

10.6 Green Roof

10.6.1 Maintenance frequency varies pertaining to the complexity of the green roof; intensive green roofs require regular inspection and action, this may include weekly mowing of grassed areas and weeding of plant beds. On the other hand, extensive green roofs will be managed with a more subtle approach, biannual visits to remove litter, invasive plants species as well as checking fire breaks and drains.

10.6.2 Maintenance responsibility for green roof systems should be placed with a responsible organisation with specialist training in green roof care, all maintenance actions must comply with appropriate health and safety regulations, especially as this encompasses regulations for working at height (e.g. operators require safety fastenings to work at roof level). Training and guidance information for operating and maintenance the roof is to be distributed to all property owners and tenants.

10.6.3 Roof access points should be designed with safety and mobile convenience at foremost, providing secure points for harness attachments where approach of the roof edges is required. CDM 2015 requires designers to ensure that all maintenance risks have been identified, eliminated, reduced and/or controlled where appropriate. This information will be required as part of the health and safety file.

10.6.4 The table below provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive and some actions may not always be required.

10.6.5 Maintenance Plans and schedules should be developed during the design phase, and will be specific to the type of roof that is adopted. Specific maintenance needs of the system should be monitored, and maintenance schedules adjusted to suit requirements.

Table 10.4: Maintenance and Operation of Green Roofs (CIRIA C753, 2015)

Maintenance Schedule	Required Actions	Typical Frequency
Regular maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth.	Biannually
	During establishment (ie year one), replace dead plants as required	Monthly (usually responsibility of manufacturer)
	Post establishment, replace dead plants as required (where >5% loss of coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Biannually or as required
	Remove nuisance and invasive vegetation, including weeds	Biannually or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Biannually 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

Maintenance Schedule	Required Actions	Typical Frequency
Monitoring	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 of roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms

10.7 Attenuation Tanks

Construction

10.7.1 Construction vehicles and equipment not directly involved in the construction of the attenuation tank will be kept away from these areas. Silt fences, staged excavation works and temporary drainage swales/bunds to divert runoff away from exposed areas will be utilised, as appropriate, to manage the risks associated with, and to intercept the discharge of, sediment laden runoff prior to its discharge to nearby watercourses. Excavations for the attenuation tank should aim to be undertaken in times of dry weather when possible, to prevent mobilisation of sediments during rainfall events. Perimeter controls should be installed prior to construction to protect watercourses.

Maintenance Schedule

10.7.2 The table below shows the operation and maintenance requirements for the Attenuation tanks, taken from the CIRIA C753 SuDS Manual.

Table 10.5: Operation and maintenance requirements for attenuation storage tanks (CIRIA C753, 2015)

Maintenance Schedule	Required Actions	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
	Remove sediment from catchpits/ gullies/ sumps.	Annually, or as required
Occasional maintenance	Removal of sediment from tank via vacuum pumping (if appropriate)	As required
Remedial maintenance	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

10.8 Proprietary Treatment Systems

10.8.1 The proprietary treatment systems include conventional pipework, gullies, catchpits, manholes, channels and headwalls.

Construction

10.8.2 During construction the principal contractor must ensure that preventative measures have been put in place as to not allow the construction runoff drain into the system. Measures must be taken to ensure debris from the construction site does not block the components. Routine inspections should be undertaken ensuring that the drainage is functioning properly. Outfalls must be constructed to the correct level and all joints must be correctly sealed. During construction backfill should be correctly installed as specified as per the manufactures' recommendations.

Maintenance Schedule

10.8.3 The maintenance schedule for the aforementioned SuDS has been adopted from the SuDS Manual C753 and are summarised in the table below.

Table 10.6: Maintenance and Operation of Proprietary Treatment Systems (CIRIA C753, 2015)

Maintenance Schedule	Required Actions	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Monitoring	Inspect monthly
Occasional maintenance	Sediment management	Annually or as required
Remedial maintenance	Structure rehabilitation/repair	As required

11.0 CONCLUSION

11.1.1 CampbellReith has been commissioned to prepare a Flood Risk Assessment (FRA) and Drainage Strategy in accordance with the National Planning Policy Framework to inform the proposed development at Greenway Academy, RH12 2JS.

11.1.2 The new development is located to the west of the existing school buildings, the development is a new two storey block with classrooms, associated toilets and kitchen facilities. Externally, the scheme also comprises construction of a new MUGA along with associated soft and hard landscaping works.

11.1.3 The surface water flood risk on site is generally low, with a very small extent of the site having a risk of flooding in a 1 in 100 year event.

11.1.4 The site is generally at low or very low risk to flooding from all other sources.

The geology of the site indicates the underlying bedrock of the site as Upper Tunbridge Wells Sands Differentiated (Weathered).

11.1.5 There is a well-established sewer network across the site, the majority of which will be abandoned with a completely new surface water drainage system, and new foul drainage for the proposed building along with retained foul drainage to still serve the nursery to be retained. Surface water will outfall to two separate connections in the south-east and south-west due to this system being two separate surface water systems. Foul will outfall via the existing connection which runs to a deep Southern Water sewer running beneath the site.

11.1.6 Ground investigations show the site is underlain by weathered Upper Tunbridge Wells Sands Bedrock. Due to the dominantly cohesive nature of the soils on site infiltration is not viable. The nearest open watercourse is located approximately 255m north-west of the site across residential and undeveloped land.

11.1.7 The proposed surface water drainage strategy seeks to utilise a combination of Sustainable Drainage Systems such as permeable paving, green roof, swale, attenuation basin and below ground attenuation tanks to attenuate surface water runoff from the new building and areas of hard standing. Any redundant sections of surface water pipework and attenuation feature will need to be suitably decommissioned in stages of construction of the new school buildings and demolition of the existing.

11.1.8 The maintenance of SuDS is vital to ensuring that they work as efficiently as they are intended to.

11.1.9 The proposed drainage strategy will not increase flood risk from any sources on or off the site and is considered appropriate for the proposed development in its current location.

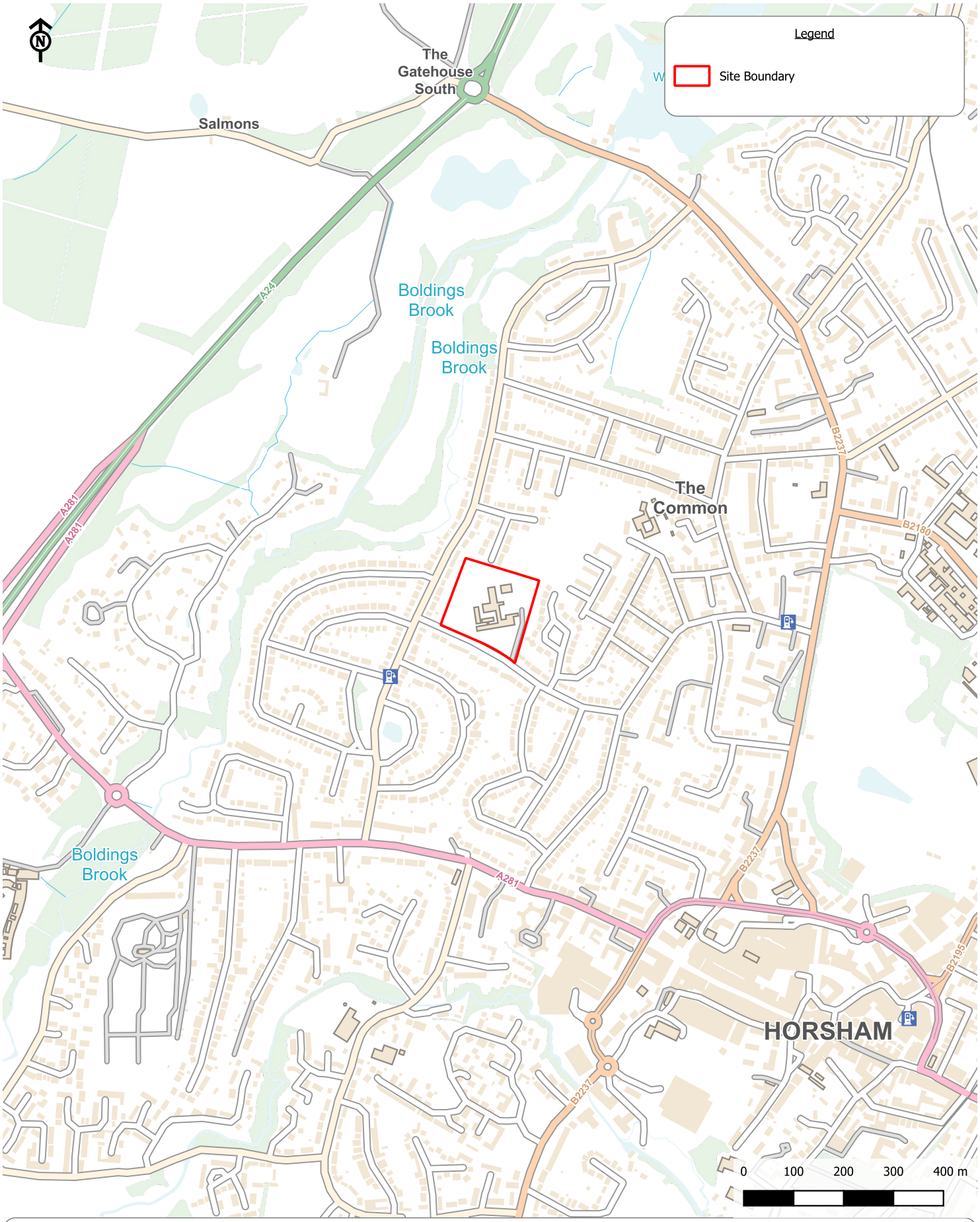


CampbellReith
consulting engineers

Appendix 1

Site Location Plan

L25263AKF-CRH-CC-CC-FG-G-7000



Greenway Junior School

Site Location

Scale:	1:10000@A4
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Appendix 2

SFRA Extract

Horsham-Level-1-SFRA_FINAL_Report

Appendix

Level 1 Strategic Flood Risk Assessment

Final Report

Horsham District Council

Project number: 60730513

September 2024

Delivering a better world

Quality information

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Abbreviations

Acronym	Definition
AIMS	Asset Information Management System
AEP	Annual Exceedance Probability
BGS	British Geological Survey
CFMP	Catchment Flood Management Plan
FCERM	Flood and Coastal Erosion Risk Management
FRA	Flood Risk Assessment
FRR	Flood Risk Regulations
FSA	Flood Storage Area
FWMA	Flood and Water Management Act
HDC	Horsham District Council
IDB	Internal Drainage Board
IUD	Integrated Urban Drainage
LLFA	Lead Local Flood Authority
LFRMS	Local Flood Risk Management Strategy
LFRZ	Local Flood Risk Zone
LPA	Local Planning Authority
NPPF	National Planning Policy Framework
PFRA	Preliminary Flood Risk Assessment
PPG	Planning Practice Guidance
RBD	River Basin District
RBMP	River Basin Management Plan
RFCC	Regional Flood and Coastal Committee
RMA	Risk Management Authority
RoFSW	Risk of Flooding from Surface Water
SFRA	Strategic Flood Risk Assessment
SMP	Shoreline Management Plan
SOP	Standard of Protection
SWMP	Surface Water Management Plan
SuDS	Sustainable Drainage Systems
WFD	Water Framework Directive
WSCC	West Sussex County Council
WWNP	Working with Natural Processes

Glossary of Terms

Glossary	Definition
1D Hydraulic Model	Hydraulic model which computes flow in a single dimension, suitable for representing systems with a defined flow direction such as river channels, pipes and culverts.
2D Hydraulic Model	Hydraulic model which computes flow in multiple dimensions, suitable for representing systems without a defined flow direction including topographic surfaces such as floodplains.
Asset Information Management System (AIMS)	Environment Agency database of assets associated with Main Rivers including defences, structures and channel types. Information regarding location, standard of service, dimensions and condition.
Aquifer	A source of groundwater comprising water bearing rock, sand or gravel capable of yielding significant quantities of water.
Attenuation	In the context of this report - the storing of water to reduce peak discharge of water.
Catchment Flood Management Plan	A high-level plan through which the Environment Agency works with their key decisionmakers within a river catchment to identify and agree policies to secure the long-term sustainable management of flood risk.
Climate Change	Long term variations in global temperature and weather patterns caused by natural and human actions.
Coastal Change Management Area	An area identified in plans as likely to be affected by physical change to the shoreline through erosion, coastal landslip, permanent inundation or coastal accretion.
Culvert	A channel or pipe that carries water below the level of the ground.
Design Flood	A flood event of a given annual probability against which the suitability of a proposed development is assessed and mitigation measures, if any, are designed. The design event is generally taken as; a 1% AEP fluvial flooding event plus an appropriate allowance for climate change, a 0.5% AEP tidal flooding event plus an appropriate allowance for climate change, or a 1% AEP surface water flooding event plus an appropriate allowance for climate change.
DG5 Register	A water-company held register of properties which have experienced sewer flooding due to hydraulic overload, or properties which are ‘at risk’ of sewer flooding more frequently than once in 20 years.
Exception Test	The Exception Test should be applied following the application of the Sequential Test. Conditions need to be met before the Exception test can be applied.
Flood Defence	Infrastructure used to protect an area against floods, such as floodwalls and embankments; they are designed to a specific standard of protection (design standard).
Flood Resilience	Measures that minimise water ingress and promotes fast drying and easy cleaning, to prevent any permanent damage.
Flood Resistant	Measures to prevent flood water entering a building or damaging its fabric. This has the same meaning as flood proof.
Flood Risk	The level of flood risk is the product of the frequency or likelihood of the flood events and their consequences (such as loss, damage, harm, distress and disruption). Areas at risk of flooding are those at risk of flooding from any source, now or in the future. Flood risk also accounts for the interactions between these different flood sources.
Flood Storage Area	Natural or man-made areas that temporarily fill with water during periods of high river level, retaining a volume of water which is released back into the watercourse after the peak river flows have passed.
Flood Zone	Flood Zones show the probability of flooding, ignoring the presence of existing defences.
Fluvial	Relating to the actions, processes and behaviour of a watercourse (river or stream).
Freeboard	The difference between the design flood level and the finished floor level of a development or soffit level of a bridge/culvert.
Functional Floodplain	Land where water has to flow or be stored in times of flood.
Groundwater	Water that is in the ground, this is usually referring to water in the saturated zone below the water table.

Lead Local Flood Authority (LLFA)	As defined by the Flood and Water Management Act, in relation to an area in England, this means the unitary authority or where there is no unitary authority, the county council for the area, in this case West Sussex County Council (WSCC).
Local Planning Authority (LPA)	Body that is responsible for controlling planning and development through the planning system.
Main River	Watercourse defined on a 'Main River Map' designated by Defra. The Environment Agency has permissive powers to carry out flood defence works, maintenance and operational activities for Main Rivers only.
Mitigation measure	An element of development design which may be used to manage flood risk or avoid an increase in flood risk elsewhere.
Ordinary Watercourse	A watercourse that does not form part of a Main River. This includes "all rivers and streams and all ditches, drains, cuts, culverts, dikes, sluices (other than public sewers within the meaning of the Water Industry Act 1991) and passages, through which water flows" according to the Land Drainage Act 1991.
Residual Flood Risk	The remaining flood risk after risk reduction measures have been taken into account.
Return Period	Also known as a recurrence interval is an estimate of the likelihood of an event, such as a flood to occur.
Risk	Risk is a factor of the probability or likelihood of an event occurring multiplied by consequence: Risk = Probability x Consequence. It is also referred to in this report in a more general sense.
Sequential Test	Aims to steer vulnerable development to areas of lowest flood risk.
Sewer Flooding	Flooding caused by a blockage or overflowing in a sewer or urban drainage system.
Surface Water	Flooding caused when intense rainfall exceeds the capacity of the drainage systems or when, during prolonged periods of wet weather, the soil is so saturated such that it cannot accept any more water.
Sustainable Drainage Systems (SuDS)	Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques.
SuDS Approval Body (SAB)	An organisation within County Councils and Unitary Authorities specifically established to deal with the design, approval and adoption of sustainable urban drainage systems (SuDS) within any new development consisting of two or more properties.

1 Introduction

1.1 Background

AECOM has been commissioned by Horsham District Council (HDC) to prepare an updated Level 1 Strategic Flood Risk Assessment (SFRA). An SFRA is a live document which provides an overview of the risk of flooding from all sources in the planning authority area, taking into the account the impacts of climate change, as well as assessing the impact that land use changes and development in the area could have on flood risk.

This SFRA does not consider sections of HDC that are shared with the South Downs National Park (SDNP) Authority, for which a separate SFRA was completed by the SDNP in 2017[1]. The SDNP SFRA has been used to inform the identification of catchments spanning both LPA areas and to highlight the potential for developments in either LPA area to result in cross-boundary impacts to flood risk, as detailed in Section 7.2. The study area is shown in Figure 1-1:.

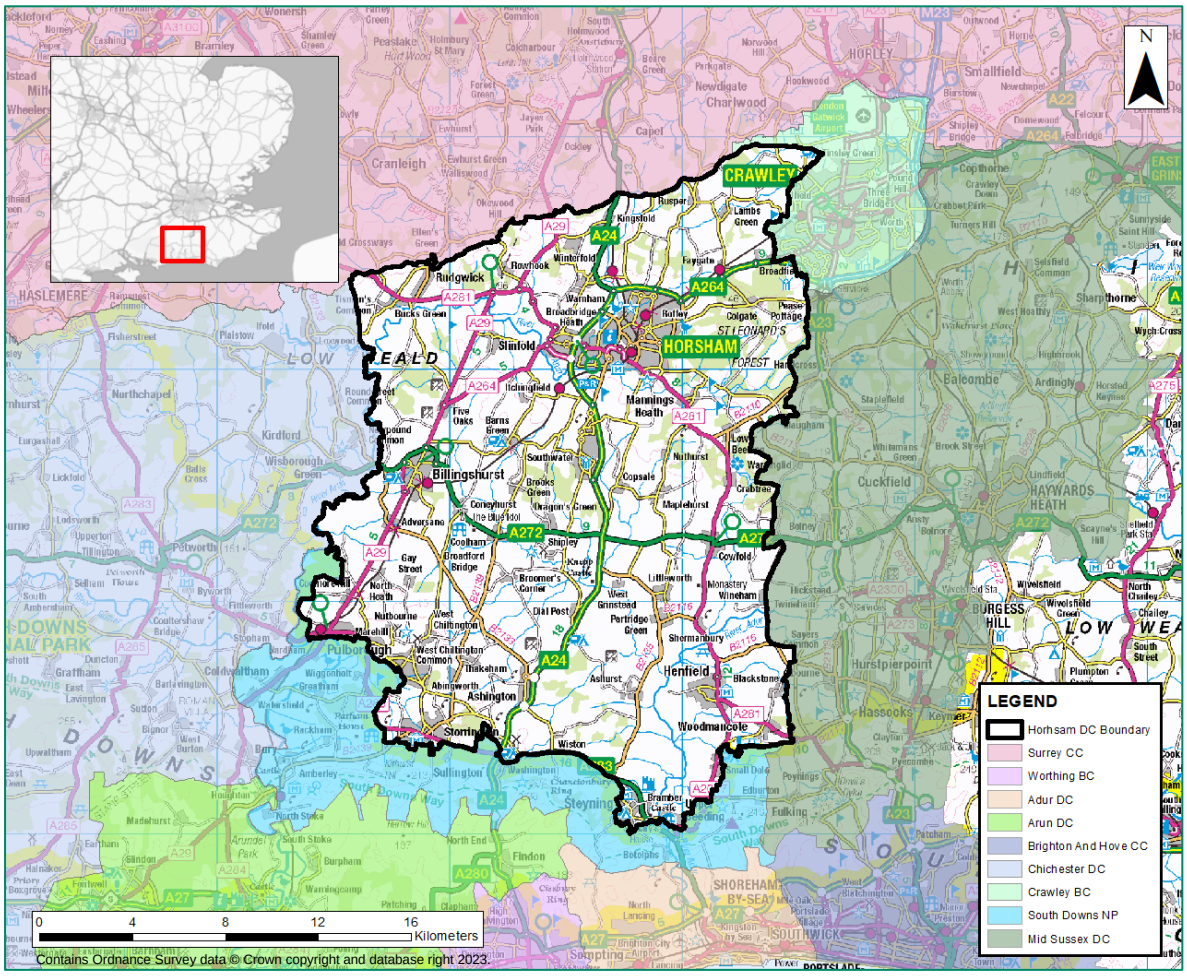


Figure 1-1: Horsham SFRA Study Area

The HDC SFRA was previously published in 2020 and is now being updated following a number of changes in planning policy and improvements in available flood mapping and modelling datasets. This updated HDC SFRA has been prepared in line with the requirements of the National Planning Policy Framework (NPPF)[2], supporting Planning Practice Guidance (PPG)[3], and Environment Agency guidance 'How to prepare a Strategic Flood Risk Assessment'[4].

[1] South Downs National Park Level 1 Update and Level 2 Strategic Flood Risk Assessment September 2017: https://www.southdowns.gov.uk/wp-content/uploads/2017/02/Level-1-Update-and-Level-2-Strategic-Flood-Risk-Assessment.pdf [Accessed May 2024].
[2] National Planning Policy Framework (NPPF): https://www.gov.uk/government/publications/national-planning-policy-framework--2 [Accessed May 2024].
[3] Planning Practice Guidance (PPG): https://www.gov.uk/government/collections/planning-practice-guidance [Accessed May 2024].
[4] 'How to prepare a Strategic Flood Risk Assessment': https://www.gov.uk/guidance/local-planning-authorities-strategic-flood-risk-assessment [Accessed May 2024].

1.2 Stakeholders

Table 1-1 identifies the stakeholders that have been involved in the preparation of this SFRA, either directly through consultation or by providing publicly available data, and their roles and responsibilities with respect to flood risk management.

Table 1-1: Stakeholders

Stakeholder	Role/Responsibility
Local Planning Authority (LPA): Horsham District Council	Responsible for preparing Local Plans including flood risk policies and development allocations. Local Drainage Authority under the Land Drainage Act. Risk Management Authority (RMA) under the Flood and Water Management Act. Category 1 responder under the Civil Contingencies Act.
Environment Agency	Lead RMA for the management of fluvial and tidal flooding. Strategic role in setting the direction for managing risks through the national Flood and Coastal Erosion Risk Management (FCERM) strategy for England, regulating activities that may affect the risk of flooding from main rivers, and to act as a statutory consultee to the planning system for certain types of applications.
Lead Local Flood Authority (LLFA): West Sussex County Council (WSCC)	Lead RMA for the management of local sources of flooding (surface water, groundwater, Ordinary Watercourses). Responsibility to develop a Local Flood Risk Management Strategy (LFRMS), investigate flood incidents, maintain a register and record of flood risk management structures and features, regulate works in Ordinary Watercourses, and to act as a statutory consultee to the planning system.
Water and Sewerage Companies: Southern Water	Responsible for public water supply and sewerage systems. Statutory consultee for SuDS that connect to the public network. Required to co-operate and share flood risk information with the LLFA.
Adur and Ouse Catchment Partnership	Partnership hosted by the Ouse & Adur Rivers Trust formed in 2011. Its role is to offer stakeholders a point of contact and place to set out actions to improve the management and health of the Adur & Ouse Catchment.
Local Planning Authorities (LPAs)	Neighbouring LPAs with the same responsibilities as Horsham District Council within their respective areas.
Natural England	The government's advisor for the natural environment in England. Responsible for providing guidance regarding land usage and environmental management.

1.3 Objectives

The objectives of the SFRA are as follows:

- Assess and describe all potential sources of flooding, both now and in the future as a result of climate change, based on readily available datasets;
- Review existing coastal and river models to confirm whether these need to be updated with the latest climate change allowances;
- Identify existing flood risk management measures as well as areas that need to be safeguarded for future flood risk management features and structures (where applicable), through reference to Environment Agency data;
- Identify opportunities to reduce the causes and impacts of flooding;
- Provide guidance for applying the Sequential Test and developing flood risk policies in the preparation of the HDC Local Plan;
- Provide recommendations of how to address flood risk in development; and
- Demonstrate how the adaptation to climate change has been undertaken.

1.4 User Guide

It is anticipated that the SFRA will have a variety of end users, including LPA officers, developers, planning consultants, neighbourhood planning bodies, LLFAs, emergency planners and local resilience forums. This Section sets out the structure of the SFRA and describes how to use it (Table 1-2). It should be noted that Appendix A contains maps while Appendix B provides an overview of the hydraulic models used within the SFRA.

Table 1-2: SFRA User Guide

Section Name and No.	Content
1. Introduction	Explains the need for the study and the objectives. Provides a user guide and identifies who has been consulted and where data has been collected. Identifies when the SFRA may need to be updated in the future.
2. Legislation and Policy Framework	Provides an overview of the latest legislation and national and regional policies in relation to flood risk and coastal change.
3. Datasets and Methodologies	Identifies the datasets used to inform the SFRA and describes the approaches taken to use and update data as part of the SFRA.
4. Applying the Sequential Test	Describes how the Sequential Test should be applied using the SFRA.
5. Preparing Flood Risk Assessments	Describes how site specific Flood Risk Assessments (FRAs) should be prepared.
6. Sources of flood risk and expected effects of climate change	Describes the local geology and hydrology in the study area, and assessment of the risk of flooding from all sources based on available datasets.
7. Cumulative impact of development and land use change	Identifies the potential for cumulative impacts on flood risk within the catchment, and cross-boundary impacts on flood risk in catchments downstream, resulting from land-use change.
8. Flood Management and Defences	Describes flood defences and flood warning services within the district.
9. Opportunities to reduce the causes and impacts of flooding	Identifies opportunities to reduce the causes and impacts of flooding in the local area and land required for flood risk management purposes.
10. Recommendations of how to address flood risk in development	Provides guidance on the range of measures that could be considered as part of development in order to manage and mitigate flood risk. These measures should be considered when preparing a site-specific FRA.

1.5 Future monitoring and update

This SFRA should be reviewed when there are changes to:

- The predicted impacts of climate change on flood risk,
- Detailed flood modelling - such as from the Environment Agency or LLFA,
- Local Plans, spatial development strategies or relevant local development documents,
- Local flood management schemes,
- Flood Risk Management Plans (FRMPs),
- Shoreline Management Plans,
- Local Flood Risk Management Strategies (LFRMS), and,
- National planning policy or guidance.

The SFRA should also be reviewed after a significant flood or coastal erosion event.

2 Legislation and Policy Framework

This Section provides a high level overview of the national and regional planning context for coastal change and flood risk management in the HDC SFRA study area.

2.1 National

2.1.1 National Planning Policy Framework

The NPPF sets out the government's planning policies for England and provides a framework within which LPAs can produce Local Plans to deliver sustainable development in the face of the challenges presented by climate change, flooding, and coastal change.

The NPPF stipulates that Local Plans should be supported by SFRAs and should develop policies to manage flood risk from all sources, taking into the advice from the Environment Agency and other relevant risk management bodies such as LLFAs and Internal Drainage Boards (IDBs).

The Sequential and Exception Tests are established by the NPPF as the primary decision-making tools which LPAs should use to direct development to areas with the lowest risk of flooding wherever possible. This SFRA provides the basis for applying these tests. Further guidance on the application of these tests can be found in Section 4.

2.1.2 Planning Practice and Guidance 'Flood Risk and Coastal Change'

The PPG is a living document that supports the NPPF and is periodically updated. The 'Flood Risk and Coastal Change' PPG outlines how the risks associated with flooding and coastal change should be assessed and addressed, including clear guidance regarding the contents of SFRAs and the application of the Sequential and Exception Tests to the siting of proposed developments.

Specific PPG paragraphs are referenced throughout this document in the relevant sections.

2.1.3 Flood and Water Management Act

The Flood and Water Management Act (FWMA)[5] (2010) aims to provide sustainable and consistent management of flooding in England and Wales. It defines the roles of RMAs as the bodies with flood risk related responsibilities. RMAs include the Environment Agency, IDBs, Water and Sewerage Companies and LLFAs. The FWMA designates county councils and unitary authorities as the LLFAs. The LLFA for the HDC area is WSCC who pursuant to the FWMA have the following responsibilities:

- Carry out work to manage flooding from local sources (surface water, groundwater, and Ordinary Watercourses),
- Prepare and maintain a LFRMS,
- Investigate significant local flood incidents and publish the results of these investigations,
- Maintain a register of flood risk assets,
- Regulate work on Ordinary Watercourses,
- Share information about flood risk,
- Perform a lead role in emergency planning and recovery after a flood event, and,
- Co-operate with other RMAs.

At present, WSCC as LLFA is a statutory consultee to HDC for matters relating to surface water management in new development. Schedule 3 of the FWMA places a duty on the local authority, likely to be the LLFA, to become a SAB. Schedule 3 will remove the automatic right to connect surface water to the public sewer network and will require all new development over a prescribed threshold (to be confirmed by secondary legislation) to use SuDS to manage surface water. In addition to the normal planning application process, developers will have to submit a

[5] Flood and Water Management Act (2010): https://www.legislation.gov.uk/ukpga/2010/29/contents [Accessed May 2024].

SuDS application to the SAB, demonstrating compliance with National Standards. The SAB will approve applications and then adopt the SuDS for the lifetime of the development, with responsibility for maintenance.

At the time of writing (August 2024), Schedule 3 has not been enacted. However, the Jenkins Review published in January 2023, made recommendations that Schedule 3 be enacted by Defra. The current indication by Defra is that Schedule 3 is likely to be enacted during 2024.

2.1.4 Flood Risk Regulations

The Flood Risk Regulations (FRR)[6] (2009) transpose the requirements of the EU Floods Directive 2007 into law in England. They outline the duties of LLFAs and the Environment Agency to produce PFRAs, flood risk maps displaying the flooding extents and hazards, and Flood Risk Management Plans (see Section 2.2 for further details). These FRR requirements are completed on a six-year cycle. The FRR will be revoked once the Retained EU Law Bill (Revocation and Reform) has been passed[7].

2.1.5 Environmental Permitting (England and Wales) Regulations

The Environmental Permitting (England and Wales) Regulations (2016)[8] stipulate the regulated activities for which an environmental permit may be required when undertaken:

- in, under, over or near a Main River (including culverted sections);
- on or near a flood defence on a Main River;
- in the flood plain of a Main River; and/or
- on or near a sea defence.

Further guidance on obtaining an environmental permit is available from the Environment Agency.

2.2 Regional

2.2.1 River Basin Management Plans & Catchment Flood Management Plans

River Basin Management Plans (RBMPs) are prepared in accordance with the Water Framework Directive (WFD) and they assess the pressure facing the water environment in River Basin Districts (RBD). Each RBMP comprises a collection of documents that describes the framework by which the quality of waterbodies will be protected or enhanced in each respective RBD.

Data tables and online interactive maps with information regarding the current conditions of, and pressures on, waterbodies within each RBD, are also provided. The entirety of the HDC area is covered by the South East RBD River Basin Management Plan (2022)[9].

Catchment Flood Management Plans (CFMPs) are high-level strategic plans providing an overview of flood risk across each river catchment. The Environment Agency use CFMPs to work with other decision makers to identify and agree long-term policies for sustainable flood risk management. The HDC area encompasses the River Adur CFMP (2009)[10] and the Arun and Western Streams CFMP (2009)[11]. The policies for those sub-areas within the River Adur and Arun CFMPs that overlap with the HDC area are summarised in Table 2-1. Sub areas within the River Adur and Arun CFMPS that do not fall within the HDC area have been excluded from Table 2-1.

[6] Flood Risk Regulations (2009): https://www.legislation.gov.uk/uksi/2009/3042/contents/made [Accessed May 2024].
[7] Retained EU Law Bill (Revocation and Reform): https://bills.parliament.uk/publications/51204/documents/3436 [Accessed May 2024].
[8] Environmental Permitting Regulations (2016): https://www.legislation.gov.uk/uksi/2016/1154/contents/made [Accessed May 2024].
[9] South East RBD River Basin Management Plan: https://www.gov.uk/guidance/south-east-river-basin-district-river-basin-management-plan-updated-2022 [Accessed May 2024].
[10] River Adur Catchment Flood Management Plan (2009): https://www.gov.uk/government/publications/adur-catchment-flood-management-plan [Accessed May 2024].
[11] Arun and Western Streams Catchment Flood Management Plan (2009): https://www.gov.uk/government/publications/arun-and-western-streams-catchment-flood-management-plan [Accessed May 2024]

Table 2-1: List of relevant CFMP sub-areas

Sub Area	Preferred Policy	Relevant CFMP
Upper Adur	Policy Option 6 - areas of low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits.	River Adur
Steyning and Upper Beeding	Policy Option 3 – areas of low to moderate flood risk where we are generally managing existing flood risk effectively.	River Adur
Adur Valley	Policy Option 6 - areas of low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits.	River Adur
Horsham	Policy Option 4 – areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change.	Arun and Western Streams
Pulborough	Policy Option 4 – areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change.	Arun and Western Streams
Rother Valley / Middle Arun / Weald	Policy Option 6 – areas of low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits.	Arun and Western Streams

Flood Risk Management Plans (FRMPs) explain the objectives and actions needed to manage flood risk at a national and local level in England. Under the FRR (2009), FRMPs must be reviewed by the Environment Agency and LLFAs every 6 years. The current FRMPs cover the period 2021-2027[12], and are separated into a part a[13], which provides an overview of national measures that apply to all river basin districts, and part b, which is composed of ten local flood risk management plans that outline the measures that apply to specific River Basin Districts. The entirety of the HDC area is covered by the South East RBD Flood Risk Management Plan 2021 to 2027.

2.3 Local Plan

2.3.1 Horsham District Planning Framework

HDC's primary planning policy document is the Horsham District Planning Framework which was adopted in 2015 and will guide development in the HDC area up to 2031. Policy 38 (Flooding) stipulates that the impact and extent of flood risk within the HDC area will be achieved through the following measures:

1. Development proposals will follow a sequential approach to flood risk management, giving priority to development sites with the lowest risk of flooding and making required development safe without increasing flood risk elsewhere. Development proposals will;
    a. take a sequential approach to ensure most vulnerable uses are placed in the lowest risk areas.
    b. avoid the functional floodplain (Flood Zone 3b) except for water-compatible uses and essential infrastructure.
    c. only be acceptable in Flood Zone 2 and 3 following completion of a sequential test and exception test if necessary.
    d. require a site-specific Flood Risk Assessment for all developments over 1 hectare in Flood Zone 1 and all proposals in Flood Zone 2 and 3.

[12] Flood risk management plans 2021 to 2027: https://www.gov.uk/government/collections/flood-risk-management-plans-2021-to-2027 [Accessed May 2024].
[13] Flood risk management plans 2021 to 2027: national overview (part a): https://www.gov.uk/government/publications/flood-risk-management-plans-2021-to-2027-national-overview-part-a [Accessed May 2024].

2. Comply with the tests and recommendations set out in the Horsham District SFRA.
3. Where there is the potential to increase flood risk, proposals must incorporate the use of SuDS where technically feasible, or incorporate water management measures which reduce the risk of flooding and ensure flood risk is not increased elsewhere.
4. Consider the vulnerability and importance of local ecological resources such as water quality and biodiversity when determining the suitability of SuDS. New development should undertake more detailed assessments to consider the most appropriate SuDS methods for each site. Consideration should also be given to amenity value and green infrastructure.
5. Utilise drainage techniques that mimic natural drainage patterns and manage surface water as close to its source as possible will be required where technically feasible.
6. Be in accordance with the objective of the WFD, and accord with the findings of the Gatwick Sub Region Water Cycle Study in order to maintain water quality and water availability in rivers and wetlands and wastewater treatment requirements.

2.3.2 West Sussex Preliminary Flood Risk Assessment

Under the 2009 FRR all LLFAs are required to prepare a PFRA, as undertaken by WSCC in 2011. The PFRA (2011)[14] provides a high-level overview of flood risk from local flood sources such as surface water, groundwater, and Ordinary Watercourses for which WSCC are responsible. Information contained within the PFRA informed the development of the LFRMS and helped to identify areas that should be prioritised for Surface Water Management Plans (SWMPs). The Environment Agency has established a national methodology for identifying Flood Risk Areas, which refer to areas at risk with populations in excess of 30,000. PFRAs act as a screening exercise by which the Environment Agency's Flood Risk Areas can be revised and updated. The WSCC PFRA concluded that none of the Environment Agency's existing Flood Risk Areas were located in West Sussex, and that the local information did not warrant the reporting of new Flood Risk Areas to the Environment Agency.

2.3.3 West Sussex County Council Local Flood Risk Management Strategy

The WSCC LFRMS (2013)[15] sets out how WSCC carries out its flood risk responsibilities that are a statutory requirement of the FWMA 2010. It should be noted that this strategy sets out policies from 2013 to 2018, and a more recent strategy is not publicly available at the time of writing (August 2024). The key objectives to guide local focus and progress in West Sussex are as follows:

1. Understand the areas that flood.
2. Manage the flood risk in West Sussex.
3. Enable people, communities, business and public bodies to work together more effectively.
4. Put communities at the heart of what we do and help West Sussex residents during flood events, and recover as quickly as possible after incidents.

The LFRMS also identifies ten "Priority Wet Spots", where risk management authorities will initially prioritise work. These are all located along the southern boundary of West Sussex, with no priority areas located within HDC.

2.3.4 West Sussex LLFA Policy for the Management of Surface Water

The West Sussex LLFA Policy for the Management of Surface Water was produced in 2018 and sets out how West Sussex LLFA, as a statutory consultee, will review drainage strategies and surface water management provisions associated with applications for development.

West Sussex LLFA has adopted the policies summarised in Table 2-3 (Table 5.1 within the policy document) to conform to statutory policy and best practice. Policies 1 to 6 set out the requirements for a drainage strategy to be compliant with the NPPF and Non-Statutory Technical Standards for Sustainable Drainage. Policies 7 to 10 set out expectations to be considered within all drainage strategies.

[14] West Sussex County Council Preliminary Flood Risk Assessment (2011): https://www.westsussex.gov.uk/media/1626/west_sussex_pfra.pdf [Accessed May 2024].
[15] West Sussex County Council Local Flood Risk Management Strategy (2014): https://www.westsussex.gov.uk/media/1595/local_flood_risk_management_strategy.pdf [Accessed May 2024]

Table 2-3: West Sussex SuDS Policies

Policy	Summary
SuDS Policy 1	Follow the drainage hierarchy
SuDS Policy 2	Manage Flood Risk through Design
SuDS Policy 3	Mimic Natural Flows and Drainage Flow Paths
SuDS Policy 4	Seek to Reduce Existing Flood Risk
SuDS Policy 5	Maximise Resilience
SuDS Policy 6	Design to be Maintainable
SuDS Policy 7	Safeguard Water Quality
SuDS Policy 8	Design for Amenity and Multi-Functionality
SuDS Policy 9	Enhance Biodiversity
SuDS Policy 10	Link to Wider Landscape Objectives

2.3.5 Water, People, Places - A guide for master planning sustainable drainage into developments

AECOM, in partnership with the LLFAs in South East England prepared a guidance document[16] for the integration of SuDS into the master planning of large and small developments. The guidance document intends to provide a consistent approach to the best practice design of SuDS at the master planning stage in the South East of England, and to be used as part of the initial planning and design process for all types of residential, commercial, and industrial development in the region.

[16] Water, People, Place - A guide for master planning sustainable drainage into developments: https://www.susdrain.org/files/resources/other-guidance/water_people_places_guidance_for_master_planning_sustainable_drainage_into_developments.pdf [Accessed May 2024].

3 Datasets and Methodologies

SFRAs rely on a large number of datasets and information from a range of stakeholder organisations. This section describes the datasets that have been obtained and the methods that have been applied to assess the risk from all sources of flooding across the study area.

3.1 Risk of Flooding from Rivers

Flooding from rivers occur when water levels rise higher than bank levels, causing floodwater to spill across adjacent land (floodplain). The main reasons for water levels rising in rivers are:

- Intense or prolonged rainfall causing runoff rates and flows to increase in rivers, exceeding the capacity of the channel. This can be exacerbated by wet conditions and where there is significant groundwater base flow.
- Constrictions in the river channel causing floodwater to back up.
- Constrictions preventing discharge at the outlet of the river e.g. locked flood gates or tide-locking at high tide.

To assess flooding from rivers the datasets described in Table 3-1 have been used. It should be noted that the Flood Map for Planning and the Risk of Flooding from Rivers and Sea datasets are expected to be updated in early 2025 upon completion of the Nafra2 project. This will combine local mapping with a new national model to produce improved mapped outputs and metadata. As a result of this, some of the published mapping will differ from the currently available local modelling at the time of writing (August 2024).

Table 3-1: Datasets for river flooding

Datasets	Notes	Data source
OS Open River	GIS shapefile which provides a high level overview of watercourses. Contains over 144,000km of water bodies and watercourses. These include freshwater rivers, tidal estuaries, and canals.	Ordnance Survey free download: https://www.ordnancesurvey.co.uk/business-government/products/open-map-rivers
Catchment boundaries	GIS shapefiles obtained from the Catchment Data Explorer have been used to identify the river basin districts, management catchments in the HDC SFRA project area.	Environment Agency Catchment Data Explorer: https://environment.data.gov.uk/catchment-planning
Flood Zone 2 and Flood Zone 3a	GIS shapefiles which identify the probability of fluvial and tidal flooding, ignoring the presence of defences as mapped on the Environment Agency Flood Map for Planning (rivers and sea). Flood Zone 1: Land having a less than 0.1% annual exceedance probability (AEP) of fluvial or tidal flooding. Flood Zone 2: Land having between a 1% and 0.1% AEP of fluvial flooding, or land having between a 0.5% and 0.1% AEP of tidal flooding. Flood Zone 3a: Land having a 1% or greater AEP of fluvial flooding, or land having a 0.5% or greater AEP of tidal flooding.	Defra Data Services Platform: https://environment.data.gov.uk/dataset/86ec354f-d465-11e4-b09e-f0def148f590 https://environment.data.gov.uk/dataset/87446770-d465-11e4-b97a-f0def148f590
AIMS Spatial Flood Defences	Contains the locations of flood defences currently owned, managed or inspected by the Environment Agency, including structures, buildings, earth banks, stone and concrete walls, and sheet-piling.	Defra Data Services Platform: https://environment.data.gov.uk/dataset/8e5be50f-d465-11e4-ba9a-f0def148f590
Reduction in Risk of Flooding from Rivers and Sea due to Defences	This dataset indicates where flood defences may reduce the risk of flooding from the rivers and the sea and has replaced the Areas Benefiting from Flood Defences dataset.	Defra Data Services Platform: https://environment.data.gov.uk/dataset/7b5cf457-6853-4b50-a812-b041d9da003a
Recorded Flood Outlines	Contains all records of historic flooding from rivers, the sea, groundwater, and surface water since 1946. Takes account of the presence of defences, structures and other infrastructure that existed at the time of flooding. A companion Historic Flood Map contains a subset of these Recorded Flood Outlines which satisfy certain criteria.	Defra Data Services Platform: https://environment.data.gov.uk/dataset/8c75e700-d465-11e4-8b5b-f0def148f590

3.1.1 Hydraulic Models

On 3 April 2024, AECOM sent a data request to the Environment Agency for all hydraulic models situated within the HDC area. A high level review of the received models has been undertaken, details of which are presented in the Hydraulic Model Review Report (Appendix B). Table 3-3 summarises the models that have been received, their extents and whether they have been used in the SFRA.

3.1.2 Functional Floodplain

The SFRA should identify areas of Flood Zone 3b functional floodplain, which is defined as land where floodwater from the river or sea has to flow or be stored in times of flooding. Within the latest NPPF update, this is now defined as land that would flood during a 3.3% AEP (1 in 30 year) event or greater, with flood risk management features and structures operating effectively.

The received hydraulic models do not include results to represent Flood Zone 3b as defined above. A conservative approach has therefore been agreed with the Environment Agency to use Flood Zone 3a in place of Flood Zone 3b.

3.1.3 Impact of climate change on peak river flow

It is anticipated that climate change will increase the frequency, extent and impact of flooding, as reflected in peak river flows. For example, wetter winters and more intense rainfall may increase fluvial flooding and surface water runoff. SFRAs should consider the risk of flooding from rivers in the future as a result of the impact of climate change on rainfall patterns and peak river flows. The Environment Agency sets out the current guidance[17] on the climate change allowances that should be applied, with peak river flow allowances provided by management catchments. Management catchments are sub-catchments of RBDs. The HDC study area comprises a single river basin district (South East) and two management catchments (Adur and Ouse Management Catchment and the Arun and Western Streams Management Catchment).

The Environment Agency's peak river flow allowances are based on percentiles. A percentile describes the proportion of possible scenarios that fall below an allowance level.

- Central Allowance is based on the 50th percentile.
- Higher Central Allowance is based on the 75th percentile.
- Upper End Allowance is based on the 95th percentile.

An allowance based on the 50th percentile is exceeded by 50% of the projections in the range. At the 70th percentile it is exceeded by 30%. At the 95th percentile it is exceeded by 5%. These allowances (increases) are provided, in the form of figures for the total potential change anticipated, for three climate change periods:

- The '2020s' (2015 to 2039).
- The '2050s' (2040 to 2069).
- The '2080s' (2070 to 2115).

The time period that should be applied in the appraisal of a proposed development is contingent upon the expected lifetime of the development. A minimum of 100 years should be considered for a residential development, whereas the lifetime of a non-residential development should be determined on a case-by-case basis.

The Environment Agency's climate change guidance stipulates that SFRAs should assess both the Central and Higher Central allowances. The Higher Central allowance should be applied to developments classified as Essential Infrastructure in Flood Zones 2, 3a, and 3b, whereas the Central allowance should be applied for all other development categories in Flood Zones 2 and 3a. Table 3-2 provides the Central and Higher Central peak river flow allowances for the two management catchments in the HDC area – Adur and Ouse, and Arun and Western Streams.

[17] Flood Risk Assessments: climate change allowances: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances [Accessed May 2024].

Table 3-2: Peak river flow allowances by management catchment (based on 1981 to 2000 baseline)[18]

Management catchment	River basin district	Allowance category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Adur and Ouse	South East	Upper End	40%	57%	107%
		Higher Central	23%	28%	55%
		Central	16%	18%	37%
Arun and Western Streams	South East	Upper End	27%	36%	64%
		Higher Central	16%	19%	36%
		Central	11%	13%	25%

Table 3-3 summarises the models that have been received and how they have been used in the SFRA. The majority of models received were updated in 2017 with the latest climate change allowances at that time, however these are lower than the current allowances at the time of writing this SFRA. On the 5th June 2024, a meeting was held between the Environment Agency, AECOM and HDC, to discuss the models available and how they should be used as part of the Level 1 SFRA.

Given that the majority of the sites being taken forward by HDC are located outside of Flood Zone 2 and 3, it was agreed with the Environment Agency that a conservative approach will be applied where Flood Zone 2 will be combined with the latest climate change extent from the modelling available, to present a future fluvial and tidal flood extent. By combining the two datasets, whichever is greatest in extent will be reflected on the final figure.

It was agreed that should any sites be taken forward which are located within Flood Zone 2 and 3 (and the future flood extent as detailed above), a detailed hydraulic modelling study would be required which includes the latest climate change allowances. Results from any modelling study would then need to be used to inform the overall design of whatever development is proposed.

[18] Adur and Ouse Management Catchment Peak River Flow Allowances: https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow?mgmtcatid=3000 [Accessed May 2024].

Table 3-3: Hydraulic models for the HDC study area

Model	Coverage	Climate Change Allowances	Used within Level 1 SFRA?
Lower Tidal River Arun Strategy Model (2010)	River Arun – Pallingham Weir to Littlehampton	+20%	Yes – the 20% climate change extent combined with the Environment Agency's Flood Zone 2
Adur Eastern Branch (2011)	River Adur – Eastern branch from Burgess Hill to Henfield	+20%	No – superseded by Adur Eastern Branch Climate Change Model (2017)
Horsham ABD and Hazard Mapping (2011)	River Arun (and tribs) through Horsham	+35%, +45% and +105%	No – superseded by the Horsham ABD and Hazard Mapping study in 2017
Adur Eastern Branch Climate Change Model (2017)	River Adur – Eastern branch from Burgess Hill to Henfield	+35%, +40% and +70%	No – superseded by Upper Adur Climate Change Model (2017)
Horsham Climate Change Flood Model (2017)	River Arun (and tribs) through Horsham	+35%, +45% and +105%	No – superseded by the Upper Arun (Horsham) model
Steyning Climate Change Model (2017)	Tanyard Stream through Steyning	+35%, +45% and +70%	Yes – the +45% climate change extent combined with the Environment Agency's Flood Zone 2
Upper Adur Climate Change Model (2017)	River Adur – Eastern and Western branch down to Steyning	+35%, +45% and +70%	Yes – the +45% climate change extent combined with the Environment Agency's Flood Zone 2
Upper Arun – Arun Model (2017)	River Arun (and tribs) from Horsham to Pallingham Weir	+35%, +45% and +105%	Yes – conservative approach with the +45% extent combined the Environment Agency's Flood Zone 2
Upper Arun – Billingshurst Model (2017)	Par Book / Brockhurst Brook through Billingshurst	+35%, +45% and +105%	Yes – conservative approach with the +45% extent combined the Environment Agency's Flood Zone 2
Upper Arun – Horsham Model (2017)	River Arun (and tribs) through Horsham	+35%, +45% and +105%	Yes – conservative approach with the +45% extent combined the Environment Agency's Flood Zone 2
Upper Arun – Loxwood Model (2017)	Anstead Brook	+35%, +45% and +105%	No – outside the HDC boundary
River Adur Intertidal Model Updates (2022)	River Adur – Henfield to Shoreham	+37%, +55% and +107% Tidal uplifts for central, higher central and upper	Yes – the +55% climate change fluvial extent and the higher central tidal extent combined with the Environment Agency's Flood Zone 2

3.2 Risk of Flooding from Surface Water

Overland flow and surface water flooding typically arise following periods of intense rainfall, often of short duration, which is unable to soak into the ground or enter drainage systems. It can run quickly off land and result in localised flooding. It can be difficult to provide a detailed representation of such localised flooding in a strategic-scale document.

The PPG states that an SFRA should identify areas at risk from surface water flooding and drainage issues, taking account of the surface water flood risk published by the Environment Agency as well other available information. The Environment Agency has undertaken modelling of surface water flood risk at a national scale and produced mapping identifying those areas at risk of surface water flooding during three annual probability events: 3.3% AEP (1 in 30 year), 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year). The extents of the latest version of the mapping have been made available for the Level 1 SFRA as GIS layers. This mapping is referred to as 'Risk of Flooding from Surface Water' (RoFSW) and is also available online on the Long Term Flood Risk Map[19].

The RoFSW mapping provides all relevant stakeholders, such as the Environment Agency, LPAs, and the public with access to information on surface water flood risk which is consistent across England and Wales. The modelling helps the Environment Agency take a strategic overview of flooding and assists LLFAs in their duties relating to management of surface water flood risk.

For the purposes of this SFRA, the mapping allows an improved understanding of areas within the study area which may have a surface water flood risk. It should be noted that this national mapping has the following limitations:

- Use of a single drainage rate for all urban areas,
- It does not show the susceptibility of individual properties to surface water flooding,
- The mapping has significant limitations for use in flat catchments,
- No explicit modelling of the interaction between the surface water network, the sewer systems, and watercourses,
- In a number of areas, modelling has not been validated due to a lack of surface water flood records, and,
- As with all models, the RoFSW mapping is affected by a lack of, or inaccuracies in, available data.

It should be noted than a new RoFSW map is expected to be published in early 2025 as part of the Nafra2 project.

3.2.1 Impact of climate change on peak rainfall intensity

Climate change is predicted to result in wetter winters and increased summer storm intensity in the future. This will lead to an increased volume of water entering land and urban drainage systems, consequently resulting in surface water flooding.

LPAs are encouraged to make allowances for climate change in Local Plans to help minimise vulnerability and provide resilience to flooding. Table 3-4 shows the peak rainfall intensity allowance for all management catchments within HDC. The specific allowance to be used depends on the development, as well as its development lifetime. Current guidance on the climate change allowances that should be applied are set out by the Environment Agency[20]. The Environment Agency advises that the peak rainfall allowances should only be used for surface water flood mapping in small catchments (under 5km^2), urbanised drainage catchments, and for site-scale applications.

[19] Environment Agency Flood Risk for Surface Water Map: https://www.gov.uk/check-long-term-flood-risk [Accessed May 2024].
[20] Environment Agency Peak River Flow Allowances: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#peak-river-flow-allowances [Accessed May 2024].

Table 3-4: Peak rainfall intensity allowance in small catchments (less than 5km^2) or urban drainage catchments (based on a 1981 to 2000 baseline)[21]

Management Catchment	River basin district	AEP	Epoch 2050s (2022-2060) or 2070s (2061-2125)	Central Allowance	Upper End Allowance
Adur and Ouse	South East	3.3%	'2050s'	20%	35%
			'2070s'	20%	40%
		1%	'2050s'	20%	45%
			'2070s'	25%	45%
Arun and Western Streams	South East	3.3%	'2050s'	20%	35%
			'2070s'	25%	40%
		1%	'2050s'	20%	45%
			'2070s'	25%	45%

The guidance advocates for the utilisation of the Upper End allowances for both the 1% (1 in 100 year) and 3.3% (1 in 30 year) AEP events when assessing the impacts of climate change on surface water flood risk within SFRAs. For site specific assessments, developers should use the 2050s epoch for development with a lifetime up to 2060 and the 2070s epoch for development with a lifetime between 2061 and 2125.

3.3 Risk of Flooding from Groundwater

Groundwater flooding usually occurs in low lying areas underlain by permeable rock and aquifers that allow groundwater to rise to the surface through the permeable subsoil following long periods of wet weather. Low lying areas may be more susceptible to groundwater flooding because the water table is usually at a much shallower depth and groundwater paths tend to travel from high to low ground. There are many mechanisms associated with groundwater flooding which are linked to high groundwater levels and can be broadly classified as:

- Direct contribution to channel flow – where the river channel intersects the water table and groundwater enters the streambed increasing water levels and causing flooding,
- Springs erupting at the surface,
- Exceptionally large flows from perennial springs or large flows from intermittent or dormant springs, and,
- Rise of typically high groundwater levels to extreme levels in response to prolonged extreme rainfall.

The main impacts of groundwater flooding are:

- Flooding of basements of buildings below ground level – in the mildest case this may involve seepage of small volumes of water through walls, temporary loss of services etc. In more extreme cases larger volumes may lead to the catastrophic loss of stored items and failure of structural integrity.
- Overflowing of sewers and drains – surcharging of drainage networks can lead to overland flows causing significant but localised damage to property. Sewer surcharging can lead to inundation of property by polluted water. Note: it is complex to separate this flooding from other sources, notably surface water, or sewer flooding.
- Flooding of buried services or other assets below ground level – prolonged inundation of buried services can lead to interruption and disruption of supply.
- Inundation of roads, commercial, residential and amenity areas – inundation of grassed areas can be inconvenient; however, the inundation of hard-standing areas can lead to structural damage and the disruption of commercial activity. Inundation of agricultural land for long durations can have financial consequences.

[21] Adur and Ouse Management Catchment peak rainfall allowances: https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall?mgmtcatid=3000 [Accessed May 2024].

- Flooding of ground floors of buildings above ground level – can be disruptive and may result in structural damage. In addition, typically a groundwater flood event will have a long duration (when compared to other flood sources) which adds to the disruptive nature of the flood event.

It should be noted that the BGS Groundwater Flooding dataset was not available for this study. In the absence of this data, GeoSmart's 2019 national groundwater flood risk dataset has been used to provide groundwater flood risk data. According to the GeoSmart User Guide[22], the dataset provides a preliminary indication of groundwater flood risk on a 5m grid. Like other current groundwater flood maps used in the UK, the GeoSmart map shows areas of potential groundwater emergence.

Areas are split into risk classes based on a combination of likelihood, model and data uncertainty and possible severity. Overall risk is presented on the map within the following classes:

- Class 1 – High Risk: There is a high risk of groundwater flooding in this area with a chance of greater than 1% annual probability of occurrence or more frequent.
- Class 2 – Moderate Risk: There is a moderate risk of groundwater flooding in this area with a chance of greater than 1% annual probability of occurrence.
- Class 3 – Low Risk: There is a low risk of groundwater flooding in this area with a chance of greater than 1% annual probability of occurrence.
- Class 4 - Negligible Risk: There is a negligible risk of groundwater flooding in this area and any groundwater flooding incidence has a chance of less than 1% annual probability of occurrence.

The map is a general purpose indicative screening tool, and is intended to provide a useful initial view for a variety of applications. However, it does not provide an alternative to a proper site-specific assessment, and a detailed risk assessment should be used for any site where the impact of groundwater flooding would have significant adverse consequences.

3.3.1 Impact of climate change on groundwater flooding

Groundwater flooding occurs primarily as a response to extended periods of rain during late autumn and early winter. With climate change bringing wetter winters, an increased risk of groundwater flooding may be seen. However, the complex relationship between rainfall, recharge, groundwater storage and flow make the response to climate change uncertain.

3.4 Risk of Flooding from Sewers

During heavy rainfall, flooding from the sewer system may occur if:

- The rainfall event exceeds the capacity of the sewer system/drainage system: New sewer systems are typically designed and constructed to accommodate 3.3% AEP (1 in 30 year) rainfall events, or greater. Older sewer systems have a variable design standard. Therefore, rainfall events with an annual probability less than 3.3% would be expected to result in surcharging of some of the sewer system. While sewerage undertakers recognise the impact that more extreme rainfall events may have, it is not cost beneficial to construct sewers that could accommodate every extreme rainfall event.
- The system becomes blocked by debris or sediment: Over time there is potential that road gullies and drains become blocked from fallen leaves, build-up of sediment and debris without sufficient maintenance (e.g. litter).
- The system surcharges due to high water levels in receiving waterbodies: There is potential for surface water outlets to become submerged due to high river or tide levels. Once storage capacity within the sewer system itself is exceeded, the water will overflow into streets and potentially into houses.

Within urban areas, rainwater is frequently drained into sewers conveying both surface and foul water known as 'combined sewers'. As a result, sewer flooding events where 'combined sewers' are particularly prevalent may be more frequent and associated with the potential contamination of floodwater by foul effluent.

[22] GeoSmart Groundwater Flood Risk Map User Guides: https://geosmartinfo.co.uk/user-guides/ [Accessed July 2024]

3.4.1 Impact of climate change on sewer flooding

Climate change is anticipated to increase the potential risk from sewer flooding as summer storms become more intense and winter storms more prolonged. This combination is likely to increase the pressure on the existing efficiency of sewer systems, thereby reducing their design standard and leading to more frequent localised flooding incidents. Any sewer flooding that may occur could be exacerbated as a result of surface water runoff during extreme rainfall events.

Water companies continue to monitor the risk of sewer flooding and put plans in place to manage the risk, as required, based on their business plan and priorities. The LPAs can work with Southern Water to identify flooding hotspots and locations of known sewer capacity issues where risk could be exacerbated. Water companies prioritise investment for potential flood alleviation schemes depending on the severity and frequency of flooding, but this can only be identified where affected property owners report the incident to the water company.

3.5 Risk of Flooding from Reservoirs

The failure of a reservoir has the potential to cause catastrophic damage due to the sudden release of large volumes of water. The PPG encourages LPAs to identify any impounded reservoirs and evaluate how they might modify the existing flood risk in the event of a flood in the catchment it is located within, and / or whether emergency draw-down of the reservoir will add to the extent of flooding. Areas at risk of reservoir flooding are presented on the Environment Agency's Long Term Flood Risk Map[23]. Datasets showing the flood extents for all large, raised reservoirs in the event of their failure are available. Two flood extents are provided for each reservoir denoting the "dry day" scenario[24] during which river levels are normal, and the "wet day" scenario[25] during which local rivers have already overflowed their banks.

The dataset represents the prediction of a credible worst case scenario, although its improbable that any actual flood would be this large. The dataset gives no indication of the likelihood or probability of reservoir flooding. Flood extents are not provided for smaller reservoirs (i.e. those with a volume below the threshold of 25,000m^3) or for reservoirs registered following the onset of the modelling programme beginning in October 2016.

Although the impacts emanating from the breach of a large, raised reservoir could be severe, large-raised reservoirs are carefully monitored and maintained across England in line with the provisions of the Reservoirs Act 1975[26], and consequently, the risk of reservoir failure is very low.

[23] Environment Agency Risk of Reservoir Flooding: https://www.gov.uk/check-long-term-flood-risk [Accessed May 2024].
[24] Reservoir Flood Extents Dry Day National: https://environment.data.gov.uk/dataset/c66ee97f-49d2-454e-9a19-d48a47bd22ad [Accessed May 2024].
[25] Reservoir Flood Extents Wet Day National: https://environment.data.gov.uk/dataset/d81646cf-37e5-4e71-bbcf-b7d5b9ca3a1c [Accessed May 2024].
[26] Reservoirs Act 1975: https://www.legislation.gov.uk/ukpga/1975/23 [Accessed May 2024].

4 Applying the Sequential and Exception Tests

4.1 Sequential Test

The Sequential Test is a decision-making tool designed to ensure that development is steered away from areas at risk of flooding, and that areas with little or no risk of flooding (from any source) are developed in preference to areas at higher risk. When preparing a Local Plan, the LPA should demonstrate that a range of site allocations have been considered, using the SFRA to apply the Sequential and Exception Tests where necessary. The Sequential Test should be applied to the whole LPA area to increase the likelihood of allocating development in areas not at risk of flooding. The sequential approach can be applied at all levels and scales of the planning process, both between and within Flood Zones. All opportunities to locate new developments (except Water Compatible developments) in reasonably available areas of little or no flood risk should be explored, prior to any decision to locate them in areas of higher risk. Figure 4-1 illustrates the approach for applying the Sequential Test that HDC should adopt in the allocation of sites as part of the preparation of the Local Plan. This has been reproduced from Diagram 2 of the PPG.

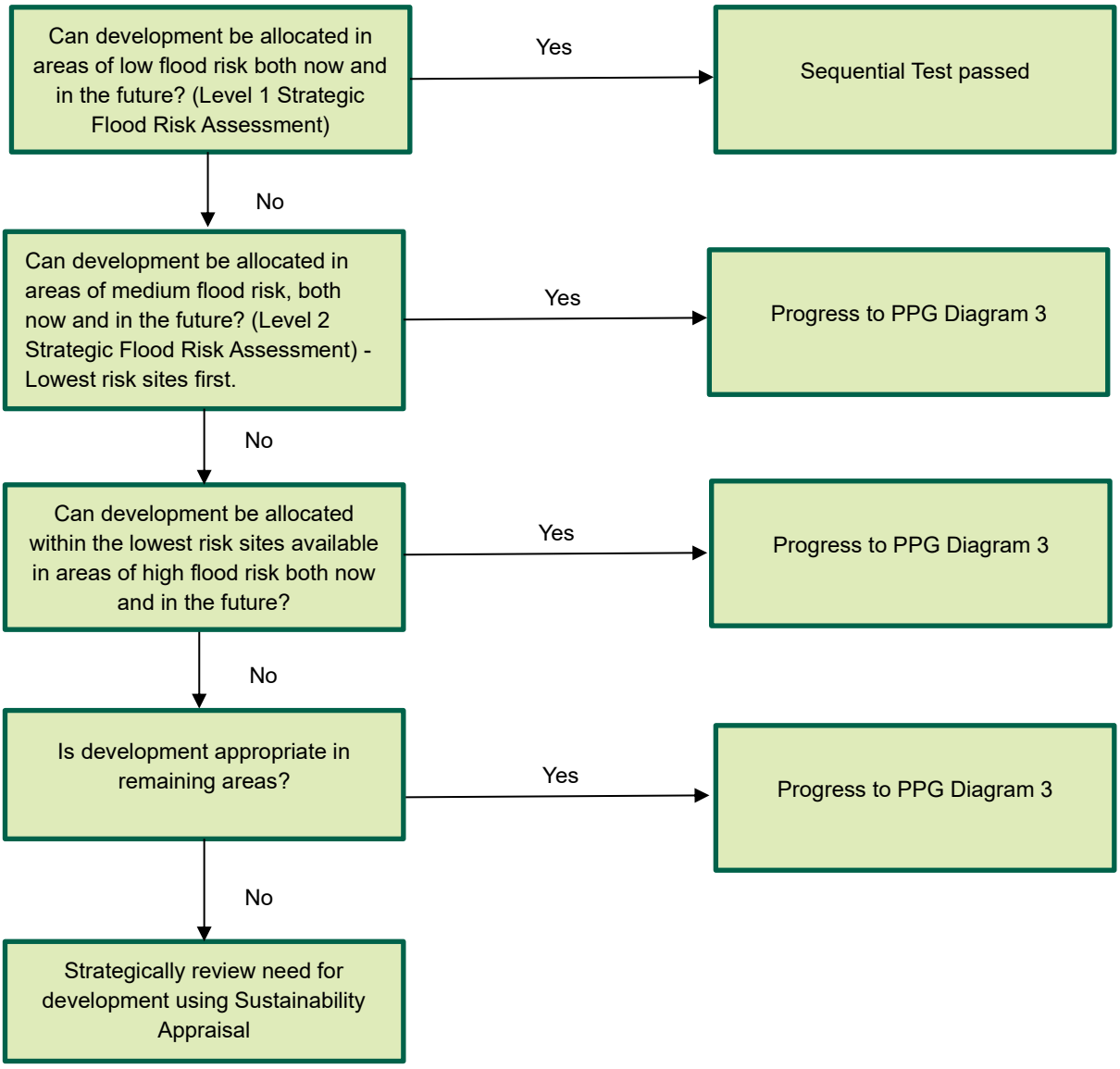


Figure 4-1: Applying the Sequential Test in the preparation of a Local Plan (PPG Diagram 2)

The NPPF acknowledges that some areas may also be at risk of flooding from sources other than fluvial. All sources must be considered when planning for new development including flooding from land or surface water runoff, groundwater, sewers, and artificial sources. If a location is recorded as having experienced repeated flooding from the same source this should be acknowledged within the Sequential Test.

4.1.1 Recommended Stages for LPA Application of the Sequential Test

As the LPA, HDC must demonstrate that throughout the site allocation process a range of possible sites have been considered in conjunction with the flood risk and vulnerability information from the SFRA, and that the Sequential Test, and where necessary the Exception Test, has been applied.

When preparing a Local Plan, a Site Assessment Database of the potential allocation sites across Horsham can be generated and populated using flood risk information from all sources contained within this SFRA and used by HDC when applying the steps below.

1. Assign potential developments with a vulnerability classification. Where development is mixed, the development should be assigned the highest vulnerability class of the developments proposed.
2. The location and identification of potential development should be recorded.
3. The Flood Zone classification of potential development sites should be determined based on a review of the Flood Map for Planning (Rivers and Sea). Where these cover more than one Flood Zone, all zones should be noted, preferably using percentages.
4. The design life of the development should be considered with respect to climate change:
    - 100 years – up to 2125 for residential developments; and
    - 75 years – up to 2100 for commercial / industrial developments, or other time horizon specific to the non-residential use proposed.
5. Identify existing flood defences serving the potential development sites. However, it should be noted that for the purposes of the Sequential Test, flood zones ignoring defences should be used (i.e. the flood zones presented on the Environment Agency's Flood Map for Planning).
6. Highly Vulnerable developments to be accommodated within the District should be located on those sites identified as being within Flood Zone 1 and at low risk of flooding from other sources. If these cannot be located in areas of low risk, because the identified sites are unsuitable or there are insufficient sites in areas of low risk, sites in Flood Zone 2 can then be considered. Highly Vulnerable sites entirely within Flood Zone 2 will require application of the Exception Test (as detailed in Table 4-1). If sites in Flood Zone 2 are inadequate, then the LPA may have to identify additional sites in Flood Zones 1 or 2 to accommodate development or seek opportunities to locate the development outside their administrative area. Within each flood zone, Highly Vulnerable development should be directed, where possible, to the areas at lowest risk from all sources of flooding. It should be noted that Highly Vulnerable development is not appropriate in Flood Zones 3a and 3b.
7. Once all Highly Vulnerable developments have been allocated to a development site, consideration can be given to those development types defined as More Vulnerable. In the first instance More Vulnerable development should be located in any unallocated sites in Flood Zone 1. Where these sites are unsuitable or there are insufficient sites remaining, sites in Flood Zone 2 can be considered. If there are insufficient sites in Flood Zone 1 or 2 to accommodate More Vulnerable development, sites in Flood Zone 3a can be considered. More Vulnerable developments entirely within Flood Zone 3a will require application of the Exception Test. As with Highly Vulnerable development, within each flood zone, More Vulnerable development should be directed to areas at lowest risk from all sources of flooding. It should be noted that More Vulnerable development is not appropriate in Flood Zone 3b.
8. Once all More Vulnerable developments have been allocated to a development site, consideration can be given to those development types defined as Less Vulnerable. In the first instance Less Vulnerable development should be located on sites in Flood Zone 1, continuing sequentially with Flood Zone 2, then 3a. Less Vulnerable development types are not appropriate in Flood Zone 3b – Functional Floodplain.
9. Essential Infrastructure should be preferentially located in the lowest flood risk zones, however this type of development may be located in Flood Zones 3a and 3b, provided the Exception Test is satisfied.
10. Water Compatible development has the least constraints with respect to flood risk and it is considered appropriate to allocate these sites last. The sequential approach should still be followed

in the selection of sites; however, it is appreciated that Water Compatible development by nature often relies on access and proximity to water bodies.

11. On completion of the Sequential Test, consideration may need to be given to the risks posed to a site within an area at risk of flooding in more detail in a Level 2 SFRA (as explained below). By undertaking the Exception Test, this more detailed study should consider the detailed nature of the risk posed by all sources of flooding, and potential flood hazard to allow a sequential approach to site allocation. Consideration of flood hazard within a flood zone would include:
    - Flood risk management measures,
    - The rate of flooding,
    - Flood water depth,
    - Flood water velocity.
12. Where the development is Highly Vulnerable, More Vulnerable, Less Vulnerable or Essential Infrastructure and a site is found to be impacted by a recurrent flood source (other than fluvial), the site and flood sources should be investigated further regardless of any requirement of the Exception Test. It is noted that for any development at risk of flooding, a site-specific FRA will be required.

If following the application of the Sequential Test, it is not possible to locate all of the sites within areas of low flood risk it may be necessary for a Level 2 SFRA to be prepared to provide additional information to support the application of the Exception Test.

The Level 2 SFRA should consider further detail on the nature of the flood risk to each site from all sources, based on available datasets. Flood depth and hazard rating should also be considered where detailed modelling outputs are available, as well as the condition and location of flood defences where appropriate. A Level 2 SFRA should use this information to further apply the sequential approach and sequential test to identify sites with the lowest risk of flooding.

4.1.2 Applying the Sequential Test for Planning Applications

The Environment Agency publication 'Demonstrating the flood risk Sequential Test for Planning Applications'[27] sets out the procedure for applying the Sequential Test to individual applications as follows:

- Identify the geographical area of search over which the test is to be applied; this could be the District area, or a specific catchment if this is appropriate and justification is provided (e.g. school catchment area or the need for affordable housing within a specific area).
- Identify the source of 'reasonably available' alternative sites; this is usually drawn from evidence base /background documents produced to inform the Local Plan.
- State the method used for comparing flood risk between sites; for example the Environment Agency's Flood Map for Planning, the SFRA mapping, site-specific FRAs if appropriate, other mapping of flood sources.
- Apply the Sequential Test; systematically consider each of the available sites, indicate whether the flood risk from all sources is higher or lower than the application site, state whether the alternative option being considered is allocated in the Local Plan, identify the capacity of each alternative site, and detail any constraints to the delivery of the alternative site(s).
- Conclude whether there are any reasonably available sites in areas with a lower probability of flooding from all sources that would be appropriate to the type of development or land use proposed.
- Where necessary, apply the Exception Test.
- Apply the sequential approach to locating development within the site.

Ultimately, after applying the Sequential Test, HDC needs to be satisfied in all cases that the proposed development would be safe and not lead to increased flood risk elsewhere. This needs to be demonstrated within a FRA and is necessary regardless of whether the Exception Test is required.

[27] Demonstrating the flood risk Sequential Test for Planning Applications: http://www.gwfoe.org.uk/wp-content/uploads/2014/01/EA-Sequential-Test-Process-v3.1-April-2012.pdf [Accessed May 2024].

4.1.3 Sequential Test Exemptions

According to the PPG and paragraph 174 of the NPPF, the Sequential Test does not need to be applied in the following circumstances:

- Individual developments proposed on sites which have already been allocated in development plans through the Sequential Test (on the assumption that the proposed development is consistent with the use for which the site was allocated, and that there have been no changes to the known level of flood risk, now and in the future).
- Change of use applications, unless it is for a change of use of land to a caravan, camping or chalet site, or to a mobile home site or park home site.
- The site is in an area at low risk from all sources of flooding unless the SFRA, or other more recent information, indicates there may be flooding issues now or in the future (for example, through the impact of climate change).
- Some minor developments including householder development and non-residential extensions with a footprint less than 250m^2.

4.2 Exception Test

Following the application of the Sequential Test it may be concluded that there are no reasonable available alternative sites in areas of lower risk, and in some cases the Exception Test may be required.

Table 4-1 (reproduced from PPG Table 2) identifies when the Exception Test is required, based on the Flood Zone and the vulnerability classification of the proposed development, as defined in Table 2 of the PPG.

Table 4-1: Flood risk vulnerability and Flood Zone 'incompatibility'[28]

Flood Zone	Flood risk vulnerability classification				
	Essential Infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a	Exception Test required†	✗	Exception Test required	✓	✓
Zone 3b*	Exception Test required*	✗	✗	✗	✓*

Notes:
✓= Exception Test not required
✗ = Development should not be permitted
†In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.
**In Flood Zone 3b (functional floodplain) essential infrastructure that has passed the Exception Test, and water-compatible uses, should be designed and constructed to:*

- *remain operational and safe for users in times of flood*
- *result in no net loss of floodplain storage*
- *not impede water flows and not increase flood risk elsewhere*

[28] Planning Practice Guidance Table 2 Flood Risk Vulnerability and Flood Zone incompatibility: https://www.gov.uk/guidance/flood-risk-and-coastal-change#table2 [Accessed May 2024].

As set out in paragraph 170 of the NPPF, of the exception test should be informed by a strategic or site-specific FRA, depending on whether it is being applied during plan production or at the application stage. To pass the exception test it should be demonstrated that:

(a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and

(b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Both elements of the Exception Test should be satisfied for development to be allocated or permitted.

In order to fulfil Part 1 of the Exception Test, the sustainability framework set out in HDC's Sustainability Appraisal (SA) report[29] should be used to assess each potential development site. The sustainability framework includes a list of objectives and indicators which can be employed to appraise the sustainability of a proposed development.

In order to address Part 2, a site-specific FRA should be prepared for the proposed development that demonstrates how the site will be safe. Consideration should be made of the following as appropriate:

- Applying a sequential approach within the site layout.
- Development design to manage and reduce flooding.
- Safe access and egress.
- Design of flood defence infrastructure.
- Operation and maintenance.
- Flood warning and evacuation procedures.
- Funding or maintenance arrangements for implementing measures.

Figure 4-2 (reproduced from PPG Diagram 3) sets out how the Exception Test should be applied in the preparation of a Local Plan.

[29] Horsham District Council Sustainability Appraisal and Strategic Environmental Assessment Report: https://www.horsham.gov.uk/planning/neighbourhood-planning/sustainability-appraisal-and-strategic-environmental-assessment [Accessed May 2024].

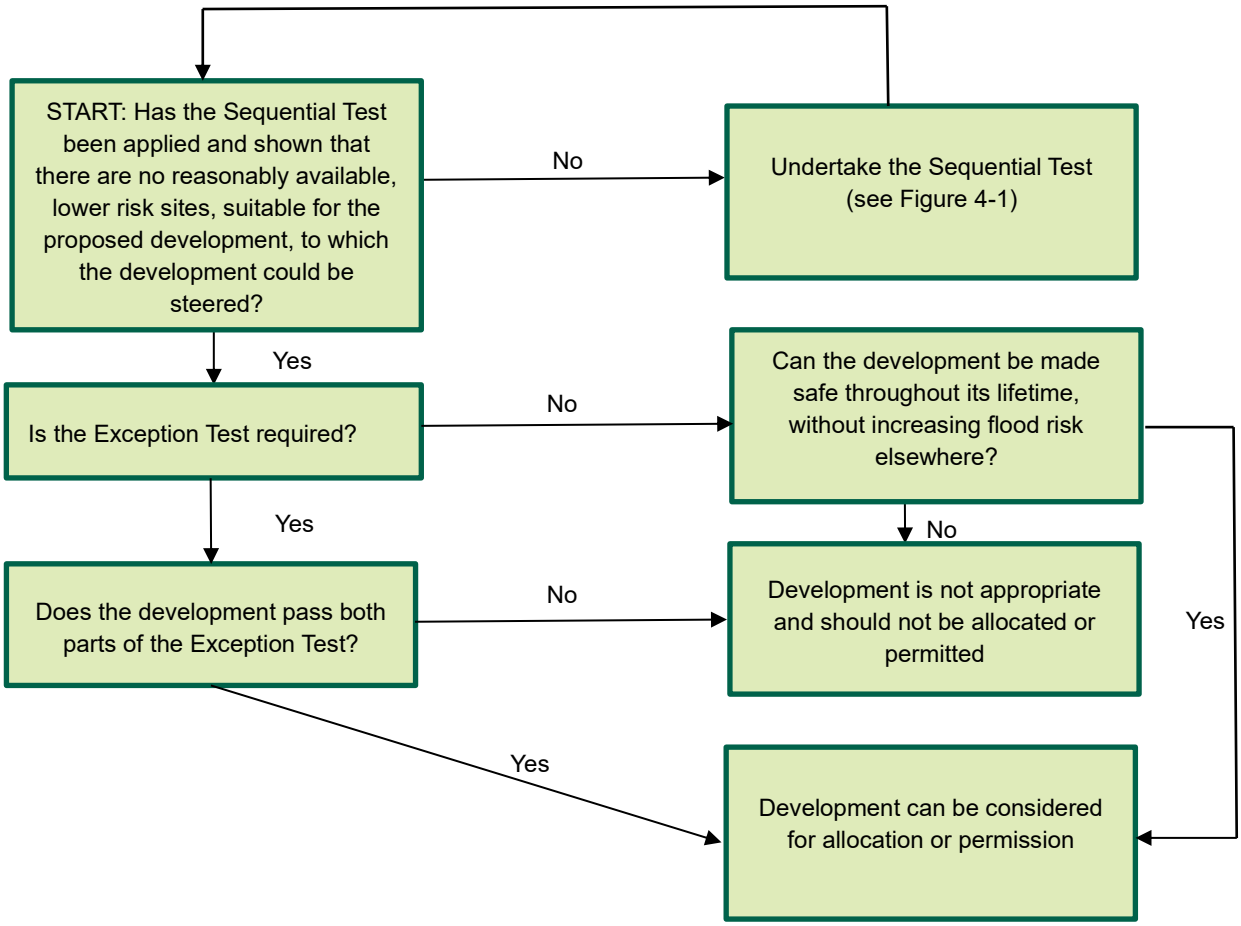


Figure 4-2: Applying the Exception Test in the preparation of a Local Plan (PPG Diagram 3)

4.3 Impact of development on flood risk elsewhere

When allocating land for development, consideration must be given to the potential for development to impact flood risk elsewhere. The increase in impermeable surfaces and resulting increase in runoff increases the chances of surface water flooding if suitable mitigation measures, such as SuDS, are not put in place. Additionally, the increase in runoff may result in more flow entering watercourses, increasing the risk of fluvial flooding downstream.

Consideration must also be given to the potential impact of the loss of floodplain as a result of development. The effect of the loss of floodplain storage should be assessed both at the development and elsewhere within the catchment and, if required, the scale and scope of appropriate mitigation should be identified.

While the increase in runoff, or loss in floodplain storage, from individual developments may only have a minimal impact on flood risk, the cumulative effect of multiple developments may be more severe without appropriate mitigation measures. This must be considered at the planning application and development design stages and the appropriate mitigation measures undertaken, within an appropriate FRA, to ensure flood risk is not exacerbated, and in many cases the development should provide betterment when flood risk is considered. Maintenance and upkeep for mitigation measures, such as SuDS, must be set out as part of a site-specific drainage strategy and management funding for the lifetime of the development must be agreed.

Where the Sequential and the Exception Tests have been applied as necessary and not met, development should not be allowed.

5 Preparing Flood Risk Assessments

5.1 What is a FRA?

A site-specific FRA is a report conducted by, or on behalf of, a developer to assess the flood risk from all sources to and from a development, and to demonstrate how the proposed development will be designed so that it remains safe over its lifetime, and not increase flood risk elsewhere. A FRA must be prepared by a suitably qualified and experienced person and must contain all the information needed to allow HDC to satisfy itself that the requirements have been met.

According to paragraph 173 of the NPPF, development should only be allowed in areas at risk of flooding where, in the light of a FRA, it can be demonstrated that:

- Within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
- The development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;
- It incorporates SuDS, unless there is clear evidence that this would be inappropriate;
- Any residual risk can be safely managed; and
- Safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

5.2 When is a FRA required?

According to footnote 59 of the NPPF a site-specific FRA is required in the following circumstances:

- Proposals for all developments in Flood Zones 2 and 3.
- Proposals of 1 hectare or greater in Flood Zone 1.
- Proposals for development in an area within which has critical drainage problems (as identified by the Environment Agency).
- Proposals in Flood Zone 1 where land is identified in an SFRA as being at increased flood risk in the future.
- Proposals for the change of use to a more vulnerable class on land that may be subject to other sources of flooding.

5.3 What needs to be addressed in a FRA?

The PPG states that the objectives of a site specific FRA are to establish:

- Whether a proposed development is likely to be affected by current or future flooding from any source.
- Whether it will increase flood risk elsewhere.
- Whether the measures proposed to manage these effects and risks are appropriate.
- The evidence for the local planning authority to apply (if necessary) the Sequential Test.
- Whether the development will be safe and pass the Exception Test, if applicable.

5.4 How detailed should a FRA be?

The PPG stipulates that site-specific FRAs should be proportionate to the scale and nature of the development, to the severity of flood risk, to the development's vulnerability classification, and to the status of the site in relation to the Sequential and Exception Test.

The report should employ readily available information such as the mapping presented within the LPA's SFRA and on the Environment Agency's website. In some cases, additional hydraulic modelling or detailed calculations may need to be undertaken. For example, an extension to an existing house (for which planning permission is required) which would not significantly increase the number of people in an area of flood risk, would typically need a less

detailed assessment than a new development comprising a greater number of houses, such as an apartment block. Likewise, HDC may require a more detailed assessment at a location where the flood risk is greater, such as the execution of site-specific hydraulic modelling to precisely determine the level of flood risk to and from the site both pre and post-development, and to appraise the effectiveness of any proposed mitigation measures.

The Environment Agency provides standing advice for FRAs[30] which should be followed for all development classed as[31]:

- a minor extension (household extensions or non-domestic extensions less than 250m^2) in Flood Zone 2 or 3.
- 'more vulnerable' development in Flood Zone 2 (except for landfill or waste facility sites, caravan or camping sites).
- 'less vulnerable' development in Flood Zone 2 (except for agriculture and forestry, waste treatment, mineral processing, and water and sewage treatment).
- 'water compatible' development in Flood Zone 2.
- a change of use into one of these vulnerable categories or into the water compatible category.

The Environment Agency's standing advice stipulates that the following information should be included in a FRA:

- site address.
- a description of the development.
- an assessment of the flood risk from all sources of flooding for the development, plus an allowance for climate change.
- the estimated flood level for the development, taking into account the impacts of climate change over its lifetime.
- details of the finished floor levels.
- details of the flood resistance and resilience plans.
- any supporting plans and drawings.

The estimated flood level is the maximum anticipated depth of flooding on a development site in a 1% AEP (1 in 100 year) fluvial event (plus an allowance for climate change) or in a 0.5% AEP (1 in 200 year) tidal event (plus an allowance for climate change).

For all developments involving surface water drainage in flood risk areas and major developments involving surface water drainage, SuDS must be provided unless clear evidence detailing their unsuitability is provided to the LPA. The management of surface water, including the provision of SuDS, should be outlined in a FRA, or in a separate surface water drainage strategy.

Environment Agency Data Requests

The Environment Agency offers a series of 'products' for obtaining flood risk information suitable for informing the preparation of site-specific FRAs as described on their website: https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications.

- Product 1: contains a flood map, including Flood Zones, defences and storage areas and areas benefitting from defences.
- Product 3: contains a basic FRA map, including Flood Zones, defences and storage areas, areas benefiting from defences, statutory Main River designations and some key modelled flood levels.
- Product 4: contains a detailed FRA map, including Flood Zones, defences and storage areas, areas benefiting from defences, statutory Main River designations, historic flood event outlines and more

[30] Preparing a flood risk assessment standing advice: https://www.gov.uk/guidance/flood-risk-assessment-standing-advice#standing-advice-for-vulnerable-developments [Accessed May 2024].
[31] Flood risk assessments if you're applying for planning permission: https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications [Accessed May 2024].

detailed information from our computer river models (including model extent, information on one or more specific points, flood levels, flood flows)

- Product 5: contains the flood modelling and hydrology reports for the specific hydraulic model.
- Product 6: contains the model output data so the applicant can interrogate the data to inform the FRA.
- Product 7: comprises the hydraulic model.
- Product 8: contains flood defences breach data including maximum flood depth, velocity and hazard maps. This allows the residual risk associated with defence breach to be assessed and is important for the consideration of mitigation if the site benefits from flood defences.

Modelling of Ordinary Watercourses

It should be noted that the scope of hydraulic modelling studies undertaken by the Environment Agency typically covers flooding associated with Main Rivers, and therefore Ordinary Watercourses that form tributaries to the Main Rivers may not always be included in the model.

Where a proposed development site is in close proximity to an Ordinary Watercourse the LLFA and/or local authority should be contacted to see whether any modelling data exists (on the assumption that this has not been considered by the Environment Agency). If either no hydraulic modelling exists, or the available modelling is considered to provide very conservative estimates of flood extents (due to the use of national generalised modelling such as JFLOW), applicants may need to prepare a hydraulic model to enable more accurate assessment of the probability of flooding associated with the watercourse and to inform the site-specific FRA. The requirements of this should first be discussed with the LLFA. If required, modelling should be carried out in line with industry standards and in agreement with the Environment Agency and WSCC (as the LLFA).

Where a watercourse exists on, under, or adjacent to a property, the owner of that property is classified as a riparian owner. A 'watercourse' here is defined as any natural or artificial channel above or below ground through which water flows, such as a river, brook, ditch, gill or stream (which may be piped or culverted in sections). The responsibilities of riparian owners include:

- The clearance of silt and debris, including rubbish, from a watercourse
- The management of vegetation within the channel
- Ensuring the flow of water within the watercourse is not obstructed

Riparian owners have the right to protect their property from flooding or their land from erosion. However, riparian owners must not:

- Dispose of waste such as grass cuttings into the watercourse
- Fill in, obstruct, bridge, or pipe the watercourse without obtaining consent

Further information in relation to riparian ownership can be viewed on the WSCC website[32].

5.5 Pre-application advice

At all stages, HDC, and where necessary the Environment Agency, WSCC and/or the statutory water undertaker, may need to be consulted to ensure the FRA provides the necessary information to fulfil the requirements for planning applications.

The Environment Agency, WSCC and HDC each offer pre-application advice services which should be utilised to discuss particular requirements for specific applications.

- HDC: https://www.horsham.gov.uk/planning/planning-applications/pre-application-planning-advice
- WSCC: https://www.westsussex.gov.uk/planning/planning-applications/county-planning-pre-application-advice/

[32] West Sussex County Council Riparian Ownership: https://www.westsussex.gov.uk/fire-emergencies-and-crime/dealing-with-extreme-weather/flooding/flood-risk-management/managing-flood-risk/ [Accessed April 2024].

- Environment Agency: https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion.

The following government guidance sets out when LPAs should consult with the Environment Agency on planning applications: https://www.gov.uk/flood-risk-assessment-local-planning-authorities.

6 Sources of flood risk and expected effects of climate change

This Section provides a description of the local topography, geology and hydrology in the study area, and an assessment of the risk of flooding from all sources based on available datasets.

6.1 Topography

Appendix A, Figure A1 displays the topography throughout the HDC area. This figure shows the Light Detection and Radar (LiDAR) dataset for HDC, which has a spatial resolution of 1m and contains digital elevation data derived from surveys carried out between 2000 and 2020.

In general, higher ground elevations are seen to the north of the area, with lower elevations situated around the channels of Main Rivers throughout the area. Topographic low points are seen surrounding the River Adur, particularly through Upper Beeding to Henfield where ground levels reach approximately 5m Above Ordnance Datum (AOD).

6.2 Geology

The bedrock geology of the HDC area is presented in Appendix A, Figure A2. The majority of the study area consists of the Wealden Group, which is split into the High Weald and the Low Weald. The High Weald, covering the majority of the study area, consists of sandstones and mudstones including the Horsham Stone Member and the Upper Tunbridge Wells Sand. These units are overlain by the Weald Clay Formation. The High Weald then drops down to the Low Weald to the south where the geology is comprised predominantly of chalk and softer sandstones and mudstones. The north of the HDC area is also intersected by the western ridge of the Wealden anticline, which gently dips to the south-southwest, such that the rocks get progressively younger in this direction.

Along the southern boundary of the HDC area, bedrock geology primarily consists of the Lower Greensand Group, with a number of other units also intersecting the HDC area near Upper Beeding.

6.3 Hydrology

The principal watercourses and associated catchments are shown in Appendix A, Figure A3 and described in Table 6-1. The primary river systems in the HDC area are the River Adur and the River Arun, with their mainstem channels and tributaries covering the majority of the district.

The catchment of the River Arun covers the north and western sections of the study area, with its source located at St Leonard's Forest near Horsham. The Upper Arun collects water from the High and Low Weald, which mainly comprises of low permeability Weald Clay, and transfers it downstream to the confluence with the River Rother at Pulborough, which is also the tidal limit. The Upper and Eastern Arun is the reach of the river that covers the majority of the study area. The watercourse continues to flow south beyond the HDC boundary and outfalls to the sea at Littlehampton.

The River Adur and its tributaries are situated in the High Weald, Low Weald and South Downs natural conservation areas. The entire catchment of the River Adur is in excess of 600km^2 and extends from the south coast at Littlehampton in the west, Brighton and Hove in the east, and northwards to Horsham and Haywards Heath. The upper and western branch of the Adur catchment spans most of Horsham District. The River Adur begins as two separate branches. The source of the Western Adur is located at Slinfold, whereas the source of the Eastern Adur is Ditchling Common in East Sussex. The two branches meet near Henfield, before flowing south through Upper Beeding and outfalling into the sea at Shoreham-by-Sea.

Table 6-1: Watercourses in the HDC area

Watercourse	Classification	Tidal (Y/N)	Description
River Arun	Main River	Y	60km long Main River that rises at St Leonard's Forest in the Weald (TQ 21819 30177), and has a mouth at Littlehampton (TQ 02881 01047). The River Arun flows westwards through Horsham, before flowing south along the western border of the HDC study area. The tidal limit is Pulborough, in the south of the HDC area. This river has the largest catchment out of all rivers in HDC, spanning Rudgwick, Billinghurst and North Heath.

River Adur	Main River	N	32km long Main River that begins as two separate branches, the western Adur and the eastern Adur, which meet 2km west of Henfield (TQ 19452 16683). The western Adur rises at Slinfold (TQ 11468 29299), and the eastern Adur rises at Ditchling Common, in East Sussex. The mouth of the River Adur is located at Shoreham-by-Sea (TQ 23513 04578).
Baldhorns Brook	Ordinary Watercourse	N	12km long tributary of the River Mole that flows through Rusper, in the north east of the HDC area. Its catchment is primarily rural.
Boldings Brook	Main River	N	10km long Main River that rises near Kingsfold (TQ 17765 36593), and outfalls into the River Adur near Highwood (TQ 15392 30199). The entirety of this watercourse is located within the HDC area, and its catchment spans Littlehaven and west Horsham.
Honeybridge Stream	Ordinary Watercourse	N	Tributary of the River Adur, which rises from springs to the west of Ashington. The streams flows north easterly for approximately 6km, before joining the River Adur near Partridge Green (TQ 18023 17851).
North River	Main River	N	Source located near Standon Lane in Dorking (TQ 13270 38612), and its confluence with the River Arun located north of Slinfold (TQ 11852 32330). The river's catchment area is primarily rural and is located along the northern border of HDC,
River Stor	Main River	N	Rises adjacent to Chantry Lane, along the southern boundary of the HDC area, then flows north west through Storrington, before reaching its confluence with the River Arun, located outside of the HDC study area.

6.4 Historical Flooding

Information on previously recorded flood events is provided in this section. This information has been taken from data provided by WSCC and the Environment Agency's Recorded Flood Outlines.

6.4.1 Fluvial flooding

A number of relatively widespread fluvial flooding events have occurred within the study area. The Environment Agency's Recorded Flood Outlines dataset documents the following events, as seen in Appendix A, Figure A4:

- September 1968 – The channel capacity of the River Arun was exceeded, causing multiple isolated areas of flooding throughout Horsham.
- November 1974 – Overtopping of defences along both the River Adur and the River Arun, causing widespread floodplain inundation in numerous locations along the reach.
- June 1981 – Channel capacity of the River Stor exceeded, causing flooding through the centre of Storrington.
- December 2013 – Overtopping of defences along the River Arun, leading to flooding along the whole stretch of river from Loxwood to Pulborough.

WSCC's 2011 PFRA provides detail on the September 1968 floods within Horsham, stating: "main road flooded and adjacent properties internally flooded to 0.6m", however no further information on the source of flooding is available.

6.4.2 Surface Water Flooding

WSCC provided a register detailing all recorded historic flooding events within HDC in the past 10 years. The most common source of historic flooding within this dataset is shown to be surface water. Appendix A, Figure A4 shows this dataset, with the areas that have experienced surface water flooding highlighted. It should be noted that records only appear where they have been reported to WSCC, and as such they may not include all instances of surface water flooding.

A high majority of recorded incidents are shown to have occurred within Billinghurst, however these areas have likely been targeted for maintenance and improvements, and as such areas that experienced flooding in the past may no longer be at greatest risk of flooding in the future.

6.4.3 Sewer Flooding

Water companies are required to maintain a register of locations which are at risk of flooding due to hydraulic overloading of sewers (sewer pipe is too small or positioned at too shallow a gradient). The identification of these locations of previous flooding can inform LPAs of areas where additional development may have a significant impact on the capacity of the sewer system, and where water companies may need to prioritise investment in measures to improve the system's capacity to support proposed developments. However, it should be noted that historic incidents may have been addressed through water companies' asset management programmes and may no longer reflect an area where sewer incapacity is a problem or where flooding is probable.

Southern Water has provided an extract from their DG5 Flood Register for the study area, which records historic internal and external sewer flooding events. Due to data protection requirements the data has not been provided at individual property level; rather the register comprises the number of properties within four digit postcode areas that have experienced flooding either internally or externally within the last 10 years (2014-2024). It should be noted that records only appear on the DG5 register where they have been reported to Southern Water, and as such they may not include all instances of sewer flooding. Furthermore, given that Southern Water target these areas for maintenance and improvements, areas that experienced flooding in the past may no longer be at greatest risk of flooding in the future.

Appendix A, Figure A5 shows the number of sewer flooding incidents reported by Southern Water over the last 10 years in each four-digit postcode in the HDC study area. However, it should be noted that Southern Water focus their efforts on removing properties from the DG5 register and therefore this information may not accurately represent those properties currently at risk. The figure shows that there is a high frequency of sewer flooding incidents in the HDC study area. Each of the 6 postcodes within HDC have experienced upwards of 21 sewer flooding incidents, with the postcodes occupying most of the district boundary (RH12, RH13 and RH20) having experienced between 41 and 120 sewer flooding incidents.

6.5 Flood Mapping

6.5.1 Fluvial and Tidal Flooding

Appendix A, Figure A6 shows Flood Zones 2 and 3 for the principal watercourses within the study area (see Table 3-1 for more information on Flood Zones). Areas of Flood Zones 2 and 3 are primarily confined to the channels and immediate floodplain surrounding the Main Rivers and ordinary watercourses throughout the catchment. An extensive area of Flood Zone 3 is concentrated around the floodplain to the north of Upper Beeding.

Future flood risk

Climate change is expected to increase the frequency, extent, and impact of flooding, as reflected in higher peak river flows. Wetter winters and more intense rainfall may increase fluvial flooding and surface water runoff and there may be increased storm intensity in summer. Rising sea levels may also increase flood risk within areas of HDC that are tidally influenced. Fluvial flood risk may also be increased due to rising tidal levels which can cause tide locking.

Appendix A, Figure A7 provides the modelled extent of the combined fluvial and tidal climate change extent (higher central, 2080s). As described within Section 3.1, a conservative approach has been taken where future flood risk has been represented by a merged maximum extent between Flood Zone 2 (0.1% AEP) and the available modelled climate change allowances as detailed in Table 3-2.

Within Appendix A, Figure A7, small increases are seen throughout the flood extents when compared to present day (Appendix A, Figure A6). Areas of flood risk which were previously confined to the channels of watercourses are now seen to encroach onto their surrounding floodplains. A large area of floodplain concentrated around the River Adur is shown to be located within the modelled flood extents, from Upper Beeding to Henfield.

6.5.2 Functional Floodplain

Flood Zone 3b functional floodplain is defined as land where water has to flow or be stored in times of flooding. This is identified by the normal form of the river channel and land that would flood during a 3.33% AEP (1 in 30 year) event or greater in any year, with flood risk management features and structures operating effectively.

As described in Section 3.1, a conservative approach was agreed with the Environment Agency regarding Flood Zone 3b. It was agreed that Flood Zone 3a would be used to represent Flood Zone 3b throughout this Level 1 SFRA as modelling results for the 3.33% AEP (1 in 30 year) were not available.

The Environment Agency guidance 'How to prepare a Strategic Flood Risk Assessment'[4] encourages the use of site specific FRAs to determine whether a site is classified as functional floodplain. If sites are proposed for development in such areas in any of the LPA's Local Plans, it may be necessary to undertake additional assessment (which may include hydraulic modelling) to map the location of the functional floodplain as part of a Level 2 SFRA.

Future Flood Risk

In line with the future flood risk of river flooding, the area of functional floodplain is expected to increase as a result of climate change. Flood Zone 3a, and subsequently Flood Zone 3b is expected to have a greater extent in the future, potentially impacting the floodplain around the River Adur from Upper Beeding to Henfield.

6.5.3 Groundwater Flooding

The 2019 GeoSmart Groundwater Flood Risk dataset has been mapped in Appendix A, Figure A8. This map does not show the risk of groundwater flooding, rather it identifies areas where geological conditions could enable groundwater flooding to occur.

The dataset shows the majority of the HDC area to be situated within Class 4 (Negligible Risk). This means that there is a less than 1% annual probability of groundwater flooding within each 5m grid square. Areas of Class 3 (Low Risk) and Class 2 (Moderate Risk) are shown to align with the River Arun and River Adur, however these areas of higher risk are primarily confined to the channels and their immediate floodplains.

There are some areas of Class 1 (High Risk) situated along the southern border of HDC, primarily located in Upper Beeding and to the east of Pulborough. Class 1 is defined as having a greater than 1% annual probability of groundwater flooding within each 5m grid square.

Future Flood Risk

Most climate change models indicate an increased likelihood of drier summers, albeit with more intense rainfall when it occurs, and wetter winters. As groundwater flooding occurs primarily as a response to extended periods of rain during late autumn and early winter, there may be an increased risk of groundwater flooding arising from these changing rainfall patterns. However, the complex relationship between rainfall, recharge, groundwater storage and flow make the response to climate change uncertain. It is recommended that this figure should be updated once the groundwater dataset is updated.

6.5.4 Surface Water

The Environment Agency's RoFSW dataset is presented in Appendix A, Figure A9. This map shows that the risk of surface water flooding is concentrated around watercourses in the district, most notably the River Arun and the River Adur. The risk of surface water flooding also increases markedly in urbanised areas, with this being most pronounced in Horsham and Billinghurst.

Future flood risk

Section 3.2 describes the impact of climate change on surface water flood risk and summarises the peak rainfall intensity climate change allowances for the study area which range from 20% - 45% depending on the specific location and epoch under consideration.

Climate change must be considered in evaluating the flood risk from all sources, including surface water. The RoFSW does not include a specific scenario to determine the impact of climate change on the risk of surface water flooding and it is not within the scope of this SFRA to undertake widespread surface water modelling to apply all the allowances within the guidance. However, a range of three annual probability events have been modelled within the RoFSW, 3.3%, 1% and 0.1%, and therefore it is possible to use with caution the 0.1% outline as a proxy dataset to provide an indication of the implications of climate change.

6.5.5 Reservoir Flooding

In total there are 17 Reservoir Act registered impoundments with the potential to cause flooding within the HDC area have been identified, which are presented in Table 6-2.

Table 6-2: List of Reservoir Act registered impoundments with the potential to cause flooding within HDC

Name	Location	Grid Reference	Flood Risk in HDC?
Douster Pond	Ifield (Outside of HDC)	TQ2444934329	Flooding is restricted to the valley of the Douster Brook and only marginally crosses into the HDC area near Ifield Wood and near Buchan Country Park. There are a few isolated vulnerable receptors within the affected area.
Furnace Pond	Crabtree	TQ2295925205	Flooding is restricted in both the 'dry day' and 'wet day' scenarios to the floodplain immediately adjacent to the Cowfold Stream between Furnace Pond and London Road. There are only isolated buildings in the affected area.
Hammer Pond	Mannings Heath	TQ2224329188	Flooding is restricted in both the 'dry day' and 'wet day' scenarios to the floodplain immediately adjacent to Golding's Stream, and subsequently the River Arun. There are no vulnerable receptors within the affected area.
Hawkins Pond	Mannings Heath	TQ2160029200	Flooding is restricted in both the 'dry day' and 'wet day' scenarios to the floodplain immediately adjacent to Golding's Stream, and subsequently the River Arun. There are no vulnerable receptors within the affected area.
Hardham Reservoir	Hardham (Outside of HDC)	TQ0414216753	Flooding is predominantly restricted to the reach of the River Arun located in the South Downs National Park and only marginally crosses into the HDC area near Pulborough. A number of vulnerable receptors are impacted within the HDC area.
Kneppmill Pond	West Grinstead	TQ1571421243	Flooding is restricted in both the 'dry day' and 'wet day' scenarios to the floodplain immediately adjacent to the River Adur between Shipley and Upper Beeding.
Park Mill Pond	Northchapel (Outside of HDC)	SU9710030800	Flooding is predominantly restricted to the reach of the River Arun located in the South Downs National Park and only marginally crosses into the HDC area near Pulborough and near Adversane. A number of vulnerable receptors are impacted within the HDC area.
Burton Mill Pond	Duncton, Chichester (Outside of HDC)	SU9790018000	Flooding is predominantly restricted to the reach of the River Arun located in the South Downs National Park and only marginally crosses into the HDC area near Pulborough and near Adversane. A number of vulnerable receptors are impacted within the HDC area.
Chingford Pond	Duncton, Chichester (Outside of HDC)	SU9725017350	Flooding is predominantly restricted to the River Rother and the reach of the River Arun located in the South Downs National Park, and only marginally crosses into the HDC area near Pulborough. A number of vulnerable receptors are impacted within the HDC area.
Ridgehanger	Ellen's Green	TQ1126034900	Flooding is restricted in both the 'dry day' and 'wet day' scenarios to the floodplain immediately adjacent to the middle reaches of the River Arun, from Stane Street to Drungewick Lane. There are some vulnerable receptors positioned within the affected area.
Roosthole Pond	Horsham	TQ2047029580	Flooding is restricted in both the 'dry day' and 'wet day' scenarios to the floodplain immediately adjacent to the upper reaches of the River Arun, from Mannings Heath to Broadbridge Heath. A number of vulnerable receptors are impacted through the centre of Horsham.

Vann Lake	Ockley	TQ1560039500	Flooding is primarily restricted in both the 'dry day' and 'wet day' scenarios to the floodplain immediately adjacent to North River, from Ockley to Slinfold. Only a very few isolated receptors are impacted during a 'wet day' event.
Warnham Mill Pond	Horsham	TQ1700032500	Flooding is restricted to the entire length of Boldings Brook, and subsequently the reach of the River Arun between Horsham and Bignor Wood. A number of isolated buildings are impacted during a 'wet day' event.
Whitevane Pond	Horsham	TQ2112431488	Flooding follows the route of the River Arun from St Leonards Forest, near the source of the river, to Stane Street in Slinfold. In the 'wet day' event, many vulnerable receptors through the centre of Horsham are impacted.
Ifield Mill Pond	Ifield (Outside of HDC)	TQ2450036400	Flooding is predominantly restricted to the River Mole and only marginally crosses into the HDC area near Ifield. A number of vulnerable receptors are impacted within the HDC area dueing both the 'wet day' and 'dry day' events.
Pond Lye	Goddards Green (Outside of HDC)	TQ2900021400	Flood extents follow the lower reach of the River Adur, from Goddards Green to Shoreham-by-Sea. The flood extent for the 'wet day' event extends far into the floodplain, particularly within the south-east region of HDC, resulting in a number of vulnerable receptors being impacted.
Burton Mill Reservoir	Duncton, Chichester	SU9790018000	Small area (approx 0.13km^2) within HDC area. There are no vulnerable receptors within the affected area.

Appendix A, Figure A10 shows the potential extent of flooding in the unlikely event of a failure of these reservoirs when river levels are normal ('dry' day scenario) and when rivers have already overtopped their banks ('wet' day scenario). The mapping shows that the area at risk follows the floodplains and valleys of the River Adur and the River Arun, with the majority of flooding occurring regardless of the river levels. Reservoir flood risk only extends to the wider floodplain surrounding the River Adur from Ashurst to Upper Beeding when rivers are in flood (i.e. the 'wet' day scenario).

7 Cumulative impact of development and land use change

7.1 Cumulative impact assessment

The NPPF states that strategic policies should be informed by a SFRA and should consider cumulative impacts in, or affecting, local areas susceptible to flooding and take account of advice from the Environment Agency and other relevant flood risk management authorities. The 'How to prepare a Strategic Flood Risk Assessment' guidance[4] also states that an SFRA should include as assessment of the cumulative impacts of development and land-use change which should include any impact expected from:

- Strategically planned development;
- Windfall development;
- Permitted development; and
- Significant changes in land use, such as paving over domestic gardens or reforestation of uplands.

Development, or the cumulative impacts of development, may result in an increase in flood risk elsewhere as a result of impacts such as the loss of floodplain storage, deflection or constriction of flood flow routes and/or through inadequate management of surface water.

Where flood storage from any source of flooding is to be lost as a result of development, on-site level for level, volume for volume compensatory storage for the 1% AEP flood event accounting for the predicted impacts of climate change over the lifetime of the development, should be provided. Where it is not possible to provide compensatory storage on site, it may be acceptable to provide off-site if it is hydraulically and hydrologically linked. More information is provided in Section 9.3.1.

Identification of those areas where changes in land use could potentially increase surface water runoff rates and volumes can strategically aid spatial planning in avoiding areas where significant mitigation of surface water runoff following development may be required. The provision of multifunctional sustainable drainage systems, natural flood management and green infrastructure can also make a valuable contribution to mitigating the cumulative impacts of development on flood risk.

Whilst individual development with appropriate site mitigation measures should not result in measurable local effects with respect to hydrology and flood risk, the cumulative effects of multiple development may be more severe at downstream locations in the catchment. Locations where there are existing flood risk issues will be particularly sensitive to cumulative effects.

The cumulative impact should be considered throughout the planning process, from the allocation of sites within the Local Plan, to the planning application and development design stages.

From a review of all future development sites provided by HDC, it is unlikely that any development sites will have a cumulative impact. Development sites are generally spread across HDC and are located in areas which are not significantly impacted by flood sources.

7.2 Cross boundary considerations

Many of the catchments within the HDC area cross borders between LPA administrative areas, such that future development in another LPA could impact flood risk in the HDC area, and vice versa. It is important that LPAs work together and take a catchment-wide approach when considering the wider impacts of any proposed development.

The source of the western Adur rises at Slinfold within HDC, and the eastern Adur rises at Ditchling Common, in Lewes District Council. Both arms join near Henfield and flow south to their mouth at Shoreham-by-Sea. Developments upstream of the eastern Adur, in Lewes District Council, could have an impact downstream on flood risk in the HDC area, whilst development in HDC could impact flood risk to other districts positioned further downstream in the River Adur catchment.

The River Arun rises at St Leonard's Forest within HDC, flows westwards through Horsham before flowing south to its mouth at Littlehampton. Therefore, any development within HDC has the potential to impact flood risk downstream of the district.

As a result, any new development will need to produce a site specific assessment inclusive of a Surface Water Drainage Strategy which ensures that flood risk will not increase to third parties as a result of the proposed development.

8 Flood Management and Defences

8.1 Defences

The following details regarding flood management and defences within the HDC area were extracted from the Environment Agency's Asset Information Management System (AIMS) dataset:

- Natural high ground is located along the majority of the length of the River Arun, located along both banks. This starts at Horsham and covers all Main River downstream of Horsham within the HDC area;
- Natural high ground surrounds the entire length of Boldings Brook on both banks;
- Engineered high ground surrounds Warnham Mill Pond. This is bordered to the south by a series of walls, embankments and Warnham Mill Road Flood Gate;
- A series of embankments spans the River Arun on both banks which starts near Bines Green and covers all Main River downstream; and
- Natural high ground covering the entirety of Cowfold Stream.

A series of smaller lengths of natural high ground are also located within the HDC area, however these are isolated areas and short in length.

8.2 Flood Warning Service

The Environment Agency operates a Flood Warning Service[33] in respect to Main River (and tidal) flooding across England. Three different codes are issued depending on the type of flooding forecasted:

- Flood Alert – Flooding is possible, be prepared.
- Flood Warning – Flooding is expected, immediate action is required.
- Severe Flood Warning – Severe flooding, danger to life.

The Environment Agency's website offers up-to-date flood information, monitoring information of river and sea levels and latest flood risk forecast, as well as a page to sign up to warnings by phone, text, email, or fax.

There are 9 Flood Warning Areas in the HDC area which are shown in Appendix A, Figure A11 including:

- Broadbridge Heath to Pallingham Quay on the River Arun;
- Coolham and Shipley on the River Adur;
- Horsham on the River Arun;
- Horsham on the Boldings Brook;
- Ifield Brook and the River Mole at Ifield and the River Mole at Lowfield Heath;
- Loxwood, Brewhurst and Drungewick on the River Lox;
- Mock Bridge, near Shermanbury on the River Adur;
- Pulborough on the River Arun; and
- Upper Beeding and Bramber on the River Adur.

The Environment Agency publishes 'Water situation: area monthly reports for England'[34] for each of its areas. These reports identify monthly rainfall, soil moisture deficit, river flows, groundwater levels and reservoir levels. The Environment Agency also publishes 'Groundwater situation'[35] reports which provide the latest update on monitored groundwater levels and whether there are any groundwater alerts or warnings in force. These reports will give an indication as to when groundwater levels may be high and groundwater flooding may be imminent.

[33] Environment Agency Flood Warning Service: https://check-for-flooding.service.gov.uk/ [Accessed May 2024].
[34] Water situation: area monthly reports for England 2022: https://www.gov.uk/government/publications/water-situation-local-area-reports [Accessed May 2024].
[35] Groundwater situation reports: https://www.gov.uk/government/collections/groundwater-current-status-and-flood-risk [Accessed May 2024].

The Environment Agency also provide a targeted groundwater flood warning service through issue of groundwater "Flood Alerts" for specific locations and communities. According to the Environment Agency's 'Hydrometric Monitoring Points' dataset[36], there is currently one groundwater monitoring station within the HDC area, named 'Ashington Jinkes Farm' which is located at Longbury Hill.

8.3 Residual Risk

The risk of flooding from rivers can never be fully mitigated, and there will always be a residual risk of flooding that will remain after measures have been implemented to protect an area or a particular site from flooding. This residual risk is associated with a number of potential risk factors including (but not limited to):

- a flooding event that exceeds that for which the flood risk management measures have been designed e.g. flood levels above the designed defence crest level,
- the structural deterioration of flood defence structures (including informal structures acting as a flood defence) over time resulting in a defence breach,
- blockage of key defence/conveyance structures,
- the occurrence of large, unpredictable cliff falls, and/or
- general uncertainties inherent in the prediction of flooding.

The modelling of flood flows and flood levels is not an exact science, therefore there are inherent uncertainties in the prediction of flood levels used in the assessment of flood risk. While Flood Zones provide a relatively robust depiction of flood risk for specific conditions, all modelling requires the making of core assumptions and the use of empirical estimations relating to (for example) rainfall distribution and catchment response. No residual modelling (breach or overtopping of defences or structural blockages) has been undertaken as part of this SFRA. This should be included as part of a site-specific FRA, or a Level 2 SFRA, should development be located in an area where residual flood risk is considered to be an issue.

Steps should be taken to manage these residual risks through the use of flood warning and evacuation procedures, as described in Section 10.

[36] Environment Agency Hydrometric Monitoring Points: https://www.data.gov.uk/dataset/0bac3947-c632-47eb-83d5-fff7f1911537/hydrometric-monitoring-points

9 Opportunities to reduce the causes and impacts of flooding

This Section identifies opportunities to reduce the causes and impacts of flooding in the local area and land required for flood risk management purposes.

9.1 Maintenance of watercourses

9.1.1 Main Rivers

The Environment Agency is likely to seek an 8m wide undeveloped easement alongside Main Rivers for maintenance purposes and is likely to also ask developers to explore opportunities for riverside restoration as part of any development.

Under Section 109 of the Water Resources Act 1991 and/or Environment Agency Byelaws, any works within 8m of any statutory Main River, flood defence or culvert (16m if it is a tidal Main River or defence structure) requires Environment Agency consent in the form of a Flood Risk Activity Permit. Under the Environmental Permitting (England and Wales) Regulations (2016), an environmental permit is required if works are to be carried out:

- on or near a Main River,
- on or near a flood defence structure,
- in a floodplain,
- on or near a sea defence.

Since requirements of the consenting process in relation to flood risk, biodiversity and pollution may result in changes to development proposals or construction methods, the Environment Agency aims to advise on such issues as part of its statutory consultee role in the planning process. Should proposed works not require planning permission the Environment Agency can be consulted regarding permission to do work on or near a river, or a flood or sea defence by contacting enquiries@environment-agency.gov.uk.

Recommendation: Where practical, retain an 8m wide undeveloped easement alongside Main Rivers or flood defence structure (16m if it is a tidal Main River or defence structure) and explore opportunities for riverside restoration. Undeveloped easements greater than 8m/16m will be encouraged where possible to provide biodiversity, flood risk and water quality benefits.

9.1.2 Ordinary Watercourses

Ordinary Watercourses are watercourses that are not part of a Main River and include streams, ditches, drains, cuts, culverts, dykes, sluices, sewers (other than public sewers) and passages, through which water flows.

Responsibility for the consenting of works by third parties on Ordinary Watercourses under Section 23 of the Land Drainage Act 1991 (as amended by the Flood and Water Management Act 2010) lies with the LLFA. As the LLFA, WSCC is responsible for the consenting of works to Ordinary Watercourses it has powers to enforce un-consented and non-compliant works. This includes any works (including temporary) that place or alter a structure within an Ordinary Watercourse or affect the flow or storage of water within an Ordinary Watercourse. WSCC will seek an undeveloped easement to be retained alongside Ordinary Watercourses. Further information can be found on the WSCC's website[37].

WSCC intends to work with riparian owners[32] (those living adjacent to an Ordinary Watercourse) who are responsible for maintaining Ordinary Watercourses to ensure that the effectiveness of the existing ditches is improved and ensure that future maintenance is undertaken at appropriate intervals. The Environment Agency have prepared a guidance document which provides information on the rights and responsibilities of riparian owners relating to flood risk management[38].

[37] WSCC Ordinary Watercourse Land Drainage Consent: https://www.westsussex.gov.uk/fire-emergencies-and-crime/dealing-with-extreme-weather/flooding/flood-risk-management/ordinary-watercourse-land-drainage-consent/ [Accessed May 2024].
[38] Managing Flood Risk: https://www.westsussex.gov.uk/fire-emergencies-and-crime/dealing-with-extreme-weather/flooding/flood-risk-management/managing-flood-risk/ [Accessed May 2024].

Recommendation: Where practical, an undeveloped easement should be retained alongside Ordinary Watercourses for maintenance purposes. This should be discussed and agreed with the LLFA. Developers should explore opportunities for riverside restoration as part of any development adjacent to Ordinary Watercourses.

9.2 River Restoration and Flood Storage

During the last century, many rivers were modified using hard engineering techniques to often straighten or canalise them. The disadvantages of these techniques have now become apparent which include the damage to the environment and ecosystems, and in some cases an increase in flooding.

River restoration contributes to flood risk management by supporting the natural capacity of rivers to retain water. By re-connecting brooks, streams and rivers to floodplains, former meanders, and other natural storage areas, and enhancing the quality and capacity of wetlands, river restoration increases natural storage capacity and can reduce flood risk. Excess water is stored in a timely and natural manner in areas where values such as attractive landscape and biodiversity are improved and opportunities for recreation can be enhanced.

Returning rivers to a more natural state can often include the removal of structures such as weirs or culverts which can have multiple benefits for biodiversity in addition to improving the flow regime[39]. Further guidance on river restoration is available from the Environment Agency[40]. The Adur River Recovery is an ongoing land manager-led project aiming to revitalise and restore the River Adur[41]. The project aims to revive floodplains, increase biodiversity and improve water quality along the Main River.

Flood Storage Areas (FSAs) are natural or man-made areas that temporarily fill with water during periods of high river level, retaining a volume of water which is released back into the watercourse after the peak river flows have passed. There are two main reasons for providing temporary detention of floodwater:

- To compensate for the effects of catchment urbanisation, and
- To reduce flows passed downriver and mitigate downstream flooding.

Providing flood storage within a development area or further upstream of a development can manage and control the risk of flooding. In some cases, it can provide sufficient flood protection on its own; in other cases, it may be chosen in conjunction with other measures. The advantage of flood storage is that the flood alleviation benefit generally extends further downstream, whereas other methods tend to benefit only the local area and may increase the flood risk downstream.

Further guidance on Flood Storage is provided within Chapter 10 of the Environment Agency's Fluvial Design Guide[42].

Recommendation: All new development close to rivers should consider the opportunity to improve and enhance the river environment. Developers should explore opportunities for river restoration, enhancement and provision of FSAs as part of the development. Options include backwater creation, de-silting, in-channel habitat enhancement and removal of structures. When designed properly, such measures can have benefits such as reducing the costs of maintaining hard engineering structures, reducing flood risk, improving water quality and increasing biodiversity. Social benefits are also gained by increasing green space and access to watercourses.

9.2.1 Floodplain Compensation

According to guidance provided in the PPG (notes to Table 2), all new development within Flood Zone 3 must not result in a net loss of flood storage capacity. Where possible opportunities should be sought to achieve an increase in the provision of floodplain storage. Where proposed development results in a change in building footprint, land raising or other structures such as bunds, the developer must ensure that it does not impact upon the ability of the floodplain to store water and should seek opportunities to provide betterment with respect to floodplain storage. Similarly, where ground levels are elevated to raise the development out of the floodplain, compensatory floodplain

[39] European Centre for River Restoration: https://www.ecrr.org/River-Restoration/Flood-risk-management/Healthy-Catchments-managing-for-flood-risk-WFD/Environmental-improvements-case-studies/Remove-culverts [Accessed May 2024].
[40] Environment Agency, Fluvial Design Guidance Chapter 8: https://assets.publishing.service.gov.uk/media/60549ae1e90e0724c0df4619/FDG_chapter_8_-_Works_in_the_river_channel.pdf [Accessed May 2024].
[41] Adur River Recovery: https://www.adur-river-recovery.org/ [Accessed June 2024]
[42] Environment Agency's Fluvial Design Guide: https://assets.publishing.service.gov.uk/media/60549b7a8fa8f545cf209a29/FDG_chapter_10_-_Flood_storage_works.pdf [Accessed May 2024].

storage within areas that currently lie outside the floodplain must be provided to ensure that the total volume of the floodplain storage is not reduced.

As depicted in Figure 9-1, floodplain compensation must be provided on a level for level, volume for volume basis on land which does not already flood and is within the site boundary. Where land is not within the site boundary, it must be in the immediate vicinity, in the applicant's ownership and linked to the site. Floodplain compensation must be considered in the context of the 1% AEP (1 in 100 year) flood level including an allowance for climate change. According to the Environment Agency's climate change allowances guidance[43], the appropriate allowance to assess off-site impacts and calculate floodplain storage compensation depends on land uses in affected areas. The allowances used should be:

- The Central allowance for most cases.
- The Higher Central allowance when the affected area contains essential infrastructure.

Likely future land uses should also be considered, shown by local plan allocations or unimplemented extant planning permissions.

When designing a scheme, floodwater must be able to flow in and out and must not pond. A FRA must demonstrate that there is no loss of flood storage capacity and include details of an appropriate maintenance regime to ensure mitigation continues to function for the life of the development. Guidance on how to address floodplain compensation is provided in Appendix A3 of the CIRIA Publication C624[44].

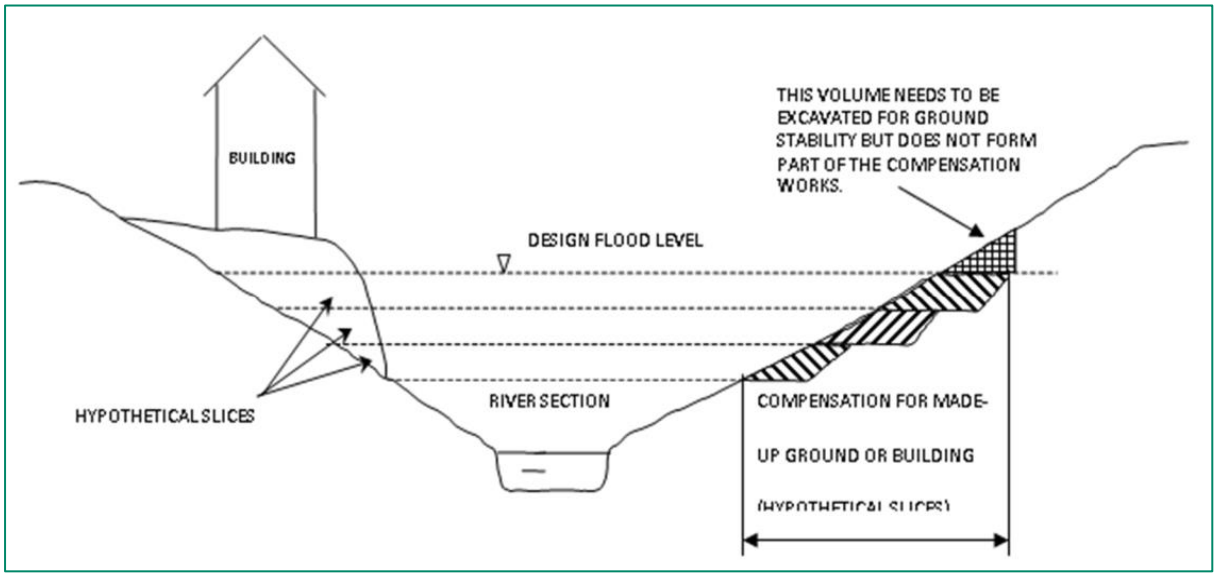


Figure 9-1: Example of Floodplain Compensation Storage (Environment Agency 2009)

The requirement for no loss of floodplain storage means that it is not possible to modify ground levels on sites which lie completely within the floodplain (when viewed in isolation), as there is no land available for lowering to bring it into the floodplain.

It is possible to provide off-site compensation within the local area e.g. on a neighbouring or adjacent site, or indirect compensation, by lowering land already within the floodplain, however, this would be subject to detailed investigations and agreement with the Environment Agency to demonstrate (using an appropriate flood model where necessary) that the proposals would improve and not worsen the existing flooding situation or could be used in combination with other measures to limit the impact on floodplain storage.

Should it not be possible to achieve all the level for level compensation required, the Environment Agency should be consulted to explore and discuss alternatives.

[43] Flood Risk Assessments: Climate Change Allowances: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances [Accessed May 2024].
[44] CIRIA (2004) CIRIA Report 624: Development and Flood Risk - Guidance for the Construction Industry.

While the use of stilts and voids below buildings may be an appropriate approach to mitigating flood risk to the buildings themselves, such techniques should not normally be relied upon for compensating for any loss of floodplain storage. This is because voids do not allow the free flow of water, trash screens get blocked, voids get silted up, they have limited capacity, and it is difficult to stop them being used for storing belongings or other materials. In line with the latest planning guidance, it is recommended that voids are not used as a form of mitigation i.e. compensatory storage.

Recommendation: As referenced within this section, all new development within Flood Zone 3 must not result in a net loss of flood storage capacity. Where proposed development results in a change in building footprint, land raising or other structures such as bunds, the developer must ensure that it does not impact upon the ability of the floodplain to store water and should seek opportunities to provide betterment with respect to floodplain storage. Floodplain compensation must be provided on a level for level, volume for volume basis on land which does not already flood and is within the site boundary. Where land is not within the site boundary, it must be in the immediate vicinity, in the applicant's ownership and linked to the site. Floodplain compensation must be considered in the context of the 1% AEP (1 in 100 year) flood level including an allowance for climate change. This should be discussed and agreed with the Environment Agency.

9.3 Groundwater

The majority of the HDC area has a negligible groundwater flood risk, however there are areas around the River Adur and Arun where risk is greater, primarily surrounding Upper Beeding and to the east of Pulborough.

Recommendation: For all proposed developments in groundwater risk areas, groundwater monitoring during periods of high groundwater (winter/spring) should be included in all FRAs, unless adequate justification can be provided by the applicant to exempt the proposed development from this requirement.

Additionally, slope stabilisation and reprofiling measures should be avoided wherever possible, to minimise/prevent disruption to groundwater flows, and the aggravation of groundwater flood risk elsewhere.

Where the installation of foundations and associated excavation works is required for proposed developments, these should either take place above the maximum height of the groundwater table (as confirmed by on-site groundwater monitoring), or shall implement appropriate pumping and SuDS to dewater the excavated area and to mitigate against the loss of groundwater storage.

9.4 Working with Natural Processes

Natural flood management involves techniques that aim to work with natural hydrological and morphological processes, features, and characteristics to manage the sources and pathways of flood waters. Techniques include the restoration, enhancement and alteration of natural features and characteristics, but exclude traditional flood defence engineering that works against or disrupts these natural processes.

There are a number of opportunities available to reduce the causes and impacts of flooding through Working with Natural Processes (WWNP). This involves implementing measures that help to protect, restore, and emulate the natural functions of catchments, floodplains, rivers, and the coast. WWNP takes many forms and can be applied in urban and rural areas, and on rivers, estuaries, and coasts. Potential natural processes are detailed in Table 9-1.

As part of a research project undertaken by the Flood and Coastal risk Management Research and Development Programme and the Environment Agency[45], a series of spatial datasets have been generated for these natural processes, identifying their best estimate of locations in the country where the methods can be applied (Table 9-1). As well as reducing the causes and impacts of flooding, WWNP has a number of environmental, social, and cultural benefits, including water quality, habitat, climate regulation, health access, air quality, and aesthetic quality. Although WWNP methods have very promising benefits, they are relatively new concepts, and more research is required to gain a greater understanding of their impacts in different conditions and representation in models. The WWNP data does not provide information on design, which may need to consider issues such as drain-down between flood events. It is important to note that land ownership and change to flood risk have not been considered. Locations identified may have more recent building or land use than available data indicates.

[45] Working with natural processes to reduce flood risk: https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/working-with-natural-processes-to-reduce-flood-risk [Accessed May 2024].

Appendix A, Figure A12 provides information from the Environment Agency's 'Working with Natural Processes' spatial datasets and displays where these measures could be applied within the HDC area.

Recommendation: Where possible, all new developments should explore the opportunity to implement natural processes to alleviate flooding. This should be discussed and agreed with HDC.

Table 9-1: Description of WWNP datasets

Natural Process	Benefits	Most Effective Conditions	Notes
Floodplain Woodland Planting Potential	Slows floodwaters and increases water depth on the floodplain. Reduces flood peaks, delays flood peak timing and desynchronises flood peaks. Enhances sediment deposition on the floodplain.	Middle and lower reaches of medium-sized and large catchments.	Based upon Flood Zone 2. Information is largely based on modelled data and open access constraints data. It is indicative rather than specific. Locations may have more recent building or land use than the available data indicates.
Riparian Woodland Planting Potential (woodlands on land immediately adjoining a watercourse)	Slows flood flows. Reduces sediment delivery to the watercourse. Reduces bankside erosion. Creates below ground storage.	At the reach scale in middle and upper catchments.	Based upon a 50m buffer of available OS Open Data river networks. Information is largely based on open data and is indicative rather than specific. Locations may have more recent building or land use than the available data indicates.
Wider Catchment Woodland	Intercepts, slows, stores and filters water. Reduced flood peaks, flood flows and frequency.	Small events on small catchments – extent of reduction decreases as flood magnitude increases.	Based upon the 1:50k BGS geology survey and relies upon identifying drift and bedrock geologies that are characteristic of slowly permeable soils. Information is largely based on the 100m gridded version of BGS data and open constraints data and is indicative rather than specific.
Floodplain Reconnection Potential (reconnecting watercourses and floodplains)	Encourages more regular floodplain inundation and floodwater storage. Decreases the magnitude and delays the onset of flood peaks. Reduces downstream floodplain depths.	High frequency, low return period floods.	Designed to support signposting of areas where there is currently poor connectivity such that flood waters are constrained to the channel and flood waves may therefore propagate downstream rapidly. Based upon the Risk of Flooding from Rivers and Sea probability maps and identifies areas of low and very low probability that are close to a watercourse, but do not contain residential properties or key services (may contain non-residential properties).
Runoff Attenuation Features (3.33% and 1% AEP) (includes swales, ponds, and sediments traps)	Delays and flattens the hydrograph and reduces peak flow locally for small flood events.	A cluster of features working as a network throughout the landscape.	Based upon the Risk of Flooding from Surface Water datasets and identifies areas of high flow accumulations for the 1% and 3.33% AEP surface water maps. The areas of ponding or accumulation are between 100 and 5000 metres squared and have been tagged where they fall on an area of slope steeper than 6% as gully blocking opportunities.

9.5 Surface Water Management

Development should be designed so that there is no increase in flood risk elsewhere and the development will be safe from surface water flooding.

Drainage systems must be designed such that flooding does not occur in any part of a site for the 3.33% (1 in 30 year) rainfall event (including the relevant allowance for climate change), and so that flooding does not occur in any part of a building, or in any utility plant susceptible to water within the development for the 1% AEP (1 in 100 year) rainfall event (including the relevant allowance for climate change). Exceedance flows resulting from rainfall in excess of the 1% AEP (1 in 100 year) rainfall event must be managed in such a way that minimises the risks to people and property[46].

With respect to peak runoff rates discharged from developments, these should never exceed the greenfield runoff rates for the annual (1 in 1 year) and 1% AEP (1 in 100 year) rainfall events (including relevant allowances for climate change) for greenfield developments. For developments on brownfield sites, the peak runoff rates must be as close to the greenfield runoff rates for the annual (1 in 1 year) and 1% AEP (1 in 100 year) rainfall events (including relevant allowances for climate change) as reasonably practicable and should not exceed the runoff rates from the site prior to redevelopment for these two events.

Proposed drainage systems should be able to accommodate multiple consecutive rainfall events by ensuring that they can empty within 48 hours. As it is not possible to design for every rainfall event, it is important that excess flows can be managed safely during rainfall events exceeding that for which the proposed drainage system has been designed for.

The 'Water. People. Places. A guide for master planning sustainable drainage into developments' document outlines the design requirements for SuDS, and the delivery stages for SuDS that should be followed by developers within the WSCC area[47].

The relevant allowances for climate change (described in Table 3-4) should be identified through reference to the lifetime of the development:

- For development with a lifetime beyond 2100, use the upper end allowances for the 2070s epoch.
- For development with a lifetime of between 2061 and 2100 use the central allowance for the 2070s epoch.
- For a development with a lifetime up to 2060 use the central allowances for the 2050s epoch.

Recommendation: All new developments should incorporate a range of SuDS to target the required water quantity, quality, amenity and biodiversity benefits, unless it can be demonstrated that SuDS are not technically appropriate. Proposed SuDS should be designed such that surface water runoff rates from greenfield developments should not exceed greenfield runoff rates for the annual and 1% AEP rainfall events, and so that surface water runoff rates for brownfield developments should not exceed existing runoff rates and should be as close to greenfield runoff rates as reasonably practicable.

For each new development, SuDS guidance should be developed to inform future management. A maintenance schedule must be prepared for all proposed SuDS, which will identify the body responsible for the maintenance and continuing funding of these. Developers should adhere to the guidance within the 'Water. People. Places.' Document from the LLFAs of the South East of England.

9.6 Sustainable Drainage Systems

Suitable surface water management measures should be incorporated into new development designs in order to reduce and manage surface water flood risk to, and posed by, a development. This should ideally be achieved by incorporating SuDS.

[46] DEFRA Sustainable Drainage Systems Non-statutory technical standards for sustainable drainage systems (March 2015): https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/415773/sustainable-drainage-technical-standards.pdf [Accessed May 2024].

[47] Water, People, Place - A guide for master planning sustainable drainage into developments: https://www.susdrain.org/files/resources/other-guidance/water_people_places_guidance_for_master_planning_sustainable_drainage_into_developments.pdf [Accessed May 2024].

SuDS are typically softer engineering solutions inspired by natural drainage processes such as ponds and swales which manage water as close to its source as possible. However, harder engineering solutions such as oversized pipes and tanks are often relied upon to provide adequate surface water storage to meet design requirements. It is recommended that preference be given to above ground SuDS in line with best practice.

Wherever possible, a SuDS technique should seek to contribute to each of the three following goals:

- To control the quantity and rate of surface water runoff from a development,
- To improve the quality of the surface water runoff,
- To provide wider landscape, amenity, and wildlife benefits to the development site and its surroundings.

According to the PPG, the aim should be to discharge surface water runoff as high up the following hierarchy of drainage options as reasonably practicable:

- Into the ground (infiltration),
- To a surface water body,
- To a surface water sewer, highway drain, or another drainage system, and,
- To a combined sewer.

SuDS techniques can be used to reduce the rate and volume, and to improve the water quality of surface water discharges from sites to the receiving environment (i.e. natural watercourse or public sewer etc). The SuDS manual[48] identifies several processes that can be used to manage and control runoff from developed areas. Each option can provide opportunities for storm water control, flood risk management, water conservation and groundwater recharge. Reference should be made to the non-statutory technical standards[49] for guidance on the design, maintenance, and operation of SuDS.

- Infiltration: The soaking of water into the ground. This is the most desirable solution as it mimics the natural hydrological process. The rate of infiltration will vary with soil type and condition, the antecedent conditions and with time. The process can be used to recharge groundwater sources and feed baseflows of local watercourses, but where groundwater sources are vulnerable or there is risk of contamination, infiltration techniques are not suitable. Where infiltration is proposed, the findings of a detailed ground investigation undertaken at the same location and depth as the proposed infiltration system, should underpin the SuDS design.
- Detention/Attenuation: The slowing down of surface flows before their transfer downstream, usually achieved by creating a storage volume and a constrained outlet. In general, though the storage will enable a reduction in the peak rate of runoff, the total volume will remain the same, just occurring over a longer duration.
- Conveyance: The transfer of surface runoff from one place to another e.g. through open channels, pipes and trenches.
- Water Harvesting: The direct capture and use of runoff on site e.g. for domestic use (flushing toilets) or irrigation of urban landscapes. The ability of these systems to perform a flood risk management function will be dependent on their scale, and whether there will be a suitable amount of storage always available in the event of a flood.

As part of any SuDS scheme, consideration should be given to the whole life management and maintenance of the SuDS to ensure that it remains functional for the lifetime of the development. All parts of the drainage system should be designed to be accessible at all times and location in private property should be avoided, wherever possible. It is advisable that a maintenance plan be submitted with the drainage application, including details of access arrangements, the safety of operatives, and the frequency of maintenance. The adopting organisation may require

[48] CIRIA C697 SuDS Manual
[49] Sustainable drainage systems non-statutory technical standards: https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards [Accessed May 2024].

the developer to maintain the drainage system for a minimum period of one year, so that problems can be identified and addressed.

As per Policy 38 in the Horsham District Planning Framework, all new developments that have potential to increase flood risk are required to incorporate SuDS, where technically feasible, to ensure there is no increase in surface water runoff from new developments. It is recommended that Policy 38 of the Horsham District Planning Framework be reviewed once the legislation regarding SABs is released.

The application of SuDS is not limited to a single technique per site. Often a successful SuDS solution will utilise a combination of techniques, providing flood risk, pollution, and landscape/wildlife benefits. In addition, SuDS can be employed on a strategic scale, for example with a number of sites contributing to a large scale jointly funded and managed SuDS. However, it should be noted that each development must offset its own increase in runoff and attenuation cannot be “traded” between developments.

SuDS should be considered and integrated into the site layout at the early stages of planning to reduce the risk of abortive work associated with needing to modify the site layout to include SuDS at a later stage, and so that the principles of a surface water drainage strategy can be agreed through consultation with the LLFA and HDC. The existing and proposed drainage outfall points for the site must be agreed with relevant stakeholders before fixing the site layout.

Georeferenced as built drawings of proposed SuDS must be supplied to WSCC as the LLFA, together with CCTV or any other surveys used to support the drainage design, for inclusion in their Asset Register. Table 9-2 details typical SuDS components, as well as their common uses.

Table 9-2*: Typical SuDS Components (Y = primary process, * = some opportunities subject to design)*

Technique	Description	Conveyance	Detention	Infiltration	Harvesting
Pervious Surfaces	Pervious surfaces allow rainwater to infiltrate through the surface into an underlying storage layer, where water is stored before infiltration to the ground, reuse, or release to surface water.		Y	Y	*
Filter Drains	Linear drains/trenches filled with a permeable material, often with a perforated pipe in the base of the trench. Surface water from the edge of paved areas flows into the trenches, is filtered, and conveyed to other parts of the site.	Y	Y		
Filter Strips	Vegetated strips of gently sloping ground designed to drain water evenly from impermeable areas and filter out silt and particulates.	*	*	*	
Swales	Shallow vegetated channels that conduct and/or retain water and can permit infiltration when unlined.	Y	Y	*	
Ponds	Depressions used for storing and treating water.		Y	*	Y
Wetlands	As ponds, but the runoff flows slowly but continuously through aquatic vegetation that attenuates and filters the flow. Shallower than ponds. Based on geology these measures can also incorporate some degree of infiltration.	*	Y	*	Y
Detention Basin	Dry depressions designed to store water for a specific retention time.		Y		
Soakaways	Sub-surface structures that store and dispose of water via infiltration.			Y	
Infiltration Trenches	As filter drains but allowing infiltration through trench base and sides.	*	Y	Y	
Infiltration Basins	Depressions that store and dispose of water via infiltration.		Y	Y	
Green Roofs	Green roofs are systems which cover a building's roof with vegetation. They are laid over a drainage layer, with other layers providing protection, waterproofing and insulation. It is noted that the use of brown/green roofs should be for betterment purposes and not to be counted towards the provision of on-site storage for surface water. This is because the hydraulic performance during extreme events is similar to a standard roof.		Y		
Rainwater Harvesting	Storage and use of rainwater for non-potable uses within a building e.g. toilet flushing. It is noted that storage in these types of systems is not usually considered to count towards the provision of on-site storage for surface water balancing, given the sporadic nature of the use of harvested water, it cannot be guaranteed that the tanks are available to provide sufficient attenuation for the storm event.	*	*	*	Y

9.7 Flow routing

Redevelopment in areas at risk of flooding from surface water, river flooding or groundwater flooding has the potential to affect flood routing and increase flood risk elsewhere. For example, redevelopment may give rise to backwater effects or divert floodwaters on to other properties.

Consideration should be given to configuring road and building layouts to preserve existing flow paths and improve flood routing, whilst ensuring that flows are not diverted towards other properties. Consideration should be given to the use of fences and landscaping walls so as to prevent causing obstruction to flow routes and increasing the risk of flooding to the site or neighbouring areas.

Opportunities should be sought within site design to make space for water, such as:

- Identification of existing surface water or fluvial flow routes across the site, so that road and building layouts can be safely designed around them.
- Removing boundary walls or replacing with other boundary treatments such as hedges and fences (with gaps).
- Considering alternatives to solid wooden gates or ensuring that there is a gap beneath the gates to allow the passage of floodwater.
- On uneven or sloping sites, consider lowering ground levels to extend the floodplain without creating ponds. The area of lowered ground must remain connected to the floodplain to allow water to flow back to river when levels recede.
- Create under-croft car parks or consider reducing ground floor footprint and creating an open area under the building to allow flood water storage.
- Where proposals entail floodable garages or outbuildings, consider designing a proportion of the external walls to be committed to free flow of floodwater.

Recommendation: All new development should not adversely affect flood routing and thereby increase flood risk elsewhere. Opportunities shall be sought within the site design to make space for water.

10 Recommendations of how to address flood risk in development

A Site Assessment Database (as per Section 4.1.1) has been provided to HDC to help inform their Sequential Test. This offers a high-level overview of the sources of flood risk and provides a ranking system to determine the overall flood risk to each of the potential development sites that have been provided. The Site Assessment Database is designed to help inform the site allocation choices in conjunction with other planning considerations summarised within a separate Site Assessment Report and Sustainability Appraisal[50].

It may not always be possible to avoid locating development in areas at risk of flooding. This section builds on the findings of the SFRA to provide guidance on the range of measures that could be considered on site in order to manage and mitigate flood risk. These measures should be considered when preparing a site-specific FRA. The section outlines the approach that HDC should consider in relation to flood risk planning policy and development management decisions.

10.1 Sequential Approach

Flood risk should be considered at an early stage in deciding the layout and design of a site so that development in current and future medium and high flood risk areas can be avoided so far as possible. Most large development proposals include a variety of land uses of varying vulnerability to flooding. The sequential approach should be applied within development sites to locate the most vulnerable elements of a development in the lowest risk areas (considering all sources of flooding) e.g. residential elements should be restricted to areas at lower probability of flooding whereas parking, open space or proposed landscaped areas may be placed on lower ground with a higher probability of flooding. Adopting a sequential approach is the most effective measure for addressing flood risk as it is not reliant on measures such as flood defences, property level resilience, and flood warnings.

As per the NPPF, development should only be allowed in areas at risk of flooding where it can be demonstrated that: within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location; the development is appropriately flood resistant and resilient; it incorporates SuDS; any residual risk can be safely managed; and safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

Recommendation: A sequential approach to site planning should be applied within new development sites.

10.2 Appropriate types of development

Table 2 in the PPG provides a compatibility matrix and determines which types of development are appropriate in areas of flood risk.

Recommendation: Location of development shall take into account the vulnerability of users.

10.3 Previously developed sites

It is possible that some areas of previously developed land could come forward as part of the site allocation process which are now considered to be at risk from fluvial/tidal flooding.

Recommendation: Where buildings have been demolished within the functional floodplain (Flood Zone 3b) for a significant length of time (i.e. over a year), the land should be reverted back to functional floodplain and consequently, development should be avoided within these areas. Where a building(s) is already located in the functional floodplain, any proposals to regenerate/replace such building(s) will not increase the footprint any greater than the existing footprint.

[50] Horsham District Council Sustainability Appraisal Update 2023: https://www.horsham.gov.uk/__data/assets/pdf_file/0006/132378/Sustainability-Appraisal-Dec-23.pdf [Accessed August 2024]

10.4 Access / egress

Where development may be proposed in areas at risk of flooding, safe access and egress are required to enable the evacuation of people from the development, provide the emergency services with access to the development during times of flood, and enable flood defence authorities to carry out any necessary duties during periods of flood.

A safe access/egress route should allow occupants to safely enter and exit the buildings and be able to reach land outside the flooded area (e.g. within Flood Zone 1 or an area of low surface water flood risk) using public rights of way without the intervention of emergency services or others during design flood conditions, including climate change allowances. Where a dry route is not possible the FRA should provide an assessment of the flood hazard rating along the route and demonstrate that the route is a low hazard (as defined in the FD2320 Flood risk to people calculator[51]).

The guidance document 'Flood Risk Emergency Plans for New Development' published by the Environment Agency and ADEPT[52] provides more detail on safe access and escape.

Recommendation: Safe access / egress must be provided for new development in areas which are at risk of flooding and must reflect the type of flooding (source of flooding, scale of flooding, floodwater depth, and floodwater velocity) that the location is vulnerable to.

10.5 Flood warning and evacuation

The Environment Agency operates an effective flood warning service with respect to Main River and tidal flooding across England. Three different codes are issued depending on the type of flooding forecasted including Flood Alerts, Flood Warnings and Severe Flood Warnings (Section 8.4).

Information on these warnings can be issued via a number of methods[53]. The Environment Agency's website offers up-to-date flood information, monitoring information of river and sea levels and latest flood risk forecast, as well as a page to sign up to warnings by phone, text, email, or fax[54].

Evacuation is where flood alerts and warnings provided by the Environment Agency enable timely actions by residents or occupants to allow them to get to safety unaided, i.e. without the deployment of trained personnel to help people from their homes, businesses, and other premises. Rescue by the emergency services is likely to be required where flooding has occurred, and prior evacuation has not been possible.

For all developments proposed in Flood Zone 2 or 3, or in areas of medium to very high surface water flood risk, a Flood Warning and Evacuation Plan should be prepared to demonstrate what actions site users will take before, during and after a flood event to ensure their safety. The plan should also demonstrate that their development will not impact on the ability of the local authority and the emergency services to safeguard the current population.

For sites in Flood Zone 1 that are located on 'dry islands', it may also be necessary to prepare a Flood Warning and Evacuation Plan to determine potential egress routes away from the site through areas that may be at risk of flooding during the 1% AEP (1 in 100 year) fluvial flood event including an allowance for climate change, or a 0.5% AEP (1 in 200 year) tidal flood event including an allowance for climate change if tidal is the dominant source.

The Environment Agency has a tool on their website to create a Personal Flood Plan[55]. The Plan comprises a checklist of things to do before, during and after a flood and a place to record important contact details. Where proposed development comprises non-residential extension <250m^2 and householder development (minor development), it is recommended that the use of this tool to create a Personal Flood Plan will be appropriate.

[51] Defra Environment Agency Flood and Coastal Defence R&D Programme, 2004: https://assets.publishing.service.gov.uk/media/602a9348e90e070559970f9d/Operations_and_Maintenance_Concerted_Action_Report_pdf.pdf [Accessed May 2024].
[52] ADEPT, Environment Agency, September 2019, Flood Risk Emergency Plans for New Development: https://www.adeptnet.org.uk/floodriskemergencyplan [Accessed May 2024].
[53] Environment Agency Flood Warnings: Flood Guidance Statement: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/services/government/hazard-manager-flood-guidance.pdf [Accessed May 2024].
[54] Environment Agency, 2022, Check for Flooding in England: https://check-for-flooding.service.gov.uk/ [Accessed May 2024].
[55] Environment Agency Tool 'Make a Flood Plan'. Available from: https://www.gov.uk/government/publications/personal-flood-plan [Accessed May 2024].

Flood Warning and Evacuation Plans should include:

- How flood warning is to be provided, such as:
  - Availability of existing flood warning systems,
  - Where available, rate of onset of flooding and available flood warning time, and,
  - How flood warning is given.
- What will be done to protect the development and contents, such as:
  - How easily damaged items (including parked cars) or valuable items (important documents) will be relocated,
  - How services can be switched off (gas, electricity, water supplies),
  - The use of flood protection products (e.g. flood boards, airbrick covers),
  - The availability of staff/occupants/users to respond to a flood warning, including preparing for evacuation, deploying flood barriers across doors etc., and,
  - The time taken to respond to a flood warning.
- Ensuring safe occupancy and access to and from the development, such as:
  - Occupant awareness of the likely frequency and duration of flood events, and the potential need to evacuate,
  - Safe access route to and from the development,
  - If necessary, the ability to maintain key services during an event,
  - Vulnerability of occupants, and whether rescue by emergency services will be necessary and feasible, and,
  - Expected time taken to re-establish normal use following a flood event (clean-up times, time to re-establish services etc.).

There is no statutory requirement for the Environment Agency or the emergency services to approve evacuation plans. WSCC is accountable as the LLFA via planning condition or agreement to ensure that plans are suitable. This should be done in consultation with emergency planning staff.

Recommendation: A Flood Warning and Evacuation Plan, including safe access/egress routes and emergency planning measures, should be prepared as part of a FRA for all developments sited within areas at risk of flooding and that have potentially vulnerable users.

10.6 Finished Floor Levels

Where developing in Flood Zone 2 and 3 is unavoidable, the recommended method of mitigating flood risk to people, particularly with More Vulnerable (residential) and Highly Vulnerable development types (as outlined in Annex 3 of the NPPF), is to ensure internal floor levels are raised to a freeboard level above the design flood level including an appropriate allowance for climate change.

For fluvial flooding, the design flood is the 1% AEP (1 in 100 year) event plus an appropriate allowance for climate change, whilst for tidal flooding, the design flood is the 0.5% AEP (1 in 200 year) event plus an appropriate allowance for climate change. Less vulnerable development should also aim to raise the floor levels. Where this is not achievable, flood resilience measures should be incorporated. These measures should be detailed within the FRA.

With reference to the 'Flood risk assessment: standing advice for flood risk[56]', finished floor levels for vulnerable developments in Flood Zone 2 and 3, or within areas of medium to very high surface water or groundwater flood risk, should be a minimum of 600mm above the estimated flood level, unless there is a high level of certainty about the estimated flood level, in which case it can be reduced to 300mm. If there is a particularly high level of uncertainty this level may need to be increased. The guidance document "Accounting for residual uncertainty: an update to the

[56] Preparing a flood risk assessment standing advice: https://www.gov.uk/guidance/flood-risk-assessment-standing-advice [Accessed May 2024].

fluvial freeboard guide – technical report"[57] explains how to determine the appropriate residual uncertainty allowances. The process involves identifying sources of uncertainty in the datasets upon which the assessment is based, estimating the magnitude of residual uncertainties, and determining the appropriate response. The resulting residual uncertainty allowances range from 300mm to 900mm.

In certain situations (e.g. for proposed extensions to buildings with a lower floor level or conversion of existing historical structures with limited existing ceiling levels), it could prove impractical to raise the internal ground floor levels to the required height. The FRA standing advice for flood risk stipulates that in these cases the design should be made sufficiently flood resilient and resistant by:

- using flood resistant materials that have low permeability to at least 600mm above the estimated flood level.
- making sure any doors, windows or other openings are flood resistant to at least 600mm above the estimated flood level.
- using flood resilient materials (for example lime plaster) to at least 600mm above the estimated flood level.
- by raising all sensitive electrical equipment, wiring and sockets to at least 600mm above the estimated flood level.
- making it easy for water to drain away after flooding such as installing a sump and a pump.
- making sure there is access to all spaces to enable drying and cleaning.
- ensuring that soil pipes are protected from back-flow such as by using non-return valves.

The FRA standing advice for flood risk also states that the details of emergency escape plans for any parts of a building below the estimated flood level should also be provided as part of a FRA.

In addition to the measures outlined in the FRA standing advice for flood risk, it is also recommended that the following steps be taken to ensure that the design of a building is flood resilient and resistant:

- ensuring that all waste pipes are protected from back-flow by using non-return valves.
- ensuring that all doors are flood-resistant doors and have not been tampered with, for example through the installation of a cat flap.
- all utilities servicing the building must be watertight.
- voids should have smart air bricks which utilise in-built sensors to regulate air flow in response to changes in humidity and temperature.

Recommendation: For More Vulnerable and Highly Vulnerable developments within Flood Zones 2 and 3a the finished floor levels for the lowest room of a building should be set above the minimum ground level of the site, above the adjacent road to the building, or above the estimated flood level for the design flood, depending on which of these three values is highest. For minor extensions, the finished floor levels of the lowest room of a building should be no lower than existing floor levels or above the estimated flood level for the design flood. The design flood here pertains to either the 1% AEP (1 in 100 year) fluvial event with an appropriate allowance for climate change, or the 0.5% AEP (1 in 200 year) tidal event with an appropriate allowance for climate change. The required freeboard value for the finished floor levels of developments is defined within the Environment Agency's online standing advice for flood risk assessments[58].

10.7 Flood resistance and resilience strategies

There is a range of flood resistance and resilience construction techniques that can be implemented in new developments to mitigate potential flood damage. The Department for Levelling Up, Housing and Communities (DLUHC) have published a document 'Improving the Flood Performance of New Buildings, Flood Resilient

[57] Accounting for residual uncertainty an update to the fluvial freeboard guide: https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/accounting-for-residual-uncertainty-an-update-to-the-fluvial-freeboard-guide?web=1&wdLOR=c7DCE6B52-35F0-469F-843D-3238FA827B79 [Accessed May 2024].
[58] Environment Agency 'Preparing a Flood Risk Assessment: Standing Advice': https://www.gov.uk/guidance/flood-risk-assessment-standing-advice [Accessed May 2024].

Construction'[59], the aim of which is to provide guidance to developers and designers on how to improve the resistance and resilience of new properties to flooding through the use of suitable materials and construction details. Figure 10-1 provides a summary of the Water Exclusion Strategy (flood resistance measures) and Water Entry Strategy (flood resilience measures) which can be adopted depending on the depth of floodwater that could be experienced.

Recommendation: Where proposing development or redevelopment in areas at risk of flooding, flood resilience and resistance strategies should be implemented to reduce damage in a flood and increase the speed of recovery. These measures should be designed to accommodate the 1% AEP event plus climate change flood level and should not be normally relied on for new development as an appropriate mitigation method. Where resilience and resistance measures are required, proposals must include details of their construction, removal, the party responsible for their maintenance, and the cost of replacement when they deteriorate.

10.7.1 Flood resistance design strategies

Resistance measures are aimed at preventing water ingress into a building (Water Exclusion Strategy): they are designed to minimise the impact of floodwaters directly affecting buildings and to give occupants more time to relocate ground floor contents. These measures will only be effective for short duration, low depth flooding i.e. less than 300mm, although these measures should be adopted where depths are between 300mm and 600mm and there are no structural concerns.

In areas at risk of flooding of low depths (<300mm), implement flood resistance measures such as:

- Using materials and construction with low permeability,
- Land raising,
- Landscaping e.g. creation of low earth bunds (subject to this not increasing flood risk to neighbouring properties),
- Raising thresholds and finished floor levels e.g. porches with higher thresholds than main entrance,
- Flood gates with waterproof seats, and,
- Sump and pump for floodwater to remove water faster than it enters.
- Properties (residential and commercial) to have smart water butts installed

There are a range of property flood protection devices available on the market, designed specifically to resist the passage of floodwater. These include removable flood barriers and gates designed to fit openings, vent covers and stoppers designed to fit WCs. These measures can be appropriate for preventing water entry associated with fluvial flooding as well as surface water and sewer flooding. The efficacy of such devices relies on them being deployed before a flood event occurs. It should also be considered that devices such as air vent covers, if left in place by occupants as a precautionary measure, may compromise safe ventilation of the building in accordance with Building Regulations.

[59] CLG (2007) Improving the Flood Performance of New Buildings, Flood Resilient Construction: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/7730/flood_performance.pdf [Accessed May 2024].

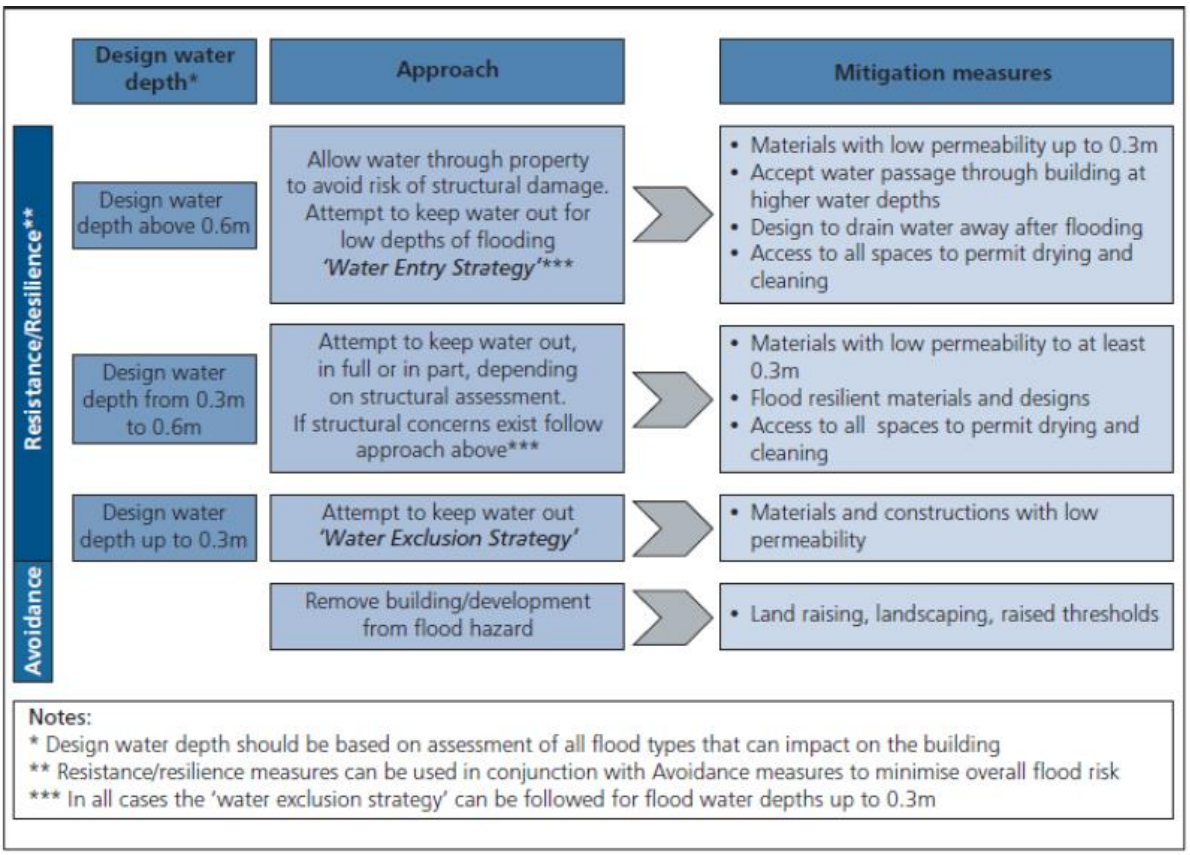


Figure 10-1: Flood Resistant/Resilient Design Strategies, Improving Flood Performance (DHLUC 2007)

10.7.2 Flood resilience design strategies

For flood depths greater than 600mm, it is likely that structural damage could occur in traditional masonry construction due to excessive water pressures. In these circumstances, the strategy should be to allow water into the building, but to implement careful design in order to minimise damage and allow rapid re-occupancy. This is referred to as the Water Entry Strategy. These measures are appropriate for uses where temporary disruption is acceptable and suitable flood warning is received.

Materials should be used which allow the passage of water whilst retaining their structural integrity and they should also have good drying and cleaning properties. Alternatively sacrificial materials can be included for internal and external finishes; for example, the use of gypsum plasterboard which can be removed and replaced following a flood event. Flood resilient fittings should be used to at least 100mm above the design flood level. Resilience measures are either an integral part of the building fabric or are features inside a building that will limit the damage caused by floodwaters.

In areas at risk of frequent or prolonged flooding, implement flood resilience measures such as:

- Use of materials with either, good drying and cleaning properties, or sacrificial materials that can easily be replaced post-flood.
- Design for water to drain away after flooding.
- Design access to all spaces to permit drying and cleaning.
- Raise the level of electrical wiring, appliances, and utility meters.
- Coat walls with internal cement-based renders; apply tanking on the inside of all internal walls.
- Ground supported floors with concrete slabs coated with impermeable membrane.
- Tank basements, cellars, or ground floors with water resistant membranes.
- Use plastic water resistant internal doors.

Further specific advice regarding suitable materials and construction techniques for floors, walls, doors and windows and fittings can be found in 'Improving the Flood Performance of New Buildings, Flood Resilient Construction[59].

Structures such as bus, bike shelters, park benches and refuse bins (and associated storage areas) located in areas with a high flood risk should be flood resilient and be firmly attached to the ground and designed in such a way as to prevent entrainment of debris which in turn could increase flood risk and/or breakaway posing a danger to life during high flows.

Appendix A - Figures

Figure A1: Topography

Figure A2: Bedrock Geology

Figure A3: Watercourses and River Catchments

Figure A4: Environment Agency Recorded Flood Outlines

Figure A5: Sewer Flooding Incidents

Figure A6: Environment Agency Flood Zones

Figure A7: Future Fluvial and Tidal Flood Extent

Figure A8: Groundwater Flooding

Figure A9: Surface Water Extents

Figure A10: Reservoir Flood Extents

Figure A11: Flood Warning Areas

Figure A12: Opportunities to Reduce the Causes and Impacts of Flooding

Appendix B – Hydraulic Model Review

Appendix C – Sequential Test Database

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Appendix 3

Topographical Survey

SRP1029-SVS-XX-XX-D-Y-0001

Appendix

General Notes:

1) Please note that this is not a full utility mapping survey of Greenway Junior School, Greenway, Horsham, RH12 2JS. The areas surveyed are highlighted within the survey extents as provided by the client. If any excavations are planned outside of the survey extents highlighted by the green hatching on the drawing, it is recommended that further surveying is undertaken in the required area.

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Date	Revision History Incl Suitability Code	Revision
MAR 2026	First Issue S2	P01

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Tel: 0845 5675677

SURVEY LEGEND

GENERAL

AFR ADDED FROM RECORDS
A/R ASSUMED ROUTE
AV AIR VALVE
BD BACKDROP
BH BOREHOLE
BL BED LEVEL
BLK BLOCKED
BO BOLLARD
BS BUS STOP
BTIC BT INSPECTION COVER
BW BRICK WALL
CC CONTROL CABINET
CG CATTLE GRID
CH CHANNEL LEVEL
CL COVER LEVEL
Conc CONCRETE
Corr CORRUGATED
CP COPING LEVEL
C/Pit CATCH PIT
CPS CONCRETE PAVING SLABS
CSE RQ CONFINED SPACE ENTRY REQUIRED
CW COMBINED WATER
CWMH COMBINED WATER MANHOLE
DP DOWN PIPE
EB ELECTRICITY BOX
EL EAVE LEVEL
EOT END OF TRACE
EOL END OF LANE
EP ELECTRICITY POLE
ER EARTHING ROD
FH FIRE HYDRANT
FIR FURTHER INVESTIGATION REQUIRED
FM FLOW METER
FW FOUL WATER
FWMH FOUL WATER MANHOLE
GB GAUGE BOARD
GG GAS LINE
GL GROUND LEVEL
GP GATE POST
GU GULLY
GV GAS VALVE
H HIGH
HOR HEAD OF RUN
HW HEADWALL
IC INSPECTION COVER
IL INVERT LEVEL
IML IMAGE LOST
JB JUNCTION BOX
KIG KERB INLET GULLY
LB LETTER BOX
LH LAMP HOLE
LP LAMP POST
MH MANHOLE
MK MARKER POST
MP MILE POST
MW MONITORING WELL
ND NO DEPTH
NVD NO VISIBLE DUCT
NVI NO VISIBLE INLET
NVO NO VISIBLE OUTLET
NVP NO VISIBLE PIPE
OH OVERHEAD
OSBM ORDNANCE SURVEY BENCH MARK
PD PERFORATED DRAIN
PE PENSTOCK
PM PARKING METER
PO POST
PZ PIEZOMETER
RB RUBBISH BIN
RE RODDING EYE
RL RIDGE LEVEL
RS ROAD SIGN
RTW RETAINING WALL
RWP RAIN WATER PIPE
SA SAPLING
S/Away SOAKAWAY
SC STOP COCK
SE SERVICE (UNIDENTIFIED)
SL SOFFIT LEVEL
SP SIGN POST
STN SURVEY STATION
SV SLUICE VALVE
SW SURFACE WATER
SWMH SURFACE WATER MANHOLE
TBM TEMPORY BENCH MARK
TCB TELEPHONE CALL BOX
TH TRIAL HOLE
TL TRAFFIC LIGHT
TP TELEGRAPH POLE
TS TREE STUMP
UD/CF UNKNOWN DUCT/CABLE FORMATION
UTL UNABLE TO LIFT
UTS UNABLE TO SURVEY
UTT UNABLE TO TRACE
VA VALVE
VP VENT PIPE
WL WATER LEVEL
WM WATER METER
WO WASH OUT
WP WOODEN POST
WV WATER VALVE

FENCE TYPES

BWF BARBED WIRE FENCE
CBF CLOSE BOARDED FENCE
CLF CHAINLINK FENCE
CPF CHESTNUT PALING FENCE
CWF CHICKEN WIRE FENCE
IRF IRON RAILING FENCE
IWF INTERWOVEN FENCE
LLF LARCH LAP FENCE
PRF POST & RAIL FENCE
PWF POST & WIRE FENCE
TR TRELLIS

PAS:128 LEGEND

QUALITY LEVELS	LOCATION ACCURACY		SUPPORTING DATA
	HORIZONTAL	VERTICAL	
AFR(B4) A/R(B4)	Undefined	Undefined	A Utility segment which is suspected to exist but has not been detected and is therefore shown as an assumed route (A/R), or taken from records (AFR).
(B3)	±500mm	Undefined (No reliable depth measurement possible).	Horizontal location only of the utility detected by one of the geophysical techniques used.
(B2)	±250mm or ±40% of detected depth, whichever is greater.	±40% of detected depth.	Horizontal and vertical location of the utility detected by one of the geophysical techniques used.
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Banking: Top / Bottom
Caution! Further Investigation is required to utility.
Hedge
Wall
Gate
Building
Fence

LEGEND & ABBREVIATIONS

E Electricity Unknown
SL Street Light
LV Low Voltage Cable
HV High Voltage Cable
EHV Extra High Voltage Cable
Overhead Elec (LV/SL)
>> Overhead HV Cable
>>> Overhead EHV Cable
ER Earth Cable
G(LP) Low Pressure Gas Pipe
G(MP) Medium Pressure Gas Pipe
G(IP) Intermediate Pressure Gas Pipe
G(HP) High Pressure Gas Pipe
W Water Pipe
BT BT Cable
Overhead BT Cable
COMM Communication Cable
CHEM Chemical Pipe
CATV TV Cable
GPR Located by GPR
RADIO Located by Radio Signal
POWER Located by Power Signal
ED Empty Duct
CCTV CCTV Cable
F/O Fibre Optic Cable
TCSU Traffic Sensor
TS Traffic Signal Cable
U Unknown Service
EF Effluent Pipe
SW Surface Water Drainage
FW Foul Water Drainage
CW Combined Drainage
FU Fuel Main
FS Ferric Sulphate
H Heating Pipe
Oil Oil Pipe Line
Overhead Pipe
Band Of Utility
X Assumed Route
Chamber
Survey extents
Inaccessible area
Utility Continues
Utility Ends

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SITE LOCATION



LEVELLING NOTES
All levels and Co-ordinates are Above Ordnance Datum, fixed to the OS Network by GPS using GPS Active Network and transformed using the OSTN15 model.
All level potitions are indicated by a cross or as noted

MORGAN SINDALL

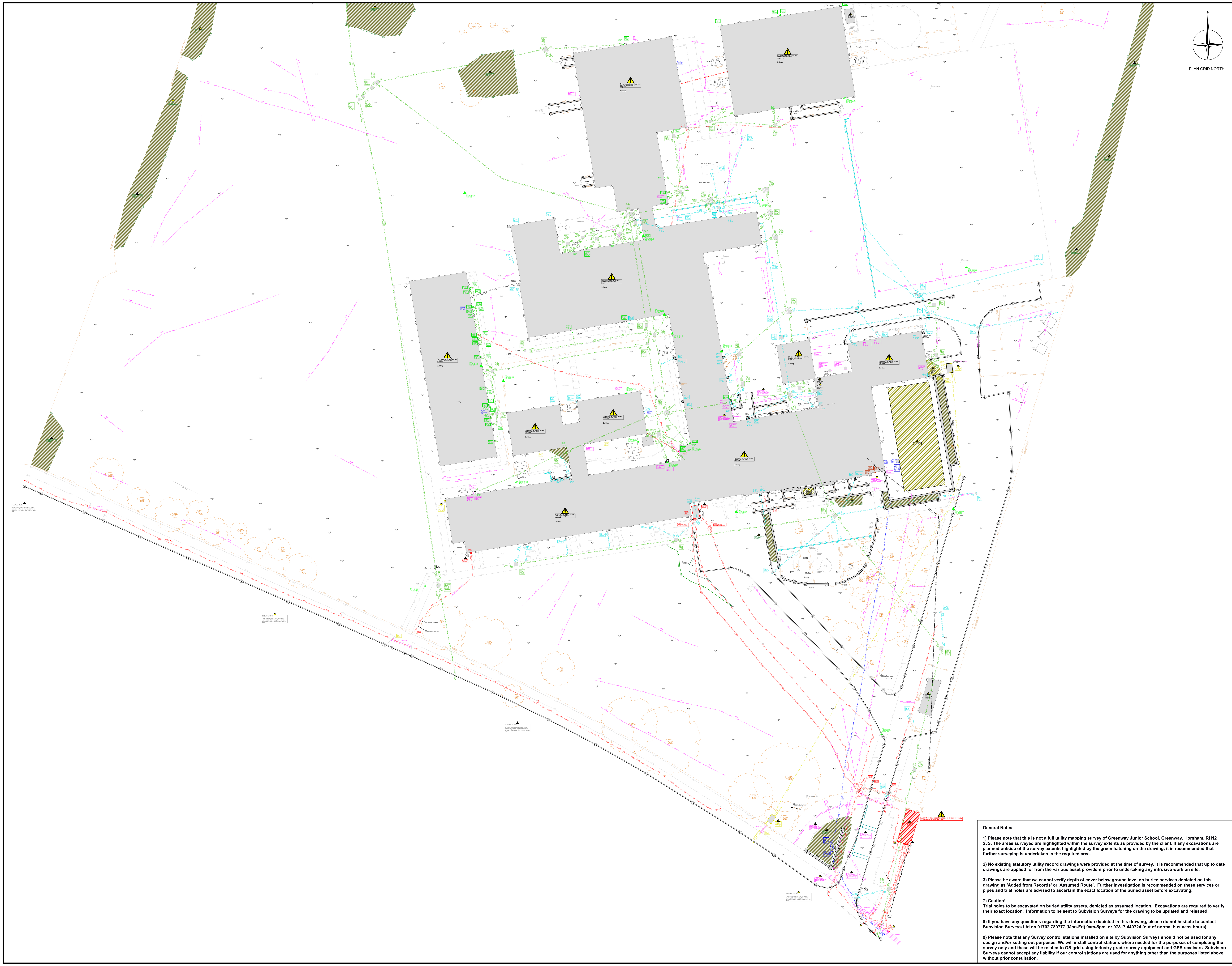
Project title: 3D PAS128 GPR Utility Mapping and 3D Topographical Survey

Drawing title: Greenway Junior School, Greenway, Horsham, RH12 2JS

Client: Morgan Sindall

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Surveyed by	Checked by	Approved by	Date
JH/BH/JB/AM/KN	KC	JH	MAR 2026



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SRP1029-SVS-XX-XX-D-Y-0001 P01 S2 FOR INFORMATION	P01

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SURVEY LEGEND

GENERAL

AFR	ADDED FROM RECORDS	LB	LETTER BOX
A/R	ASSUMED ROUTE	LH	LAMP HOLE
AV	AIR VALVE	LP	LAMP POST
BD	BACKDROP	MH	MANHOLE
BH	BOREHOLE	MK	MARKER POST
BL	BED LEVEL	MP	MILE POST
BLK	BLOCKED	MW	MONITORING WELL
BO	BOLLARD	ND	NO DEPTH
BS	BUS STOP	NVD	NO VISIBLE DUCT
BTIC	BT INSPECTION COVER	NVI	NO VISIBLE INLET
BW	BRICK WALL	NVO	NO VISIBLE OUTLET
CC	CONTROL CABINET	NVP	NO VISIBLE PIPE
CG	CATTLE GRID	OH	OVERHEAD
CH	CHANNEL LEVEL	OSBM	ORDNANCE SURVEY BENCH MARK
CL	COVER LEVEL	PD	PERFORATED DRAIN
Conc	CONCRETE	PE	PENSTOCK
Corr	CORRUGATED	PM	PARKING METER
CP	COPING LEVEL	PO	POST
C/Pit	CATCH PIT	PZ	PIEZOMETER
CPS	CONCRETE PAVING SLABS	RB	RUBBISH BIN
CSE RQ	CONFINED SPACE ENTRY REQUIRED	RE	RODDING EYE
CW	COMBINED WATER	RL	RIDGE LEVEL
CWMH	COMBINED WATER MANHOLE	RS	ROAD SIGN
DP	DOWN PIPE	RTW	RETAINING WALL
EB	ELECTRICITY BOX	RWP	RAIN WATER PIPE
EL	EAVE LEVEL	SA	SAPLING
EOT	END OF TRACE	S/Away	SOAKAWAY
EOL	END OF LANE	SC	STOP COCK
EP	ELECTRICITY POLE	SE	SERVICE (UNIDENTIFIED)
ER	EARTHING ROD	SL	SOFFIT LEVEL
FH	FIRE HYDRANT	SP	SIGN POST
FIR	FURTHER INVESTIGATION REQUIRED	STN	SURVEY STATION
FM	FLOW METER	SV	SLUICE VALVE
FW	FOUL WATER	SW	SURFACE WATER
FWMH	FOUL WATER MANHOLE	SWMH	SURFACE WATER MANHOLE
GB	GAUGE BOARD	TBM	TEMPORY BENCH MARK
GG	GAS LINE	TCB	TELEPHONE CALL BOX
GL	GROUND LEVEL	TH	TRIAL HOLE
GP	GATE POST	TL	TRAFFIC LIGHT
GU	GULLY	TP	TELEGRAPH POLE
GV	GAS VALVE	TS	TREE STUMP
H	HIGH	UD/CF	UNKNOWN DUCT/CABLE FORMATION
HOR	HEAD OF RUN	UTL	UNABLE TO LIFT
HW	HEADWALL	UTS	UNABLE TO SURVEY
		UTT	UNABLE TO TRACE
IC	INSPECTION COVER	VA	VALVE
IL	INVERT LEVEL	VP	VENT PIPE
IML	IMAGE LOST		
JB	JUNCTION BOX		
KIG	KERB INLET GULLY	WL	WATER LEVEL
		WM	WATER METER
		WO	WASH OUT
		WP	WOODEN POST
		WV	WATER VALVE

FENCE TYPES

BWF	BARBED WIRE FENCE	IWF	INTERWOVEN FENCE
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CWF	CHICKEN WIRE FENCE	TR	TRELLIS
IRF	IRON RAILING FENCE		

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Banking	Top / Bottom	Caution!	Further Investigation is required to utility.
Hedge		Wall	
Gate		Building	
Fence			

LEGEND & ABBREVIATIONS

E	Electricity Unknown	ED	Empty Duct
SL	Street Light	CCTV	CCTV Cable
LV	Low Voltage Cable	F/O	Fibre Optic Cable
HV	High Voltage Cable	TCSU	Traffic Sensor
EHV	Extra High Voltage Cable	TS	Traffic Signal Cable
	Overhead Elec (LV/SL)	U	Unknown Service
>>	Overhead HV Cable	EF	Effluent Pipe
>>>	Overhead EHV Cable	SW	Surface Water Drainage
ER	Earth Cable	FW	Foul Water Drainage
G(LP)	Low Pressure Gas Pipe	CW	Combined Drainage
G(MP)	Medium Pressure Gas Pipe	FU	Fuel Main
G(IP)	Intermediate Pressure Gas Pipe	FS	Ferric Sulphate
G(HP)	High Pressure Gas Pipe	H	Heating Pipe
W	Water Pipe	Oil	Oil Pipe Line
BT	BT Cable		Overhead Pipe
	Overhead BT Cable		Band Of Utility
COMM	Communication Cable	X	Assumed Route
CHEM	Chemical Pipe		Chamber
CATV	TV Cable		Survey extents
GPR	Located by GPR		Inaccessible area
RADIO	Located by Radio Signal		Utility Continues
POWER	Located by Power Signal		Utility Ends

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MORGAN SINDALL

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Client	Morgan Sindall

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Surveyed by	Checked by	Approved by	Date
JH/BH/JB/AM/KN	KC	JH	MAR 2026



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Appendix 4

Ground Investigations

3.1 SRP1029 Geotechnical and Geo-environmental Investigation

Appendix



Department for Education

Greenway Academy

Phase 2 Geo-environmental and Geotechnical Site Investigation

1921968-R02(00)

RSK GEOSCIENCES

DECEMBER 2021

RSK GENERAL NOTES

Project No.: 1921968 -R01(00)

Title: Phase 2 Geo-environmental and Geotechnical Site Investigation: Greenway Academy, greenway, Horsham, West Sussex, RH12 2JS

Client: Department for Education

Date: December 2021

Office: RSK Environment Limited, 18 Frogmore Road, Hemel Hempstead, Herts, HP3 9RT. Tel 01442 437500

Status: Rev 00

Author	Chris Duffield	**Technical reviewer**	Andrea Grossey/ Duncan Sharp
Signature		Signature	
Project manager	Andrea Grossey	**Quality reviewer**	
Signature		Signature	

Revision control sheet				
Revision ref.	**Date**	**Reason for revision**	**Amended by:**	**Approved by:**
Rev 00	03/12/2021	First issue	n/a	see above

RSK Environment Limited (RSK) has prepared this report for the sole use of the client, showing reasonable skill and care, for the intended purposes as stated in the agreement under which this work was completed. The report may not be relied upon by any other party without the express agreement of the client and RSK. No other warranty, expressed or implied, is made as to the professional advice included in this report.

Where any data supplied by the client or from other sources have been used, it has been assumed that the information is correct. No responsibility can be accepted by RSK for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

This work has been undertaken in accordance with the quality management system of RSK Environment Ltd. No part of this report may be copied or duplicated without the express permission of RSK and the party for whom it was prepared.

Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

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1.2 Objectives 1
1.3 Scope of works 1
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APPENDICES

Appendix A Service constraints
Appendix B Development drawings
Appendix C Summary of legislation and policy relating to land contamination
Appendix D Utility service plans
Appendix E Site photographs
Appendix F Technical background
Appendix G Exploratory hole records
Appendix H Ground gas monitoring data and site conditions
Appendix I Laboratory certificates for soil analysis
Appendix J Laboratory certificates for geotechnical analysis
Appendix K Generic Assessment criteria for human health
Appendix L Generic Assessment criteria for phytotoxic effects
Appendix M Generic Assessment criteria potable water supply pipes
Appendix N WM3 assessment

1 INTRODUCTION

1.1 Commissioning

RSK Environment Limited (RSK) was commissioned by Turner and Townsend, on behalf of Department for Education to carry out a Phase 2 Geo-environmental and Geotechnical Site Investigation of the land at Greenway Academy, Greenway, Horsham, West Sussex, RH12 2JS. The project was carried out to an agreed brief as set out in RSK's proposal (Ref. 1921968, T01, dated 27th August 2021).

RSK's Service Constraints are shown in Appendix A.

The Site in question is being considered for development for a continued school use.

1.2 Objectives

The objective of the work is:

- to identify any land contamination and/or geotechnical constraints to the proposed development; and
- to identify the need for any additional investigation or remediation works to demonstrate that the site is suitable for its proposed use.

1.3 Scope of works

The scope of this assessment has been developed in accordance with relevant British Standards and authoritative technical guidance as referenced through the report. The assessment of the contamination status of the site is in line with the technical approach presented in Land Contamination Risk Management (LCRM) (Environment Agency, 2021) – which supersedes CLR11 Model Procedures for Land Contamination – and in general accordance with BS 10175: 2011 + A2 2017 (BSI, 2017). It is also compliant with relevant planning policy and guidance.

The scope of the intrusive investigation has been designed in line with the recommendations of BS5930:2015+A1:2020 Code of practice for ground investigations (BSI, 2020), which maintains compliance with BS EN 1997-1 and 1997-2 and their related standards. It has also been developed in general accordance with BS 10175: 2011 + A2 2017. Ground gas assessment has been undertaken in general accordance with BS8576: 2013 and BS 8485:2015+A1:2019.

A brief summary of relevant legislation and policy relating to land contamination is given in Appendix C.

The scope of works for the assessment has included the following:

Intrusive Investigation

- 5 (no.) dynamic sampler boreholes to provisionally 5m depth with SPTs and ground gas monitoring installations;
- 2 (no.) foundation exposure pits;

- 2 (no.) Cable Percussive boreholes provisionally to 20m depth;
- 1 (no.) groundwater sampling visit (if groundwater encountered);
- 3 (no.) gas monitoring visits (if ground conditions deem gas generation beneath the site to be plausible);
- Laboratory analysis of selected soil and groundwater samples; and
- Factual and interpretive reporting.

1.4 Existing reports

A Preliminary Risk Assessment was prepared by RSK in July 2021 (ref: 1921968-R01(00)).

Pertinent information from this report has been summarised in **Section 2.**

1.5 Limitations

This report is subject to the RSK Service Constraints given in Appendix A and limitations that may be described through this document.

2 SITE DETAILS

2.1 Site location

Site location details are presented in **Table 1** and a site location plan is provided on Figure 1.

Table 1 Site location details

Site name	Greenway Academy
Full site address and KT3 6NUF	Greenway, Horsham, West Sussex, RH12 2JS
National Grid reference (centre of site)	516580, 131370

2.2 Site description

The Site boundary and current site layout are shown on Figure 2. The Site covers an area of c. 2.5 hectares. It is currently occupied by Greenway Academy.

There are a total of five teaching blocks on site, the buildings date from the 1950s through to the 2010s. The buildings approximately occupy the western half of the site with the eastern side being occupied by a playing field. The site is not only used by the school but also a privately run nursery who lease one of the buildings. There are cricket nets in the north east corner of the site used by a local cricket team.

2.3 Surrounding land uses

The Site is located in the north-west of Horsham. Approximately 1 km from the town centre, the surrounding use is predominantly a residential setting. Other surrounding land uses include a cricket club 115m north and a golf centre 145m north-west.

2.4 Development plans

It is understood that the proposed development if for a 480 place junior school. The development will involve the demolition of most of the existing buildings (with exception to teaching blocks EFAC and EFAF), with two new modular blocks to be built in the south-west of the site. The larger modular block is to be double storey with a smaller adjoined storey and a half modular block. The buildings to be demolished will be replaced by an area of mixed hard and soft landscaping, the exact layout of which was not available at time of reporting. .

No details of the proposed ground levels have been provided therefore for the purpose of this report it has been assumed that the current levels will remain unchanged.

The proposed future layouts of the site, at the time of preparing this report, are shown in Appendix B.

3 OVERVIEW OF PRELIMINARY RISK ASSESSMENT

The preliminary risk assessment (PRA) includes a review of geological, hydrogeological and hydrological information, a commercially available Environmental Database Report (including historical plans) and information from a site walkover. The information is used to develop an initial conceptual site model (CSM) to consider any potentially complete pollutant linkages. The PRA is presented in full in the RSK 2021 report and summarised in the following sections.

3.1 History of site and surrounding area

Earliest mapping shows the site as featureless other than trees and is assumed to be a field/open space. The school is first seen on historic maps from the early 1960s in which the layout is broadly similar to that seen in the present day. Some minor extension and addition of smaller buildings have taken place since 1970s up until relatively recently circa 2006.

Historically the surrounding area was rural. A brick pit was present to the north-east which became woodland by the 1960s and later a recreation ground to present day. Extensive residential development took place around the site post World War 2. There has been ongoing residential development in the area up until the present day.

3.1.1 Unexploded ordnance

As part of the RSK Preliminary Risk Assessment report a preliminary UXO risk assessment was carried out by 1st Line Defence Ltd. in June 2021. The report concluded that there is a low risk from UXO contamination on the site. It was recommended that no further action be taken on the site.

3.2 Relevant information from the environmental database report

No contemporary trade directory entries were identified that were considered to be a potential source of contamination on the site.

No national or internationally designated sensitive land uses such as sites of special scientific interest (SSSI) were identified in the vicinity of the site

3.3 Site geology

3.3.1 Anticipated geological sequence

Published records (British Geological Survey) for the area indicate the geology of the site to be characterised by bedrock of the Upper Tunbridge Wells Sand (Mudstone) in the east of the site and Upper Tunbridge Wells Sand (Sandstone and Siltstone Interbedded) in the west. There are no superficial deposits record on site. There has been development on site and the presence of made ground should be expected.

The Park Farm fault line is shown to bisect the site from north to south, down-throwing to the west. The BGS geological mapping indicates that the presence of the fault defines the boundary between the two geological units present on site.

3.4 Hydrogeology

The Upper Tunbridge Wells Sand is designated a Secondary 'A' Aquifer.

The two closest BGS borehole records (353 m and 383 m north west) record relatively shallow groundwater strikes at 8 mbgl and 10.5 mbgl. Groundwater flow is likely to be in the direction and flow of the nearby Boulding's Brook (west and south-west).

There are no groundwater abstractions within 500m of the site. The site is not located within a Source Protection Zone (SPZ).

3.5 Hydrology

There are no surface water features on site. There is a small stream associated with Bolding's Brook approximately 75 m west of the site.

There are no surface water abstractions within 500 m of the site.

3.6 Site Walkover

A site reconnaissance survey was completed on 23rd June 2021. With the exception of an electrical substation being present on the site's south-eastern boundary, no potentially significant land contamination or geotechnical issues were identified during the site reconnaissance survey.

3.7 Preliminary Geotechnical Constraints

The key findings of the initial geotechnical assessment were:

- Potential for sudden lateral changes in ground conditions across the site (potential variations in depth of made ground and differing bedrock condition of the Upper Tonbridge Wells Sands due to the presence of the fault);
- Potential below ground sub-structures from current and former building foundations and drainage runs or soakaway chambers (if present);
- Filled and made ground prior to initial development of the site (where adjacent former brickfield is adjacent to the sites north-eastern boundary);
- Adverse ground chemistry (potential for weathering of sulphide to sulphate and aggressive ground conditions on concrete); and
- Geological fault present across the centre of the site, which may impact foundation selection in this area.

3.8 Initial Conceptual Site Model

3.8.1 Potential sources of contamination

The potential sources identified by the Preliminary Risk Assessment are summarised in **Table 2**

Table 2 Potential Sources of Contamination

Potential sources	Contaminants of concern
On-site	
Localised made ground associated with development of the school	Unknown fill material but potentially including brick, ash and clinker and containing toxic and phytotoxic metals, inorganics, polycyclic aromatic hydrocarbons (PAHs) and asbestos
Off-site	
Electrical Substation/ Transformer (located on the sites south-eastern boundary)	PCBs, mineral oils
Historical brick field/pit on north-east boundary of site, including the potential of infill with unknown materials (likely to be inert waste)	Unknown fill material but potentially including brick, ash and clinker and containing toxic and phytotoxic metals, inorganics, polycyclic aromatic hydrocarbons (PAHs) and asbestos Ground gas - elevated methane, carbon dioxide, carbon monoxide

3.8.2 Sensitive receptors and linking exposure/migration pathways

Sensitive receptors identified by the Preliminary Risk Assessment at or in the vicinity of the site that could be affected by the potential sources identified are listed below, potential linking pathways are show in brackets for each item:

- current/ future site users – Staff, pupils, site visitors [migration and ingress of ground gases into buildings, build-up in confined spaces and explosion/ asphyxiation];
- current/ adjacent site users – residential users [migration and ingress of ground gases into buildings, build-up in confined spaces and explosion/ asphyxiation]; and
- current/ future buildings [migration and ingress of ground gases into buildings, build-up in confined spaces and explosion].

The assessment has identified receptors to include building structures and current/future end-users and adjacent users to the school site. It is considered however, that any ground gas generation from the infilled brickfield/pit located on the sites north-eastern boundary is likely to migrate and vent at surface due to this area comprising a playing field and hence the lack of hardstanding at surface.

It is also likely that any made ground underlying the site will be of minimal thickness due to the lack of significant redevelopment of the school site since being constructed in the 1960's. Therefore, this source is unlikely to be considered for significant gas generation.

3.8.3 Potentially Complete Contaminant Linkages

Potentially complete contaminant linkages with a potential risk of '**Moderate to Low'** or identified by the Preliminary Risk Assessment comprise:

- Future site users of the school – from localised, but direct contact (including inhalation, ingestion and dermal contact) with potentially contaminated soils, dust, fibres originating from made ground within localised areas on site;
- Future site users of the school – from ingress into proposed buildings* and inhalation of ground gases from the historic infilled brickfield located on the north-eastern boundary; and
- Future proposed buildings at the school site* - from ingress and containment of ground gases in confined areas causing explosion.

These potentially complete contaminant linkages need to be assessed further through appropriate site investigation to target the identified sources of potential contamination and assess the feasibility of identified pathways.

*It is considered that these linkages (relating to the migration of ground gas/vapours into buildings) will only be applicable should future development proposals include for new buildings on the north western boundaries of the site. The generation potential of this source is considered to be low and therefore any buildings developed away from the north-western site boundary is unlikely to be considered a potential linkage.

Should ground conditions differ from those assumed within the CSM, then refinement of the CSM will be required and further assessment to determine the potential impact of all pollutant linkages identified.

3.9 Data gaps and uncertainties

Key data gaps and uncertainties identified in the CSM at desk study stage include:

- The exact proposed development is unknown but understood to comprise re-development of the school to include demolition of existing buildings and construction of new buildings within close proximity to the existing structures;
- The interior of the school was not accessed due to the school being in use during the walkover. It is assumed unseen areas are normal school use and therefore unlikely to be relevant in respect to contaminated land;
- Depth to groundwater below site and flow direction has been assumed at this stage;
- The composition and thickness of the made ground on site is unknown;
- The weathered nature of the Upper Tonbridge Wells Sands and unsaturated zone beneath the site is assumed at this stage; and
- A precautionary approach has been taken in respect to the historic brickfield/ pit that was adjacent to the north-east border of the site. The nature of any infill and its potential to generate ground gas that could migrate on to the fringe of the site is unknown at this stage, however, risks not considered significant due to intervening soft landscaping and assumed nature of fill (Inert waste).

4 SITE INVESTIGATION STRATEGY & METHODOLOGY

4.1 Introduction

RSK carried out intrusive investigation works and subsequent monitoring of boreholes between 27th October 2021 and 25th November 2021. A selection of photographs taken during the site works is presented as Appendix E.

4.2 Objectives

The specific objectives of the investigation were as follows:

- to establish the ground conditions underlying the site including the extent and thickness of any made ground;
- to investigate specific potential sources of contamination identified in initial CSM;
- to determine the ground gas regime underlying the site;
- to assess geotechnical properties of soils; and
- to address data gaps identified by the Preliminary Risk Assessment.

4.3 Selection of investigation methods

The techniques adopted for the investigation were chosen with consideration of the objectives and site constraints, which are described below.

Cable percussion drilling was chosen based on the targeted drill depth, requirement for in-situ geotechnical data, the opportunity to collect both disturbed and undisturbed samples and install monitoring wells. This was supplemented by dynamic (window) sampling to obtain a number of investigation locations and install further monitoring wells. Hand pits was chosen to allow accurate and careful digging around building foundations.

Prior to conducting intrusive works, utility service plans were obtained and buried service clearance undertaken in line with RSK's health and safety procedures. Copies of statutory service records obtained by RSK as part of the agreed scope of works are contained in Appendix D.

4.4 Investigation strategy

The ground investigation was carried out using intrusive ground investigation techniques in general accordance with the recommendations of BS5930:2015+A1:2020, which maintains compliance with BS EN 1997-1 and 1997-2 and their related standards. Whilst every attempt was made to record full details of the strata encountered in the boreholes, techniques of hole formation and sampling will inevitably lead to disturbance, mixing or loss of material in some soils and rocks.

The investigation comprised an exploratory investigation. The investigation strategy generally involved non-targeted boreholes and foundation trial pits.

The constraints to the investigation were as follows:

- Buried infrastructure (e.g., drainage, electric) on the site.

Breaking out of hardstanding was required at the foundation inspection pits around the school buildings.

Details of the investigation locations, installations and rationale are presented in **Table 3**. An exploratory hole location plan is shown on Figure 2.

Table 3 Exploratory hole and monitoring well location rationale

Investigation type	Number	Designation	Maximum Depth (mbgl)	Monitoring well installations	Rationale examples below
Boreholes by cable percussive methods	2	BH101 and BH102	7.00	Gas/ groundwater	To prove the geological succession beneath the site and obtain geotechnical data.
Boreholes by dynamic/ windowless sampling methods	4	WS101 to WS104	2.30-3.15	Gas/ groundwater	To determine the contamination status of the ground beneath the site and obtain geotechnical data.
Trial-pits excavated by hand	2	FP101 and FP102	1.00-1.50	None	Foundation inspection pits of select buildings on site to determine existing foundation design.

4.4.1 Implementation of investigation works

The exploratory holes were logged by an engineer in general accordance with the recommendations of BS5930:2015+A1:2020 (which incorporates the requirements of BS EN ISO 14688-1, 14688-2 and 14689-1).

The monitoring well construction and associated response zones are detailed on the exploratory hole records in Appendix G. The response zones were installed to target identified gas generation sources or migration pathways detailed in the initial preliminary CSM.

The soil sampling and analysis strategy was designed to characterise each encountered soil strata, permit an assessment of the potential contaminant linkages identified and investigate the geotechnical characteristics. In addition, samples were taken to allow for geo-environmental and geotechnical testing to be undertaken.

Soils collected for laboratory analysis were placed in a variety of containers appropriate to the anticipated testing suite required. They were dispatched to the laboratory in cool boxes under chain of custody documentation. Samples were stored in accordance with the RSK quality procedures to maintain sample integrity and preservation and to minimise the chance of cross contamination.

4.5 Monitoring programme

4.5.1 Ground gas monitoring

In line with the initial CSM, response zones were installed to target the sources or pathways as detailed in **Table 2**.

3 (no.) monitoring rounds have been undertaken to provide data to support refining of the CSM. The number of monitoring rounds undertaken is in general accordance with the decision matrix presented as Figure 6 of BS8576 for a low source generation potential and medium sensitivity development.

A calibrated infrared gas meter was used to measure gas flow, concentrations of carbon dioxide (CO_2), methane (CH_4) and oxygen (O_2) in percentage by volume, while hydrogen sulphide (H_2S) and carbon monoxide (CO) were recorded in parts per million.

Initial and steady state concentrations were recorded. In addition, all wells were screened with a PID to establish if there are any interferences and cross-sensitivity of other hydrocarbons with the infrared gas meter.

The atmospheric pressure before and during monitoring, together with the weather conditions, were recorded. The monitoring included periods of falling atmospheric pressures and after/during rainfall.

All ground gas monitoring results together with the temporal conditions are contained within Appendix H. Equipment calibration certificates are available on request.

4.6 Laboratory testing

Laboratory testing was undertaken at a UKAS accredited laboratory with ISO17025 and MCERTS accredited test methods were specified where applicable for contamination testing and as shown in the laboratory test certificates appended.

4.6.1 Chemical analysis of soil samples

The soil sampling strategy was designed to characterise made ground and natural strata typically within the upper 1.0m of the ground profile whilst also characterising deeper strata and the potential for contaminant migration from relevant sources of identified within the preliminary CSM.

The programme of chemical tests undertaken on soil samples obtained from the intrusive investigation is presented in **Table 4** with the laboratory testing results contained in Appendix I.

Table 4 Summary of chemical testing of soil samples

Stratum	Tests undertaken	No. of tests
Topsoil	Speciated total petroleum hydrocarbons (TPH), 16 (no.) speciated polycyclic aromatic hydrocarbons (PAH), metals (arsenic, boron, cadmium, chromium, copper, lead, mercury, nickel and zinc), sulphate, pH	2

	Asbestos	1
	Soil organic matter	1
Made ground	Speciated total petroleum hydrocarbons (TPH), 16 (no.) speciated polycyclic aromatic hydrocarbons (PAH), metals (arsenic, boron, cadmium, chromium, copper, lead, mercury, nickel and zinc), sulphate, pH	2
	Soil organic matter	1
	Asbestos identification and quantification (if present)	2
	VOCs and SVOCs	2
Upper Tunbridge Wells Sand (undifferentiated)	Speciated total petroleum hydrocarbons (TPH), 16 (no.) speciated polycyclic aromatic hydrocarbons (PAH), metals (arsenic, boron, cadmium, chromium, copper, lead, mercury, nickel and zinc), sulphate, pH	6
	Asbestos identification and quantification (if present)	1
	Soil organic matter	2

4.6.2 Geotechnical analysis of soils

Where appropriate disturbed, bulk and undisturbed soil samples were taken for geotechnical classification testing with the depth and nature of samples detailed within the exploratory hole records.

Where appropriate, testing was undertaken in accordance with BS 1377:1990 Method of Tests for Soils for Civil Engineering Purposes or, where superseded, by the relevant part of BS EN ISO 17892:2014 Geotechnical investigation and testing - Laboratory Testing of Soil. Tests carried out in order to classify the concrete class required on-site have been undertaken following the procedures within BRE SD1:2005.

The programme of geotechnical tests undertaken on samples obtained from the intrusive investigation is presented in **Table 5**. The results and UKAS accreditation of tests methods are shown in Appendix J.

Table 5 Summary of geotechnical testing undertaken

Strata	Tests undertaken	No. of tests
Upper Tunbridge Well Sand (undifferentiated)	Moisture Content	10
	Liquid/plastic limits	6
	Single stage triaxial	3
	BRE SD1 Brownfield Pyritic ground (Determination of sulphate class and ACEC classification)	6

5 SITE INVESTIGATION FACTUAL FINDINGS

The results of the intrusive investigation and subsequent geo-environmental and geotechnical laboratory analysis undertaken are detailed below.

5.1 Ground conditions encountered

The descriptions of the strata encountered, notes regarding visual or olfactory evidence of contamination, list of samples taken, field observations of soil and groundwater, in-situ testing and details of monitoring well installations are included on the exploratory hole records presented in Appendix G.

The exploratory holes revealed that the site is underlain by weathered Upper Tunbridge Wells Sand bedrock with no superficial deposits present. Locally, made ground is present which was identified in three of the exploratory holes. The ground conditions encountered appears to confirm the stratigraphical succession described within the preliminary CSM.

For the purpose of discussion, the ground conditions encountered during the fieldworks are summarised in **Table 6** with the strata discussed in subsequent subsections.

Table 6 General succession of strata encountered

Stratum	Exploratory holes encountered	Depth to top of stratum m bgl	Proven thickness (m)
Hardstanding cover (tarmac and/or concrete)	FP101 and FP102	Ground level	0.04 to 0.25
Topsoil	BH101, BH102, WS101 to WS 104	Ground level	0.2 to 0.34
Made Ground	FP101, FP102 and WS101	0.15 to 0.25	0.25 to 0.90
Upper Tunbridge Wells Sand undifferentiated (weathered)	All exploratory hole locations	0.2 to 1.05	1.10 to 5.8 *
*Encountered to full depth of all boreholes, thickness represents proven depth			

5.1.1 Made ground

The made ground generally comprised a cohesive soil with a minor proportion of granular material with rare brick and charcoal. The made ground ranged in thickness from 0.20 to 0.90 m and is likely reworked soils from the Upper Tunbridge Sand.

5.1.2 Upper Tunbridge Sand

This stratum was encountered directly beneath the topsoil or made ground (where present) and comprised a firm greyish brown silty clay, which transitioned to stiff and then very stiff with depth.

The clay was sometimes described as slightly fine sandy or with pockets of fine sand and had interbeds of very hard siltstone. It extended beyond a depth of 7m bgl, the maximum depth of the investigation. The strata encountered is interpreted as weathered mudstone or siltstone.

The field descriptions of the weathered material encountered do not allow for an accurate distinction between the two different Tunbridge Wells Sand units (mudstone and sandstone/siltstone), as at shallow depths both were recovered as a silty clay. However, discernible difference in Plasticity Index was apparent from the laboratory test results.

BH101 located to the east of the site resulted in notably higher Plasticity Index (PI) percentages when compared to those of BH102 drilled to the west of the site. The higher PI (difference between Liquid Limit and Plastic Limit) could be attributable to a higher percentage of clay as apparent in mudstone when compared to a sandstone/siltstone. These finding also correlate with the anticipated geological model for the area (as discussed in **Section 3.3**), with the east of the site likely to comprise a mudstone as a result of the fault line bisecting the site.

A summary of the in-situ and laboratory test results recorded in the stratum are presented in **Table 7** and **Table 9** for each unit.

Table 7 Summary of in-situ and laboratory test results for Upper Tunbridge Wells Sand- Mudstone

Soil parameters	Min. Value	Max. Value	Reference
Moisture content (%)	14	32	Appendix J
Modified moisture content (%)	14	32	Appendix J
Liquid limit (%)	70	72	Appendix J
Plasticity limit (%)	27	33	Appendix J
Plasticity index (%)	39	43	Appendix J
Modified plasticity index (%)	39	43	Appendix J
Plasticity term	Very High	Very High	Appendix J
Volume change potential	Medium	High	Appendix J
SPT 'N' values	7	>50	Appendix G
Undrained shear strength inferred from SPT 'N' values (kN/m^2)*	30.1	>215	Appendix G
Undrained shear strength from hand vane testing (kN/m^2)*	50	90	Appendix G
Undrained shear strength measured by triaxial testing (kN/m^2)**	364**	364**	Appendix J
Consistency term from field description	Firm	Very Stiff	Appendix G
Strength term (inferred from Triaxial testing)	Extremely high**	Extremely high**	Appendix J
Notes: *derived using a Stroud Factor of 4.3 ** Based on single test			

Table 8 Summary of in-situ and laboratory test results for Upper Tunbridge Wells Sand- Sandstone and Siltstone

Soil parameters	Min. Value	Max. Value	Reference
Moisture content (%)	14	30	Appendix J
Modified moisture content (%)	14	30	Appendix J
Liquid limit (%)	42	46	Appendix J
Plasticity limit (%)	24	27	Appendix J
Plasticity index (%)	18	19	Appendix J
Modified plasticity index (%)	18	19	Appendix J
Plasticity term	Intermediate	Intermediate	Appendix J
Volume change potential	Low	Low	Appendix J
SPT 'N' values	7	>50	Appendix G
Undrained shear strength inferred from SPT 'N' values (kN/m^2)*	40.6	>290	Appendix G
Undrained shear strength from hand vane testing (kN/m^2)*	81	89	Appendix G
Undrained shear strength measured by triaxial testing (kN/m^2)**	339	364	Appendix J
Consistency term from field description	Firm	Very Stiff	Appendix G
Strength term (inferred from Triaxial testing)	Extremely high	Extremely high	Appendix J
Notes: *derived using a Stroud Factor of 5.8			

5.1.3 Visual/olfactory evidence of soil contamination

Beside the presence of anthropogenic materials (mainly fragments of brick and charcoal), there was no visual/olfactory evidence of contamination within made ground deposits and underlying natural strata.

5.2 Groundwater and surface water

5.2.1 Groundwater encountered during intrusive works

Groundwater was encountered during the intrusive investigation works as detailed on the logs in Appendix G. Groundwater was encountered in BH101 and BH102 only. Groundwater was recorded as a seepage at 5.0m bgl in BH101. In BH102 a water strike was recorded at 5m. After 0.5 hours the water was recorded to have risen to 4.50m bgl.

5.2.2 Groundwater encountered during monitoring

Resting groundwater levels recorded during the monitoring programme are summarised in **Table 9** based on the data provided in Appendix H. Field data measurements are also shown in Appendix G.

Table 9 Summary of groundwater monitoring results

Monitoring well	Response zone stratum	Depth to water min (mbgl)	Depth to water max (mbgl)	Groundwater elevation (m AOD) – min.	Groundwater elevation (m AOD) – max.	Base of well (m AOD)
BH101	Upper Tunbridge Wells Sand	1.895	3.94	41.388	39.343	38.563
BH102		0.82	2.14	42.618	41.298	41.288
WS101		2.53	DRY	40.955	DRY	40.885
WS102		1.66	1.66	40.25	DRY	40.24
WS103		0.42	DRY	42.428	42.258	40.738
WS104		1.23	DRY	41.698	DRY	40.808

The findings reflect that groundwater is likely isolated pockets of perched water as opposed to being part of a continuous groundwater body or surface water pooling within the monitoring well.

Notwithstanding the above, it is noted that a programme of long term monitoring would be required to record any seasonal variations in water levels.

5.2.3 Visual/olfactory evidence of groundwater contamination

There was no visual/olfactory evidence of contamination in groundwater during well development or monitoring.

5.3 Existing foundations

Two foundation exposure pits were undertaken to observe existing building foundations as summarised below. The trial pit drawings are presented in Appendix G.

5.3.1 Building EFAA West (FP101)

Foundation pit FP101 was excavated against the southern elevation of building EFAA on the western part of the building. The pit identified the presence of a concrete foundation extending to a depth of 0.77m bgl and bearing within the Upper Tunbridge Wells Sand (Clay).

5.3.2 Building EFAA East (FP102)

Foundation pit FP102 was excavated against the south elevation on the eastern part of building EFAA. FP102 identified the presence of a concrete foundation extending to a depth of 0.90 mbgl and bearing within the Upper Tunbridge Wells Sand (Clay).

5.4 Chemical laboratory results

The soil testing results are presented in Appendix I.

No asbestos was identified in any of the four (4 no) samples analysed by the laboratory.

5.5 Geotechnical laboratory results

The results of the geotechnical testing are discussed in **Section 8** and presented in Appendix J.

5.6 Ground gas monitoring

The results of the ground gas monitoring and testing carried out are given in Appendix H and discussed in **Section 6.**

6 GEO-ENVIRONMENTAL ASSESSMENT

6.1 Refinement of initial CSM

No additional sources from those at the PRA stage were identified. Though groundwater was encountered, this appears to be localised pockets and not a continuous ground water body. It is not considered a relevant receptor or source in the CSM.

The ground conditions were otherwise broadly as anticipated at PRA stage. The ground investigation has confirmed that there does not appear to be any superficial deposits present on site. Made ground was only identified in the foundation inspection pits, likely associated with the construction of the buildings and comprised reworked natural ground with anthropogenic inclusions which mainly included brick. There was no visual or olfactory evidence of contamination within the made ground and no material was identified within the made ground that is likely to have significant ground gas potential.

6.2 Linkages for assessment

As described in LCRM (Environment Agency, 2021), there are two stages of quantitative risk assessment (QRA), Tier 2 generic (GQRA) and Tier 3 detailed (DQRA). The GQRA comprises the comparison of soil, groundwater, soil gas and ground gas results with generic assessment criteria (GAC) that are appropriate to the linkage being assessed. This comparison can be undertaken directly against the laboratory results or following statistical analysis depending upon the sampling procedure that was adopted. This assessment relates to LCRM Stage 1, Tier 2 generic quantitative risk assessment

Following the refinement of the CSM, the potentially complete contaminant linkages that require further assessment and the methodology of assessment are presented in **Table 10.** Although not identified as a potential contaminated linkage at the time, an assessment into phytotoxicity has also been undertaken for completeness.

Table 10 Linkages for GQRA

Potentially relevant contaminant linkage	Assessment method
Soil data	
1. Oral, dermal and inhalation exposure with impacted soil, soil vapour and dust by future site users	Human health GAC in Appendix K for a proposed **secondary school end** use. Consideration given to the applicability of the use of Statistical Assessment.
2. Inhalation exposure of future residents to asbestos fibres	Qualitative assessment based on the asbestos minerals present, their form, concentration, location and the nature of the proposed development.
3. Uptake of contaminants by vegetation potentially impacting plant growth (phytotoxicity).	Comparison of soil data to GAC in Appendix L for phytotoxicity.

Potentially relevant contaminant linkage	Assessment method
4. Contaminants permeating potable water supply pipes	Comparison of soil data to GAC in Appendix M for plastic water supply pipes using UKWIR (2010) guidance.
Ground Gas	
5. Concentrations of methane and carbon dioxide in ground gas entering and accumulating in enclosed spaces or small rooms in new buildings, which could affect future site users. For methane this could create a potentially explosive atmosphere, while death by asphyxiation could result from carbon dioxide.	Borehole hazardous gas flow rates (Qhg) have been calculated using maximum (peak) methane and carbon dioxide concentrations and steady state flow rates in accordance with BS8485. This is subject to interpretation and use of professional judgement to designate the site or zones of the site characteristic situation by comparison to a Gas Screening Value (GSV) as appropriate and in line with the CSM. For applicable low-rise residential developments reference to NHBC guidance has also been considered.

6.3 Methodology and assessment of soil results

The analysis of laboratory results relating to soil samples submitted for testing is included in the following sections.

6.3.1 Oral, dermal and inhalation exposure with impacted soil by future occupants/site users

In order to assess the soil results against the appropriate GAC, the soil results have been split into appropriate data sets relevant to the oral, dermal and inhalation linkage. These included the made gorund and natural silty clay soils (including topsoil).

As an initial assessment, all soil results have been directly compared against the GAC for a secondary school end use.

The ratio of soil contaminant concentrations of genotoxic PAHs (benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(ah)anthracene, indeno(123-cd)pyrene and benzo(ghi)perylene) against benzo(a)pyrene have been compared against lower and upper limits set out in C4SL project methodology (CL:AIRE, 2014). All genotoxic PAH ratios were within the upper and lower bounds of the underlying toxicological study. Therefore, and in accordance with HPA guidance (HPA, 2010), the assessment of genotoxic PAHs has been based on the use of benzo(a)pyrene as a surrogate marker. Therefore, a risk from genotoxic PAHs is only considered likely if the respective benzo(a)pyrene concentrations exceed the relevant GAC.

6.3.1.1 Analysis of results

All results have been compared with the primary school GAC. A soil organic matter (SOM) of 2.5 % has been selected since laboratory results range from 0.9 % and 3.1 %.

Results indicate that all contaminants are below the relevant GAC therefore it is considered that a relevant contaminant linkage does not exist.

6.3.1.2 *Summary*

All samples tested were below the adopted GAC indicating both the made ground and natural soils (including topsoil) are suitable for use. Based on the above assessment, no potentially significant risks associated with the soil contamination have been identified and it is considered that the site may be regarded as suitable for the proposed end use.

6.3.2 Inhalation exposure of future occupants/site users to asbestos fibres

The scheduled laboratory screening for asbestos found no detectable asbestos fibres within the samples tested.

6.3.3 Uptake of contaminants by vegetation potentially inhibiting plant growth (phytotoxicity)

The results have been compared with the GAC presented in Appendix L for this linkage.

The results indicate that a relevant contaminant linkage is unlikely to exist associated with phytotoxic effects.

6.3.4 Impact of organic contaminants on potable water supply pipes

For initial assessment purposes, the results of the investigation have been compared with the GAC presented in Appendix M for this linkage, which are reproduced from *UKWIR Report 10/WM/03/21. Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites* (UKWIR, 2010).

The results indicate that a relevant linkage is unlikely to exist associated with organic contaminants and therefore pollutant polyethylene (PE) and/or polyvinyl chloride (PVC) water supply pipes are expected to be suitable for use on the development.

It should be noted that at the time of this investigation the future routes of water supply pipes had not been established, hence the investigation and sampling strategy may not be fully compliant with UKWIR recommendations. Consequently, a targeted investigation and specific sampling/analytical strategy may be required at a later date once the route(s) of the supply pipe(s) are known. In addition, it is recommended that the relevant water supply company be contacted at an early stage to confirm its requirements for assessment, which may not necessarily be the same as those recommended by UKWIR.

6.4 Ground gas risk assessment – bulk gases

6.4.1 Appropriate guidance

The risks to development from ground gases have been assessed in accordance with BS8485:2015+A1:2019 (BS8485), which provides guidance on ground gas (methane and carbon dioxide) characterisation and hazard assessment, as well as providing a framework for the prescription of protection measures within new buildings.

The process involves characterising the gas hazard from combining the qualitative assessment of risk (using the CSM) with ground investigation data so that a 'characteristic situation' (CS) can be derived for the site or zones within the site. Characteristic situations range from CS1 to CS6, the higher the CS, the higher the hazard potential. Gas protection

measures within new buildings can be prescribed using a point scoring system, taking into consideration the CS and the proposed building type.

BS8485 indicates that the gas hazard can be characterised using the following methods:

- an empirical semi-quantitative approach using gas monitoring data to determine the 'characteristic situation' of the site (or zones of the site) and subsequent protective measures (Wilson and Card approach);
- an empirical semi-quantitative approach using TOC data to determine the 'characteristic situation' of the site (or zones of the site) and subsequent protective measures (CL:AIRE RB17 approach); or
- detailed quantitative assessment methodologies.

For the purpose of this assessment, the empirical semi-quantitative approach above has been used to characterise the gas hazard and provide advice on the protective measures likely to be required within new buildings at the site.

6.4.2 Summary of the refined CSM for ground gas

In the assessment of risks and selection of appropriate mitigation measures, BS8485 highlights the importance of the conceptual model. In summary, potential sources of ground gas within influencing distance of the site identified in the preliminary conceptual side model comprise:

- Limited made ground associated with development on the site, TOC up to 6%.
- Historical brick pit beyond the north-east boundary of site, including potential infill with unknown materials

The laboratory testing of the soils found TOC of 0.41-1.82% (converted from SOM). Made ground was found to be between 0.57 m and 0.90 m thick and was localised round the existing buildings.

This assessment has been undertaken to assess risks to building structures and proposed end users. The assessment has not taken into consideration the health and safety of construction workers. Risks may still be present to construction workers especially where works include the entry into excavations within the ground. Construction workers should undertake appropriate risk assessments and risks should be managed through health and safety procedures and safe systems of work.

The risk assessment has been undertaken based on the current understanding of the CSM.

6.4.3 Empirical semi-quantitative approach using borehole monitoring data (Wilson and Card approach, BS8485)

6.4.3.1 Background

The empirical semi quantitative approach using gas monitoring data requires the designation of a gas screening value (GSV) for the entire site or zones within the site, which informs the hazard potential and associated prescribed ground gas protection measures within new buildings (where necessary). BS8485 defines the GSV as the *'flow*

rate (l/hr) of a specific hazardous gas ***representative of a site or zone****, derived from assessment of borehole concentration and flow rate measurements and taking account of all other influencing factors, in accordance with a conceptual site model'.*

BS8485 Section 6.3.1 outlines the process for developing a GSV for the site or a zone as follows:

- borehole hazardous gas flow rate (Q_{hg}) is calculated for each borehole standpipe for each monitoring event. The borehole hazardous gas flow rate is defined in BS8485 as the '*flow rate of a specific hazardous gas, either methane or carbon dioxide, from a borehole standpipe'*. The Q_{hg} is calculated from individual borehole measurements of total gas flow and the concentration of the specific hazardous gas. BS8485 states in Section 6.3.4 that the **maximum** gas concentration recorded during the monitoring event should be used, together with **steady-state** values of gas flows;
- the reliability of the measured gas flow rates and concentrations are assessed taking into account borehole construction;
- decisions are made about how to deal with any temporal or spatial shortages in the data; and
- judgements are made about what GSV to designate for use for design purposes taking all relevant information and the conceptual site model into account.

Once the Q_{hg} has been calculated for methane and carbon dioxide, individual borehole measurements are compared to the thresholds presented in Table 2 of BS8485 which inform the CS that directly relates to each individual measurement. Taking into account the site data (i.e. borehole gas concentration and flow rate to calculate the Q_{hg}) and all other influencing factors in accordance with the CSM, a decision can then be made regarding the GSV that is considered to be representative of the site or a zone within it.

Typical threshold concentrations of methane (1% v/v) and carbon dioxide (5% v/v), and flow rates (>70 l/h), are also considered when designating the GSV for the site or zone, which in turn dictates the hazard potential and CS. It is important to note that the site or zone characteristic GSV and maximum concentration or flow thresholds are guideline values and not absolute. The thresholds may be exceeded in certain circumstances, if the CSM indicates it is safe to do so.

6.4.3.2 Designation of a GSV for the site or zone

The results of the ground gas monitoring and testing undertaken, alongside site conditions at the time of monitoring, are given in Appendix H.

Consideration has been given to the presence of flooded or partially flooded response zones at the time of monitoring, with details of fully or partially flooded response zones detailed in Appendix H.

For the purposes of the current ground gas risk assessment, data from entirely flooded response zones has not been included in the risk assessment.

A summary of the maximum recorded concentrations per borehole (or minimum for oxygen) is presented in **Table 11** overleaf. This table also presents details of the response zone, maximum recorded initial and steady state flow rates and minimum recorded depth to water across all monitoring rounds.

The range of atmospheric pressure over the 3 (no.) monitoring rounds completed was 1013-1029 mbar and this was recorded to be falling during round 3.

Table 11 Summary of ground gas monitoring results

Exploratory position ID	Response zone top (mbgl)	Response zone base (mbgl)	Response zone geological unit	No. of monitoring rounds	Peak CH_4 max. (%/vol)	Steady-state CH_4 max. (%/vol)	Peak CO_2 max. (%/vol)	Steady-state CO_2 max. (%/vol)	Oxygen min. (%/vol)	Peak gas flow max. (l/hr)	Steady-state gas flow max. (l/hr)	Depth to water min. (m)	Depth to water max. (m)	Atm. pressure min. (mb)	Atm pressure max. (mb)
BH101	0.5	7.00	UTWS (M)	3	0.1	0.1	0.6	0.5	17.0	0.0	0.0	1.895	3.94	1014	1029
BH102	0.5	5.5	UTWS (M)	3	0.1	0.1	1.9	0.8	19.7	0.3	0.3	0.82	2.14	1013	1028
WS101	0.5	3.00	UTWS (M)	3	0.1	0.1	1.2	0.4	10.9	0.1	0.1	2.53	DRY	1013	1028
WS102	0.5	2.00	UTWS (S)	3	0.1	0.1	1.3	1.0	10.0	0.1	0.1	1.66	DRY	1013	1028
WS103	0.5	2.00	UTWS (S)	3	0.1	0.1	3.0	3.0	13.0	0.1	0.1	0.42	0.59	1014	1028
WS104	0.5	2.00	UTWS (M)	3	0.2	0.2	0.7	0.7	16.6	0.0	0.0	1.23	DRY	1014	1028

UTWS (M) = Upper Tunbridge Wells Sand (Mudstone)
UTWS (S) =Upper Tunbridge Wells Sand (Sandstone and Siltstone interbedded)

6.4.3.3 *Worst case check*

In accordance with BS8485, a 'worst case' Q_{hg} has been calculated across all data collected for the entire site, which has been calculated by multiplying the maximum recorded flow by the maximum recorded methane or carbon dioxide concentration.

A worst case Q_{hg} was calculated for CH_4 and CO_2 of 0.0006 l/hr and 0.009 l/hr, respectively as shown in **Table 12** below.

Table 12 Summary of ground gas monitoring results

Hazardous gas	GSV (l/h)	Justification for the GSV
Methane	0.0006	Worst case
Carbon dioxide	0.009	Worst case

Based on the Q_{hg}, the maximum concentrations and flows recorded, the CSM and the method for determining the CS presented within Table 2 of BS8485, the site has been characterised as **CS1.**

6.4.3.4 *Data Limitations*

It should be noted that there are inherent limitations in ground gas monitoring including spatial adequacy of monitoring locations, changes in groundwater levels, variation in temporal or atmospheric conditions and whether these have been adequately characterised by the scope of monitoring undertaken.

No credible ground gas source was identified during the site works and the CSM identified a low risk from ground gas. Monitoring has been carried out which confirms the assumptions of the CSM. The investigation undertaken to date has incorporated an appropriate number of ground gas monitoring visits, the data is considered reliable, and spatially representative of the site in the area of the proposed development.

6.4.4 BS8485 recommended ground gas protection measures

Based on the current understanding of the conceptual site model and the assessment undertaken, the site has been classified as CS1. Considering the foregoing and in accordance with BS8485, ground gas protective measures are not considered necessary within proposed buildings.

6.5 Uncertainties and implications in refined CSM and GQRA

In accordance with good practice, data gaps and uncertainties in the refined CSM have been identified at this stage. These are summarised in **Table 13** along with the likely implications.

Table 13 Data gaps and uncertainties

Data gap/ uncertainty	Details	Implications
Asbestos not found in made ground samples tested.	Although not encountered to date, asbestos containing	Vigilance should be maintained for any potential

Data gap/ uncertainty	Details	Implications
	material (ACM) could still be present in discrete locations.	ACM or fibrous material during below ground works.
Ground gas monitoring has not included periods of falling atmospheric pressure.	The worst case conditions for gas flow are unlikely to have been characterised, limiting the risk assessment.	Unlikely to be relevant, no credible ground gas source has been identified. Gas flow unlikely to significantly alter in different atmospheric pressure conditions.

7 PRELIMINARY WASTE ASSESSMENT

In accordance with the definition provided in the Waste Framework Directive (WFD), materials are only considered waste if 'they are discarded, intended to be discarded or required to be discarded, by the holder'. Naturally occurring soils are not considered waste if reused on the site of origin for the purposes of development. Soils such as made ground that are not of clean and natural origin (irrespective of whether they are contaminated or not) and other materials such as recycled aggregate, do not become waste until the criteria above are met. Further background information is provided in Appendix F.

Excavation arisings from the development may therefore be classified as waste if surplus to requirements or unsuitable for reuse. The following assessments assume the material tested is classified subsequently as waste.

7.1 Hazardous waste assessment

Technical Guidance WM3 (EA, 2018) sets out in its **Appendix D** requirements for waste sampling. It is a legal requirement to correctly assess and classify waste. The level of sampling should be proportionate to the volume of waste and its heterogeneity. The preliminary assessment provided below is based only upon the available sample results and may not be sufficient to adequately classify the waste.

7.1.1 Chemical contaminants

Envirolab, an RSK company, has developed a waste soils characterisation assessment tool (HASWASTE), which follows the guidance within Technical Guidance WM3. The analytical results have been assessed using this tool to assess the hazardous properties to support potential off-site disposal of materials in the future. Note that it is ultimately for landfills to confirm what wastes they are able to accept within the constraints of their permit.

Of the ten samples tested, all samples were not found to have hazardous properties based on this assessment. This suggests that if applicable the waste would require disposal at a suitably permitted inert or non-hazardous waste landfill.

7.1.2 Asbestos within waste soils

Technical Guidance WM3 requires that within a mixed waste the separately identifiable wastes be assessed separately.

For instance, where waste soil contains identifiable pieces of asbestos (visible to the naked eye) the asbestos should, where feasible, be separated from the soil and classified separately. This should be disposed of within a hazardous, stable non-reactive hazardous waste landfill or a special cell in a non-hazardous waste landfill.

No visible potential asbestos containing material was identified during the site works.

7.2 WAC assessment

No samples were submitted for waste acceptance criteria (WAC). It is likely that natural soils will be classified as inert waste.

7.2.1 Summary

The results of the waste assessment indicates that made ground is suitable for disposal as a non-hazardous waste, which would need to be confirmed with Waste Acceptance Criteria (WAC) testing during site redevelopment.

It is likely that the natural soils will be classed as an inert waste.

RSK recommends that a Sampling Plan be prepared to support any waste classifications and hazardous waste assessments, prior to any material being excavated. Given the level of data obtained, scale of the development and heterogeneity of the site soils, the following assessment should be considered indicative and further assessment should be undertaken following the preparation of a waste sampling plan.

It is recommended that all results be forwarded to the receiving landfill for their comment and approval.

8 GEOTECHNICAL ASSESSMENT

8.1 Proposed development

It is understood the development is likely to involve the demolition of most of the existing buildings (EFAC and EFAF to be retained), with two new modular blocks to be built in the south-west of the site. The larger modular block is to be double storey with a smaller adjoined storey and a half modular block.

No details of the proposed ground levels have been provided therefore for the purpose of this report it has been assumed that the current levels will remain unchanged.

8.2 Key geotechnical hazards/development constraints

The key risks identified from the available ground investigation data are discussed below:

- The Park Farm geological fault line (orientated generally north to south) is predicted to outcrop at surface beneath the site, down-throwing the natural geological succession to the west .
- Perched water within Upper Tunbridge Wells Sand Formation;
- Potential for sudden lateral changes in ground conditions across the site (potential variations in Upper Tunbridge Wells Sands);
- The presence of widespread cohesive deposits at shallow depths, which have been shown to have a medium to high volume change potential in the east and low in the west of the school site; and
- Potential for loss of strength in wet conditions due to a variable silt content in the weathered Upper Tunbridge Wells Sands Formation.

8.3 Foundations

8.3.1 Foundation options

The ground investigation has initially recorded very localised areas of made ground beneath the site, extending to a maximum depth of 0.90m associated with areas immediately surrounding existing buildings. No made ground was present in the area of the proposed development to the west of the existing school building.

Weathered Tunbridge Wells Sand Formation sub copped immediately beneath the made ground (where present) or below topsoil reaching beyond the terminal depth of investigation (7.0m bgl).

Laboratory testing recorded the Tunbridge Wells Sand Formation to comprise a low to high plasticity sandy clay. Laboratory strength tests recorded the Tunbridge Wells Sand Formation to comprise an extremely high strength soil. Locally perched waters were encountered within the Formation.

The exposure pits inferred the existing buildings to be supported on mass concrete footings extending to bear within the Tunbridge Wells Sand Formation at depths ranging between 0.77 m and 0.90 m below existing ground level.

The undisturbed Tunbridge Wells Sand Formation is anticipated to provide suitable bearing resistance for traditional spread foundations to support lightly to moderately loaded structures. However, foundations will need to extend below any made ground soils and any existing/future ground disturbance in addition to extending to a moisture stable horizon, which may be of significant depth within areas of tree influence.

Should the depth of the spread foundation, or the magnitude of the structural loads prove prohibitive, then piles would appear the most suitable alternative. It is recommended that structures are not supported on differing foundation solutions in order to prevent issues associated with differing settlement.

8.3.2 Spread foundations

The recommendations for the design and construction of spread foundations in relation to the ground conditions are set out in **Table 14**.

Table 14 Design and construction of spread foundations

Design/construction considerations	Design/construction recommendations
Founding stratum	Tunbridge Wells Sand Formation
Depth	Foundations should be taken to a minimum depth of 1.0m below the final or existing ground level, whichever is lower, and at least 0.2m into the founding stratum below any overlying made ground or to any greater depth required in respect of the special design considerations given below.
Special design considerations	
Shrinkable soils	Owing to the presence of shrinkable clay soils, foundations should be designed taking into account all the normal precautions, including minimum founding depths, to minimise the risk of future foundation movements in accordance with NHBC standards or similar. The findings of the ground investigation indicate that foundations should be designed for shrinkable soils of high volume change potential.
Variable founding soils	Owing to the potential lateral and vertical variability of the founding Tunbridge Wells strata across the fault line crossing the site in a north to south direction, consideration should be given to incorporating appropriate reinforcement to minimise the risk of future differential foundation movements.
Presumed bearing capacity	Strip foundations with a width of up to 1.0 m and constructed on the Tunbridge Wells Sand Formation at a minimum depth of 1.0 m may be designed using a presumed bearing capacity of 125 kN/m^2. The presumed bearing capacity includes a partial factor on bearing resistance of 3 against bearing capacity failure and maximum associated total settlement not exceeding 25 mm.

Design/construction considerations	Design/construction recommendations
Construction considerations	All foundation excavations should be inspected, and any made ground and soft, organic or otherwise unsuitable materials removed and replaced with mass concrete. The proposed founding stratum is a relatively silt-rich soil, hence susceptible to rapid softening once exposed. Hence all foundation excavations should immediately be blinded with concrete or the full foundation constructed. In the event that excavations are to remain open for longer periods, consideration should be given to the use of trench support systems.
Dewatering	The exploratory holes generally remained dry during drilling, but localised perched groundwater seepages were encountered in the deeper boreholes at 5m depth. Localised dewatering is therefore unlikely to be required to facilitate foundation excavation. The general cohesive nature of the soils encountered suggests that pumping from open sumps (if required) should generally be sufficient to keep the excavations reasonably dry.

8.3.3 Floor slabs

Ground bearing floor slabs may be adopted in areas of the site located away from tree influence and where made ground and / or ground disturbance is absent.

Within areas of made ground and / or ground disturbance, these soils should be removed and replaced with compacted fill to enable ground bearing floor slabs to be adopted.

Alternatively, recourse could be made to suspended floor slabs.

8.4 Excavations for foundations and services

Considering the predominantly cohesive soils on site any future excavation should remain stable in the short term. In the event that excavations are to remain open for longer periods, consideration should be given to the use of trench support systems.

Man entry into any excavations should not be undertaken without provision of suitable shoring and support and dewatering or suitable regrading and battering of side slopes to safe angles. Confined spaces protocols for the Health and Safety of personnel should always be used where man entry into excavations is to be undertaken as low oxygen conditions may be present.

8.5 Chemical attack on buried concrete

This assessment of the potential for chemical attack on buried concrete at the site is based on BRE Special Digest 1: Concrete in aggressive ground, which represents the most up-to-date guidance on this topic currently available in the UK.

The desk study and site reconnaissance indicate that, for the purposes of assessing the aggressive chemical environment of the site, the site should be considered as comprising brownfield ground likely to contain pyrite.

Based on testing results, **Table 15** gives the characteristic pH, water-soluble and total sulphate content values for shallow soils encountered on site.

Table 15 Characteristic pH, water soluble sulphate and total sulphate values

Stratum	pH	Water Soluble Sulphate (mg/l)	Total Potential Sulphate (mg/l)
Made Ground	7.86	20	-
Tunbridge Wells Sand Fm.	7.63	72	0.01

Based on the results above and following the steps outlined in the BRE guidance, the Design Sulphate Classes and Aggressive Chemical Environment for Concrete classifications are summarised in **Table 16**, on the basis of water-soluble sulphate, respectively.

Table 16 Concrete design class

Stratum	Ground water	Water Soluble Sulphate		Total Potential Sulphate	
		DS Class	AC Class	DS Class	AC Class
Made Ground	Static	DS-1	AC-1	-	-
Tunbridge Wells Sand Formation.	Static	DS-1	AC-1	DS-1	AC-1

The recommended ACEC Classification is therefore **AC-1** with a Design Sulphate Class of **DS-1.**

8.6 Infiltration drainage

Given the dominantly cohesive nature of the soils on site, the ground conditions are not considered to be suitable for use of pit soakaways to discharge surface run-off water by infiltration. However, it should be noted that no in-situ testing has been conducted at this time to confirm this conclusion.

9 CONCLUSIONS AND RECOMMENDATIONS

9.1 Geo-environmental assessment

The results of the site investigation and GQRA indicate that the identified potential contaminant linkages are absent based on the data available and therefore the site is suitable for the proposed secondary school end use.

Although not encountered to date, localised sources of contamination could still be present, although they are unlikely to be widespread. Data gaps and uncertainties have been considered and no further assessment is considered to be required.

The visual inspection at the laboratory identified no materials suspected of potentially containing asbestos and the scheduled laboratory screening found no detectable asbestos fibres.

A relevant pollutant linkage relating to plant phytotoxicity effects is unlikely to exist on site and both polyethylene (PE) and /or polyvinyl chloride (PVC) water supply pipes are expected to be suitable for use on site

No samples were found to have hazardous properties and therefore made ground waste is likely to require disposal at a suitably permitted non-hazardous waste landfill. This would need to be confirmed with WAC testing at the appropriate time. Natural soil would be considered to be Inert Waste.

Should unforeseen contamination be encountered during the development then specialist advice should be sought to determine the appropriate course of action. Imported material (e.g. topsoil, subsoil) should be validated before use on-site to confirm its suitability.

9.2 Geotechnical assessment

The key risks identified from the available ground investigation data were identified as:

- The Park Farm geological fault line is predicted to sub crop beneath the centre of the site, down-throwing natural geological succession to the west, which may result in sudden changes in ground conditions.
- Perched water within Upper Tunbridge Wells Sand Formation;
- The presence of widespread cohesive deposits at shallow depths which have been shown to have a medium to high volume change potential in the east and low in the west of the school site; and
- Potential for loss of strength in wet conditions due to a variable silt content in the weathered Upper Tunbridge Wells Sands Formation.

The undisturbed Tunbridge Wells Sand Formation is anticipated to provide a suitable bearing resistance for traditional spread foundations to support light to moderately loaded structures. However, foundations will need to extend below any made ground soils and any existing/future ground disturbance in addition to extending to a moisture stable horizon, which may be of significant depth within areas of tree influence.

Should the depth of the spread foundation, or the magnitude of the structural loads prove prohibitive, then piles would appear the most suitable alternative. It is recommended that

structures are not supported on differing foundation solutions in order to prevent issues associated with differing settlement.

Owing to the potential for sudden lateral changes in the proposed founding Tunbridge Wells strata, consideration should be given to incorporating appropriate reinforcement to minimise the risk of future differential foundation movements.

The natural soils encountered within the proposed area of development to the west of the existing school buildings (and outside of areas influenced by vegetation) indicate that ground bearing floor slabs may be adopted with a suitable sub-base layer for the proposed development.

The made ground soils nearer to the school building are not suitable to support ground bearing floors and as such floors should be suspended. Alternatively, outside of areas influenced by vegetation, the made ground could be engineered to an appropriate specification or removed and replaced with compacted granular fill to enable the support of ground bearing floor slabs.

Based on the characteristic water-soluble sulphate concentrations recorded on site, the Design Sulphate class for the soils encountered on site is **DS-1** whilst the aggressive chemical environment for concrete (ACEC) is **AC-1**.

Given the dominantly cohesive nature of the soils on site, the ground conditions are not considered to be suitable for use of pit soakaways to discharge surface run-off water by infiltration. However, no in-situ testing has been conducted at this time.

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FIGURES

FIGURE 1 SITE LOCATION PLAN



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SITE LOCATION PLAN	**Client:** Department for Education	**Figure No:** 1
RSK GEOSCIENCES	**Site:** Greenway Academy	**Job No:** 1921968
	Scale: Not reproduced to scale	**Source:** OS

FIGURE 2 SITE LAYOUT AND EXPLORATORY HOLE LOCATION PLAN



RSK GEOSCIENCES	**Exploratory Hole Location Plan**	**Client:**	Department for Education	**Figure No:**	2
		Site:	Greenway Academy	**Job No:**	1921968
		Scale:	Not to scale	**Source:**	Base image provided by Client

APPENDICES

APPENDIX A
SERVICE CONSTRAINTS

1. This report and the site investigation carried out in connection with the report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) for Department for Education (the "Client") in accordance with the terms of a contract [RSK Environment Standard Terms and Conditions] between RSK and the Client, dated 20th August 2021. The Services were performed by RSK with the reasonable skill and care ordinarily exercised by an environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the Client.
2. Other than that, expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.
3. Unless otherwise agreed in writing, the Services were performed by RSK exclusively for the purposes of the Client. RSK is not aware of any interest of or reliance by any party other than the Client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. **Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.**
4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK 's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.
5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the Client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.
6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the Client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off site of asbestos, invasive plants, electromagnetic fields, lead paint, heavy metals, radon gas, persistent, bioaccumulative or toxic chemicals (including PFAS/ PFOS) or other radioactive or hazardous materials, unless specifically identified in the Services.
7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a visual inspection of the site together with RSK's interpretation of information, including documentation, obtained from third parties and from the Client on the history and usage of the site, unless specifically identified in the Services or accreditation system (such as UKAS ISO 17020:2012 clause 7.1.6):
    a. The Services were based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely.

b. The Services were limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the visual inspection.

c. The Services did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services.

RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the Client and RSK.

8. The intrusive environmental site investigation aspects of the Services are a limited sampling of the site at pre-determined locations based on the known historic / operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the properties of the materials adjacent and local conditions, together with the position of any current structures and underground utilities and facilities, and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters (as stipulated in the scope between the client and RSK, based on an understanding of the available operational and historical information) and it should not be inferred that other chemical species are not present.

9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (intrusive and sample locations etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.

10. The comments given in this report and the opinions expressed are based on the ground conditions encountered during the site work and on the results of tests made in the field and in the laboratory. However, there may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account. In particular, it should be noted that there may be areas of made ground not detected due to the limited nature of the investigation or the thickness and quality of made ground across the site may be variable. In addition, groundwater levels and ground gas concentrations and flows, may vary from those reported due to seasonal, or other, effects and the limitations stated in the data should be recognised.

11. Asbestos is often observed to be present in soils in discrete areas. Whilst asbestos-containing materials may have been locally encountered during the fieldworks or supporting laboratory analysis, the history of brownfield and demolition sites indicates that asbestos fibres may be present more widely in soils and aggregates, which could be encountered during more extensive ground works.

12. Unless stated otherwise, only preliminary geotechnical recommendations are presented in this report and these should be verified in a Geotechnical Design Report, once proposed construction and structural design proposals are confirmed.

APPENDIX B
DEVELOPMENT DRAWINGS

Play Area

Recreation Ground

149

TCB

39.7m

EFAB -
DEMOLISHED
CIRCA 520m2

EFAC - OUT OF
SCOPE
CIRCA 300m2

SEPARATE ACCESS TO
NURSURY AWAY FROM
GREENWAY PLAYGROUND

NEW BUILD STOREY AND
A HALF MODULAR BLOCK
CIRCA 300m2

EFAF RETAINED
CIRCA 300m2

PLAYGROUND
(HARD INFORMAL AND
OUTDOOR PE SPACE)

EFAD + EFAE
DEMOLISHED

EFAA
DEMOLISHED
CIRCA 1650m2

NEW BUILD DOUBLE
STOREY MODULAR
BLOCK
CIRCA 1790m2

21985

LEVELS TO BE ANALYSED
ONCE TOPOGRAPHICAL
SURVEY IS RECEIVED

ENTRANCE

NURSERY AND SCHOOL
ENTRANCE AND EXIST POINT

EXISTING SUBSTATION

ESS

Main Building
Basement (located under room 008)

CHURCHILL AVENUE

HILL MEAD

1 SITE APPRAISAL PLAN -OPTION 3

1 : 500

GRAPHIC SCALE 1:500

REVISION SCHEDULE

REV	REVISION DETAILS	DATE	DRAWN BY
P1	OPTION APPRAISAL ISSUE	14.07.21	DMA
P2	EXTERNAL AREA CALCULATED	22.07.21	DMA
P3	NEW BUILD AREA AMENDED	23.08.21	DMA

KEY PLAN

ORIGINATOR
DMA

TITLE
PROPOSED SITE CONTROL PLAN

PROJECT
GREENWAY ACADEMY
GREENWAY, HORSHAM,
RH12 2JS

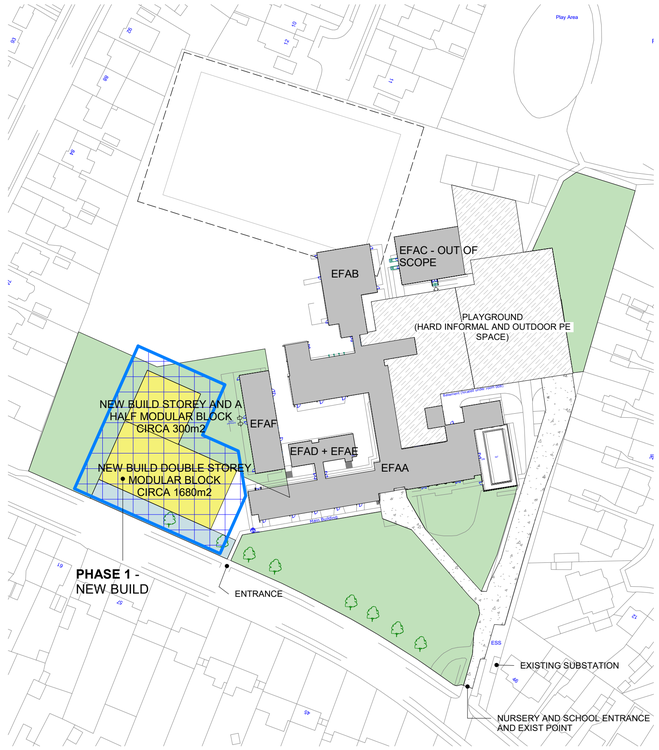
PURPOSE OF ISSUE
FOR INFORMATION

STATUS S0

REVISION P3

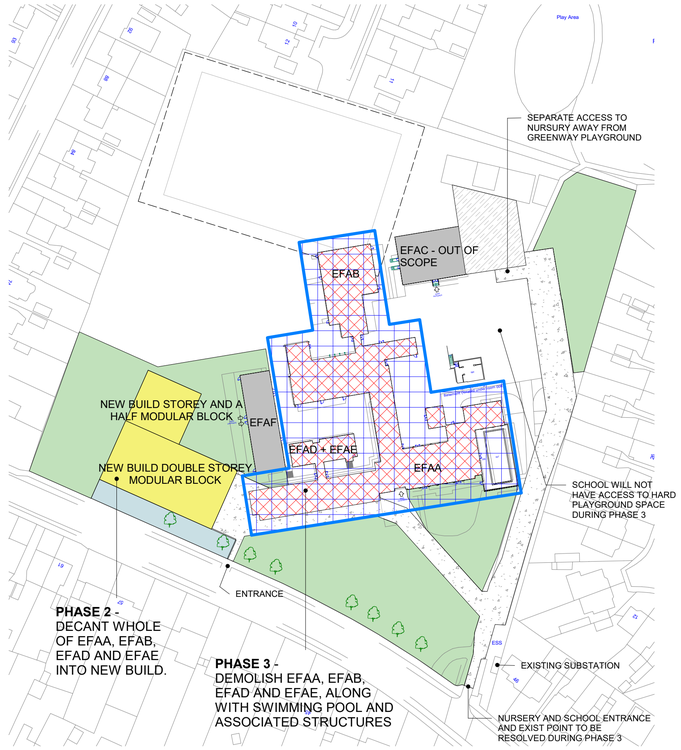
JOB NO.	SCALE	DRAWN	CHECKED	APPROVED
580	1:500 @A1	AD	ADs	DMA

PROJECT	ORIGINATOR	VOLUME	LEVEL	TYPE	ROLE	DOC NO
GWA	DMA	XX	ZZ	DR	A	012002



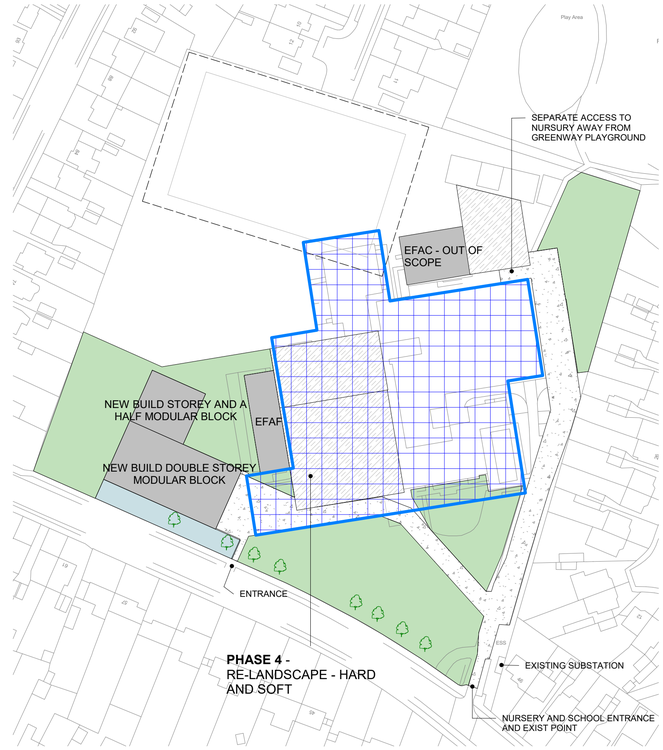
1 **SITE APPRAISAL PLAN -OPTION PHASE 1**

1 : 1000



2 **SITE APPRAISAL PLAN -OPTION PHASE 2 AND 3**

1 : 1000



3 **SITE APPRAISAL PLAN -OPTION PHASE 4**

1 : 1000

REVISION SCHEDULE

REV	REVISION DETAILS	DATE	DRAWN BY
P1	FIRST ISSUE	19.08.21	DMA

KEY:

- NEW BUILD
- REFURBISHMENT
- COMPLETED OR OUT OF SCOPE BLOCK
- DEMOLISHED BLOCK
- CONSTRUCTION SITE

NOTE:

1. SCHOOL TO REVIEW ENTRANCE LOCATIONS DURING PHASING
3. PHASING TO BE REVIEWED BY FIRE CONSULTANT
2. DO NOT SCALE FROM THIS DRAWING
3. WORK TO FIGURE DIMENSIONS WHERE SHOWN
4. CONFIRM DIMENSIONS ON SITE BEFORE FABRICATION OR CONSTRUCTION
5. DRAWINGS TO BE PRINTED AND READ IN COLOUR



KEY PLAN

ORIGINATOR
DMA

TITLE
PROPOSED PHASING PLANS

PROJECT	PURPOSE OF ISSUE	STATUS	REVISION
GREENWAY ACADEMY GREENWAY, HORSHAM, RH12 2JS	FOR INFORMATION	S0	P1

JOB NO.	SCALE	DRAWN	CHECKED	APPROVED
580	1000 @A1	AD	ADs	DMA

PROJECT	ORIGINATOR	VOLUME	LEVEL	TYPE	ROLE	DOC NO
GWA	DMA	XX	ZZ	DR	A	012005

APPENDIX C
SUMMARY OF LEGISLATION AND POLICY RELATING TO LAND CONTAMINATION

Part IIA of the Environmental Protection Act 1990

Part IIA of the Environmental Protection Act 1990 (Part IIA) and its associated Contaminated Land Regulations 2000 (SI 2000/227), which came into force in England on 1 April 2000, formed the basis for the current regulatory framework and the statutory regime for the identification and remediation of contaminated land. Part IIA of the EPA 1990 defines contaminated land as 'any land which appears to the Local Authority in whose area it is situated to be in such a condition by reason of substances in, on or under the land, that significant harm is being caused, or that there is significant possibility of significant harm being caused, or that pollution of controlled waters is being or is likely to be caused'. Controlled waters are considered to include all groundwater, inland waters and estuaries.

In August 2006, the Contaminated Land (England) Regulations 2006 (SI 2006/1380) were implemented, which extended the statutory regime to include Part IIA of the EPA as originally introduced on 1 April 2000, together with changes intended chiefly to address land that is contaminated by virtue of radioactivity. These have been replaced subsequently by the Contaminated Land (England) (Amendment) Regulations 2012, which now exclude land that is contaminated by virtue of radioactivity.

The intention of Part IIA is to deal with contaminated land issues that are considered to cause significant harm on land that is not undergoing development (see Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance, April 2012). This document replaces Annex III of Defra Circular 01/2006, published in September 2006 (the remainder of this document is now obsolete).

Planning Policy

Contaminated land is often dealt with through planning because of land redevelopment. This approach was documented in Planning Policy Statement: Planning and Pollution Control PPS23, which states that it remains the responsibility of the landowner and developer to identify land affected by contamination and carry out sufficient remediation to render the land suitable for use. PPS23 was withdrawn early in 2012 and has been replaced by much reduced guidance within the National Planning Policy Framework (NPPF), reference ISBN: 978-1-5286-1033-9, February 2019.

The new framework has only limited guidance on contaminated land, as follows:

Chapter 11. Making effective use of land

117 Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or 'brownfield' land.

118. Planning policies and decisions should:

c) give substantial weight to the value of using suitable brownfield land within settlements for homes and other identified needs, and support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land.

Chapter 15. Conserving and enhancing the natural environment

170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and

f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

Ground conditions and pollution

178. Planning policies and decisions should ensure that:

a) a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);

b) after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990; and

c) adequate site investigation information, prepared by a competent person, is available to inform these assessments.

179. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.

Water Resources Act (WRA)

The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 updated the Water Resources Act 1991, which introduced the offence of causing or knowingly permitting pollution of controlled waters. The Act provides the Environment Agency with powers to implement remediation necessary to protect controlled waters and recover all reasonable costs of doing so.

Water Framework Directive (WFD)

The Water Framework Directive 2000/60/EC is designed to:

- enhance the status and prevent further deterioration of aquatic ecosystems and associated wetlands that depend on the aquatic ecosystems
- promote the sustainable use of water
- reduce pollution of water, especially by ‘priority’ and ‘priority hazardous’ substances
- ensure progressive reduction of groundwater pollution.

The WFD requires a management plan for each river basin be developed every six years.

Groundwater Directive (GWD)

The 1980 Groundwater Directive 80/68/EEC and the 2006 Groundwater Daughter Directive 2006/118/EC of the WFD are the main European legislation in place to protect groundwater. The 1980 Directive is due to be repealed in December 2013. The European legislation has been transposed into national legislation by regulations and directions to the Environment Agency.

Priority Substances Directive (PSD)

The Priority Substances Directive 2008/105/EC is a 'Daughter' Directive of the WFD, which sets out a priority list of substances posing a threat to or via the aquatic environment. The PSD establishes environmental quality standards for priority substances, which have been set at concentrations that are safe for the aquatic environment and for human health. In addition, there is a further aim of reducing (or eliminating) pollution of surface water (rivers, lakes, estuaries and coastal waters) by pollutants on the list. The WFD requires that countries establish a list of dangerous substances that are being discharged and EQS for them. In England and Wales, this list is provided in the River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2010. In order to achieve the objectives of the WFD, classification schemes are used to describe where the water environment is of good quality and where it may require improvement.

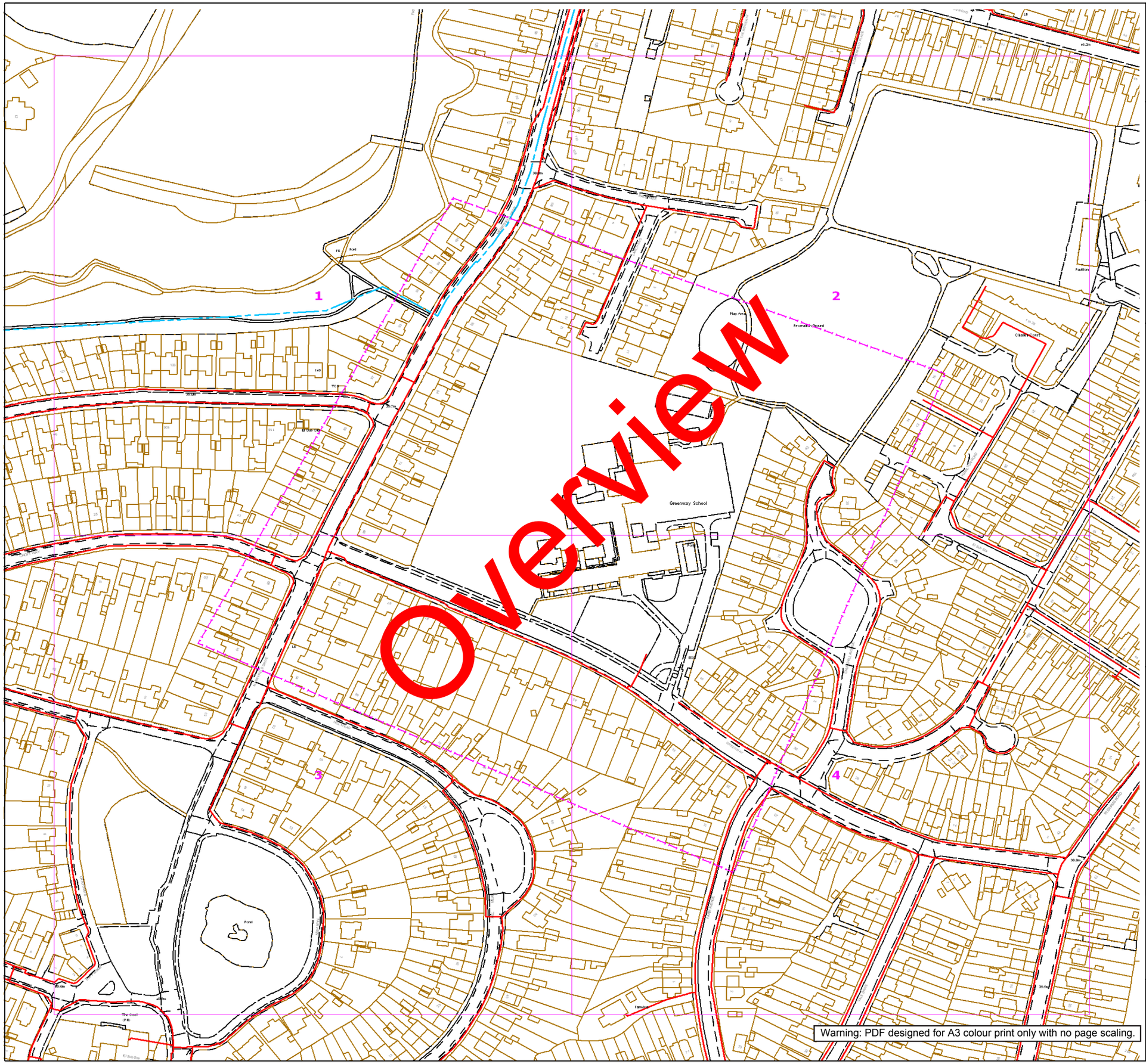
Environmental Permitting Regulations (EPR)

The Environmental Permitting (England and Wales) Regulations 2016 (as amended) provide a single regulatory framework that streamlines and integrates waste management licensing, pollution prevention and control, water discharge consenting, groundwater authorisations, and radioactive substances regulation. Schedule 22, paragraph 6 of EPR 2016 states: 'the regulator must, in exercising its relevant functions, take all necessary measures - (a) to prevent the input of any hazardous substance to groundwater; and (b) to limit the input of non-hazardous pollutants to groundwater so as to ensure that such inputs do not cause pollution of groundwater.'

Notes:

1. *The above information is provided for background but does not constitute site-specific advice*
2. *The above summary applies to England only. Variations exist within other countries of the United Kingdom*

APPENDIX D
UTILITY SERVICE PLANS



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Mapping Enquiries:
All areas

General Enquiries:
All areas

Date Requested: 16/06/2021
Job Reference: 22424098
Site Location: 516569 131358
Requested by:
Miss Monique Elsom
Your Scheme/Reference:
2190563 Greenway Academy

This plan shows the location of those pipes owned by Scotia Gas Networks (SGN) by virtue of being a licensed Gas Transporter (GT). Gas pipes owned by other GTs or third parties may also be present in this area but are not shown on this plan. Information with regard to such pipes should be obtained from the relevant owners. No warranties are given with regard to the accuracy of the information shown on this plan. Service pipes, valves, siphons, sub-connections etc. are not shown but their presence should be anticipated. You should be aware that a small percentage of our pipes/assets may be undergoing review and will temporarily be highlighted in yellow. If your proposed works are close to one of these pipes, you should contact the SGN Safety Admin Team on 0800 912 1722 for advice. No liability of any kind whatsoever is accepted by SGN or its agents, servants or sub-contractors for any error or omission contained herein. Safe digging practices, in accordance with HS (G)47, must be used to verify and establish the actual position of mains, pipes, services and other apparatus on site before any mechanical plant is used. It is your responsibility to ensure that plant location information is provided to all persons (whether direct labour or sub-contractors) working for you on or near gas apparatus. Information included on this plan should not be referred to beyond a period of 28 days from the date of issue.

Report damage immediately – KEEP EVERYONE AWAY FROM THE AREA
0800 111 999

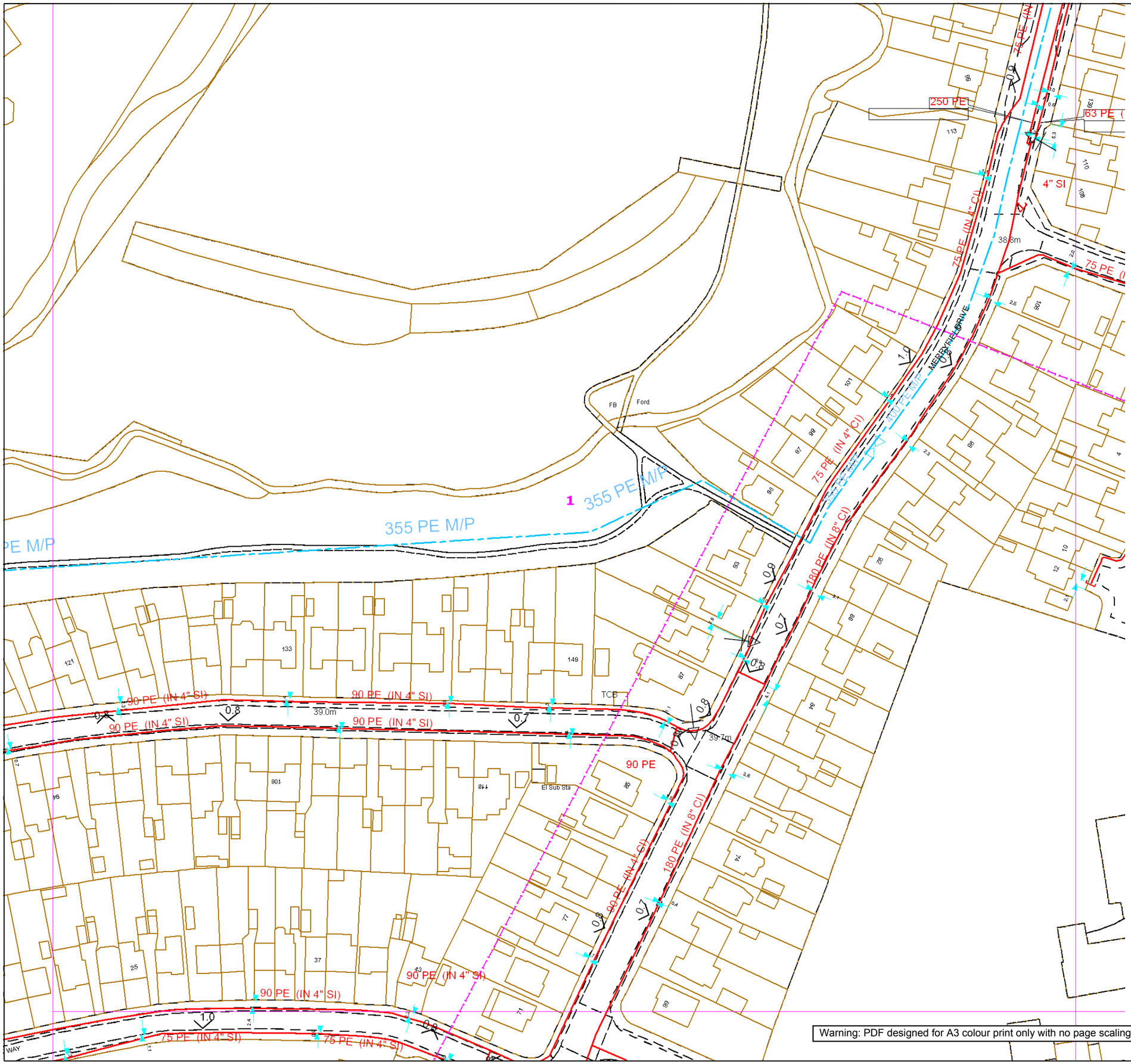
Low Pressure Mains
Medium Pressure Mains
Intermediate Pressure Mains
High Pressure Mains
LAs
GTs
SSSIs

Some Examples Of Plant Items
Valve | Syphon | Depth of Cover | Diameter Change | Material Change

Digsite: Line: Area:

Linesearch before Udig

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All areas

General Enquiries:
All areas

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Requested by:
Miss Monique Elsom
Your Scheme/Reference:
2190563 Greenway Academy
Exact Scales:
1:1000 Area or Circle dig site
1:1000 Line dig site

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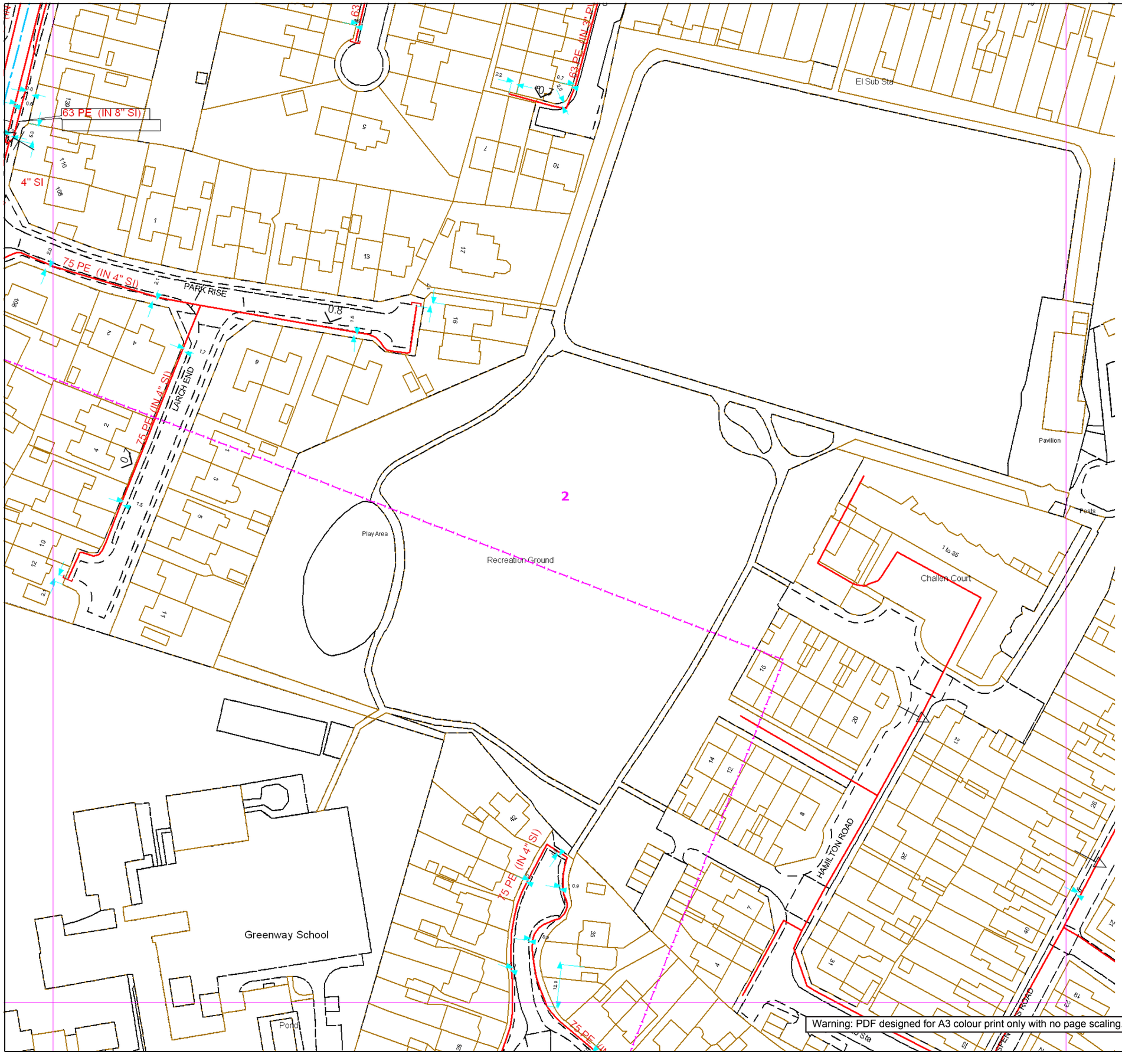
Low Pressure Mains
Medium Pressure Mains
Intermediate Pressure Mains
High Pressure Mains
LAs
GTs
SSSIs

Some Examples Of Plant Items
Valve | Syphon | Depth of Cover | Diameter Change | Material Change

Digsite: Line: Area:

Linesearch before dig

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All areas

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1:1000 Line dig site

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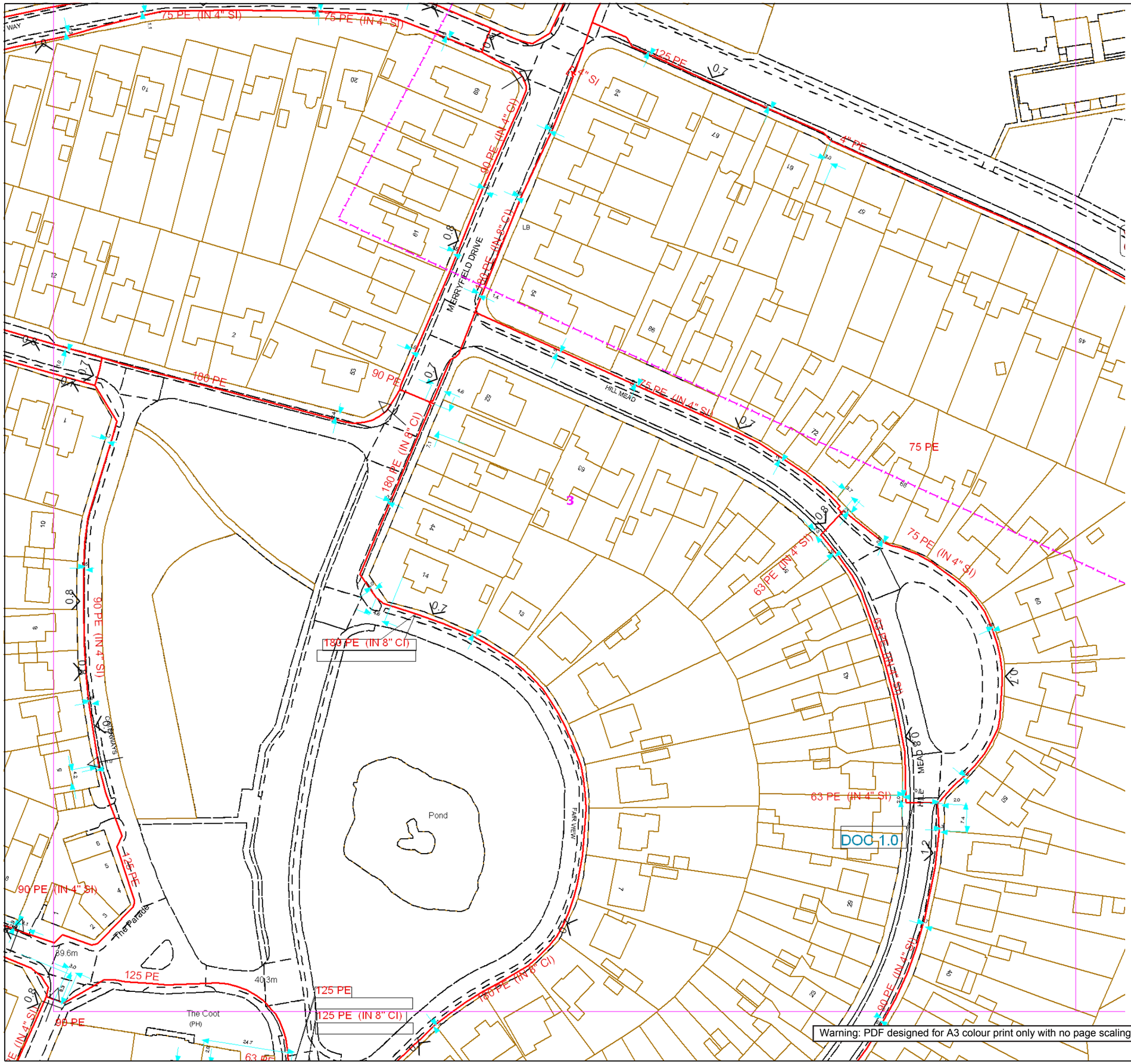
Low Pressure Mains
Medium Pressure Mains
Intermediate Pressure Mains
High Pressure Mains
LAs
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SSSIs

Some Examples Of Plant Items
Valve | Syphon | Depth of Cover | Diameter Change | Material Change

Digsite: Line: Area:

Linesearch before dig

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Your Scheme/Reference:
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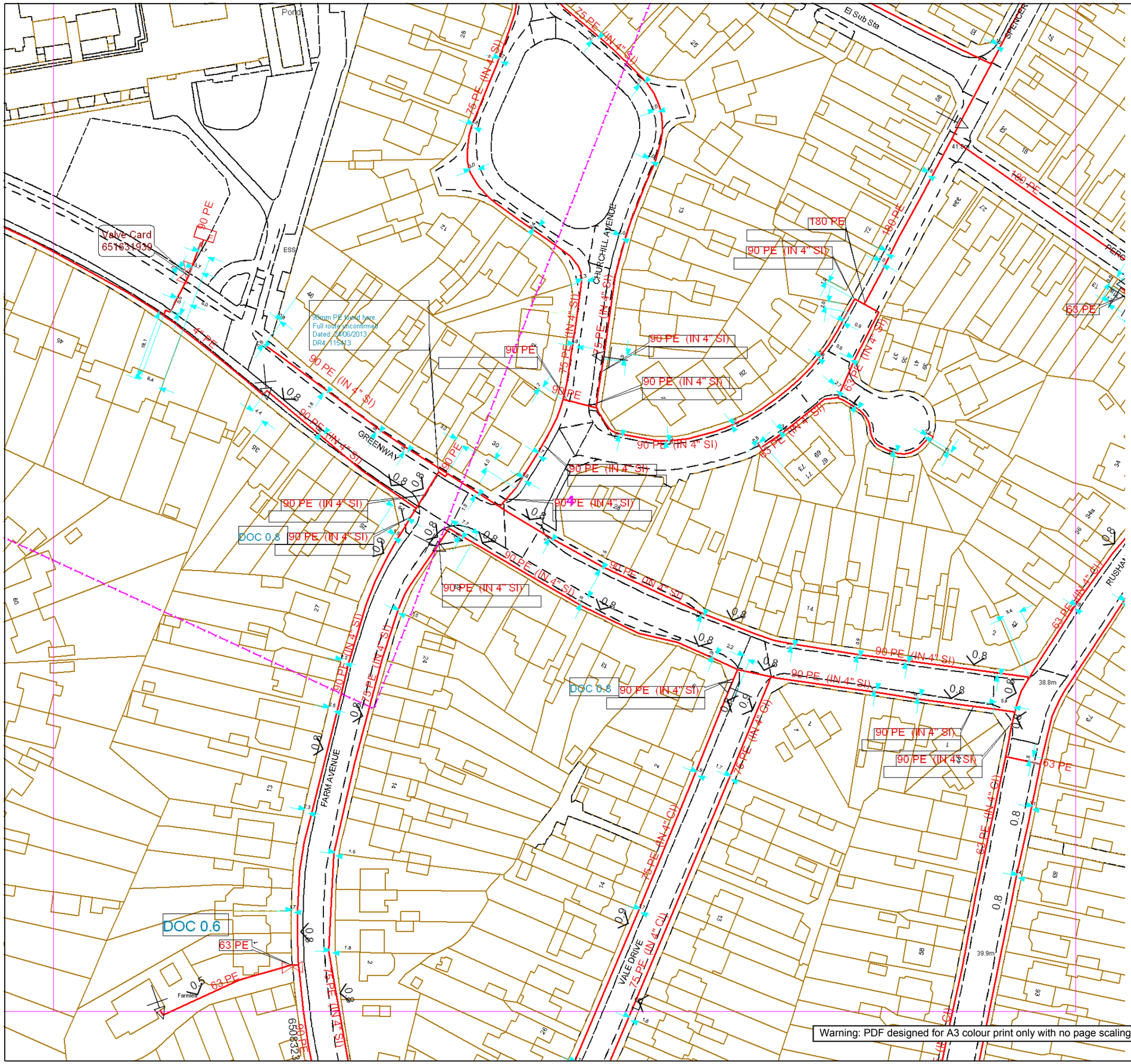
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All areas

General Enquiries:
All areas

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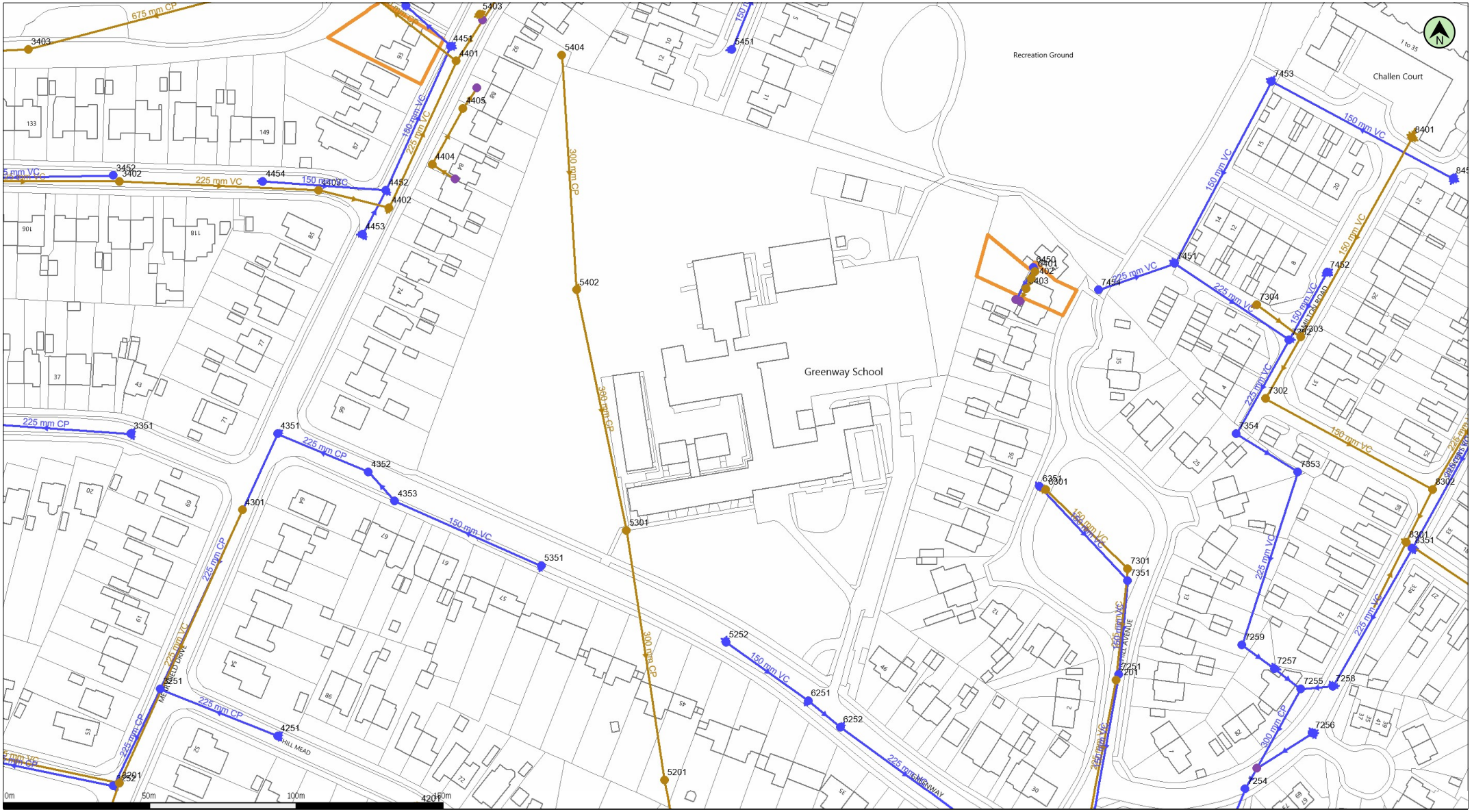
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The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2021 Ordnance Survey 100031673 .This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

Foul Gravity Sewer
Combined Gravity Sewer
Culverted Water Course or Treated Effluent
Surface Water Gravity Sewer
Rising Main, Vacuum or Syphon
Combined Outfall
Surface Water Outfall
Foul Outfall
Surface Water Inlet
Combined Pumping Station
Surface Water Pumping Station
Foul Pumping Station
Water Treatment Works
Section 104 Area
Building Over Agreement Area
Foul Manhole
Combined Manhole
Surface Water Manhole
Side Entry Manhole, Decarcation Chamber, Dummy Manhole or Surface Water Soakaway

melsom@rsk.co.uk

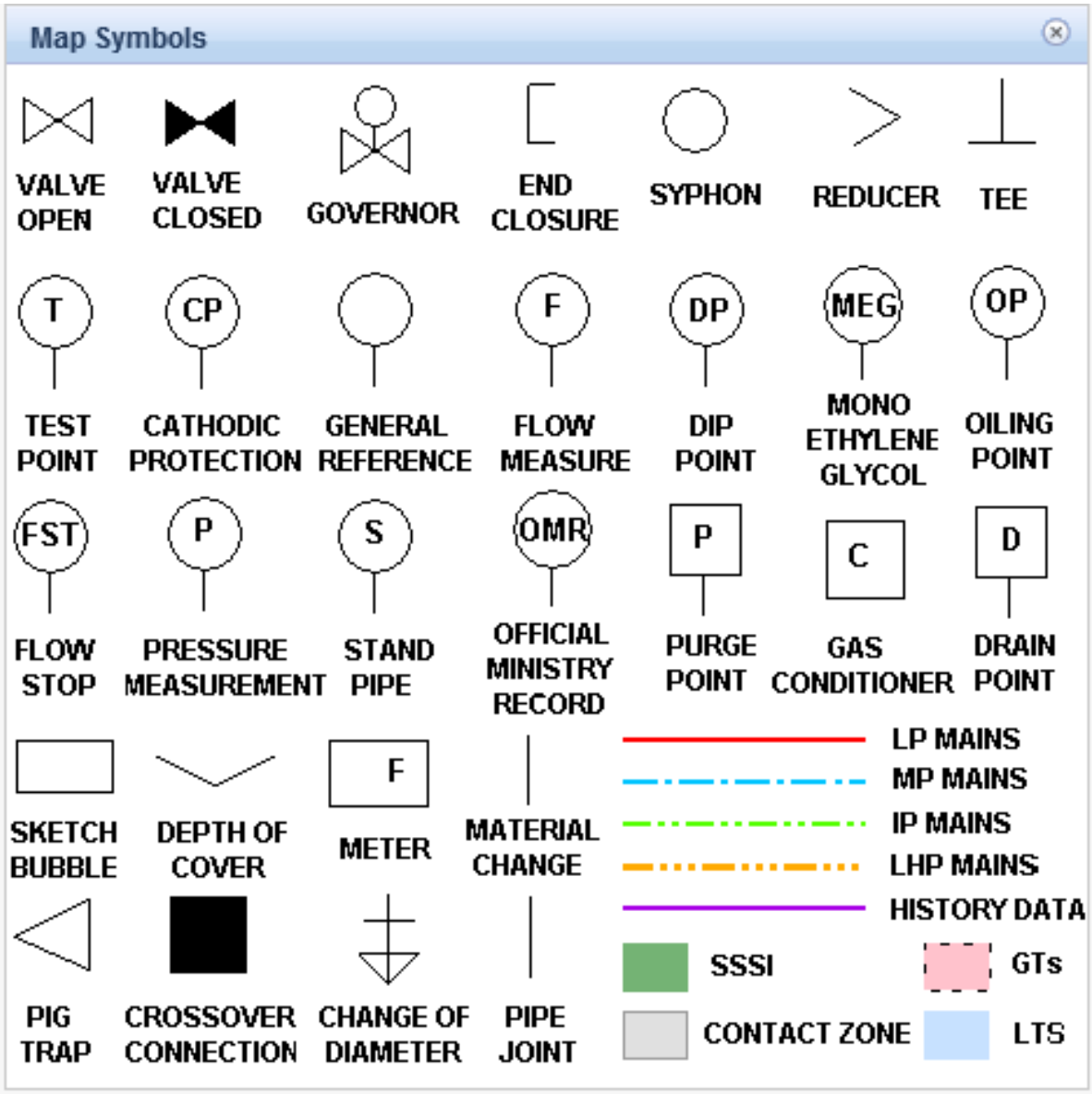
2190563 Greenway

WATER for LIFE from Southern Water.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
3201	F	40.02	38.20	
3402	F	39.36	34.86	
3403	F	37.22	33.24	
4201	F	42.05	39.45	
4301	F	40.49	39.26	
4401	F	38.17	33.86	
4402	F	39.63	34.55	
4403	F	39.58	34.67	
4404	F	0.00	0.00	
4405	F	0.00	0.00	
5201	F	42.72	33.09	
5301	F	43.84	33.39	
5402	F	41.46	33.68	
5403	F	38.16	34.24	
5404	F	0.00	0.00	
6301	F	42.95	40.92	
6401	F	0.00	0.00	
6402	F	0.00	0.00	
6403	F	0.00	0.00	
7201	F	41.16	38.99	
7301	F	41.87	39.58	
7302	F	42.74	41.41	
7303	F	43.24	41.67	
7304	F	43.13	41.84	
8301	F	41.70	40.52	
8302	F	41.89	40.71	
8401	F	44.38	42.34	
3251	S	40.03	38.36	
3252	S	40.02	37.90	
3351	S	40.44	38.68	
3452	S	39.31	37.83	
4251	S	40.28	38.80	
4351	S	40.84	39.20	
4352	S	41.49	40.13	
4353	S	41.86	40.67	
4451	S	38.08	36.37	
4452	S	39.53	37.70	
4453	S	39.97	38.09	
4454	S	39.58	38.18	
4455	S	37.93	35.26	
5252	S	42.86	41.04	
5351	S	43.34	42.07	
5451	S	41.05	40.30	
6251	S	42.19	40.55	
6252	S	41.98	39.92	
6351	S	42.96	41.17	
6450	S	0.00	0.00	
7251	S	41.20	39.29	
7254	S	40.49	38.60	
7255	S	40.81	39.26	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
7256	S	40.36	39.68	
7257	S	40.75	39.42	
7258	S	40.72	40.00	
7259	S	41.05	39.71	
7351	S	41.86	39.84	
7352	S	43.14	40.86	
7353	S	42.14	40.47	
7354	S	0.00	0.00	
7451	S	42.89	41.09	
7452	S	43.72	41.18	
7453	S	43.53	41.74	
7454	S	0.00	0.00	
8351	S	41.63	40.57	
8451	S	43.75	42.30	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert


Map Symbols
VALVE OPEN
VALVE CLOSED
GOVERNOR
END CLOSURE
SYPHON
REDUCER
TEE
T
TEST POINT
CP
CATHODIC PROTECTION
GENERAL REFERENCE
F
FLOW MEASURE
DP
DIP POINT
MEG
MONO ETHYLENE GLYCOL
OP
OILING POINT
FST
FLOW STOP
P
PRESSURE MEASUREMENT
S
STAND PIPE
OMR
OFFICIAL MINISTRY RECORD
P
PURGE POINT
C
GAS CONDITIONER
D
DRAIN POINT
SKETCH BUBBLE
DEPTH OF COVER
F
METER
MATERIAL CHANGE
LP MAINS
MP MAINS
IP MAINS
LHP MAINS
HISTORY DATA
PIG TRAP
CROSSOVER CONNECTION
CHANGE OF DIAMETER
PIPE JOINT
SSSI
GTs
CONTACT ZONE
LTS



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WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

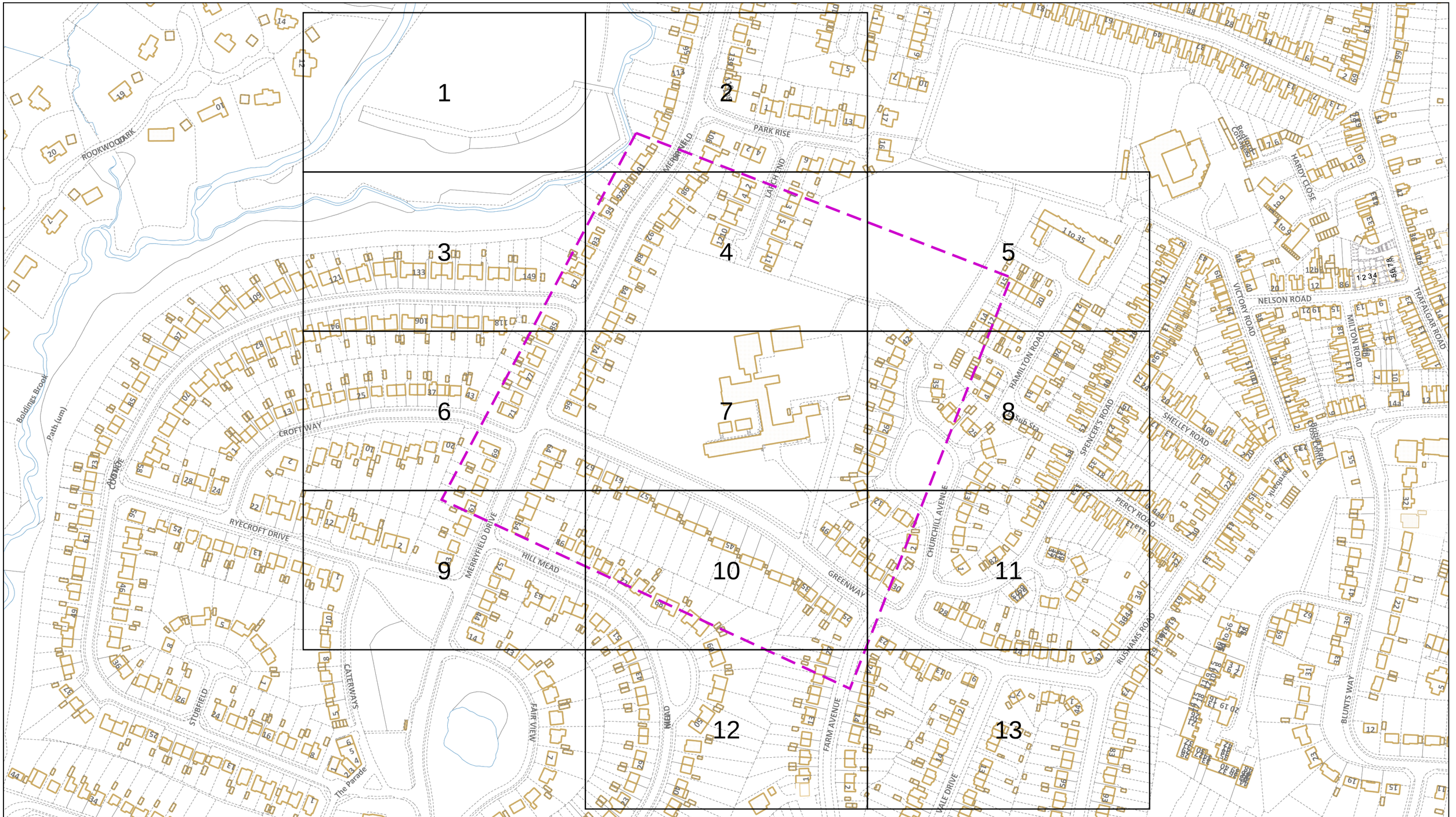
Water Main | Proposed Main | Trunk Main | Non-potable Main | Abandoned Main

Water Hydrant | Water Meter | Water Valve

melsom@rsk.co.uk

2190563 Greenway

WATER for LIFE from Southern Water.



Dig Sites Area: Line:

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Date Requested: 17/06/2021
Job Reference: 22424098
Site Location: 516174 131062
Requested by:
Miss Monique Elsom
Your Scheme/Reference: 2190563
Greenway Academy

Scale: 1:2563 (When plotted at A3)

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N W E S

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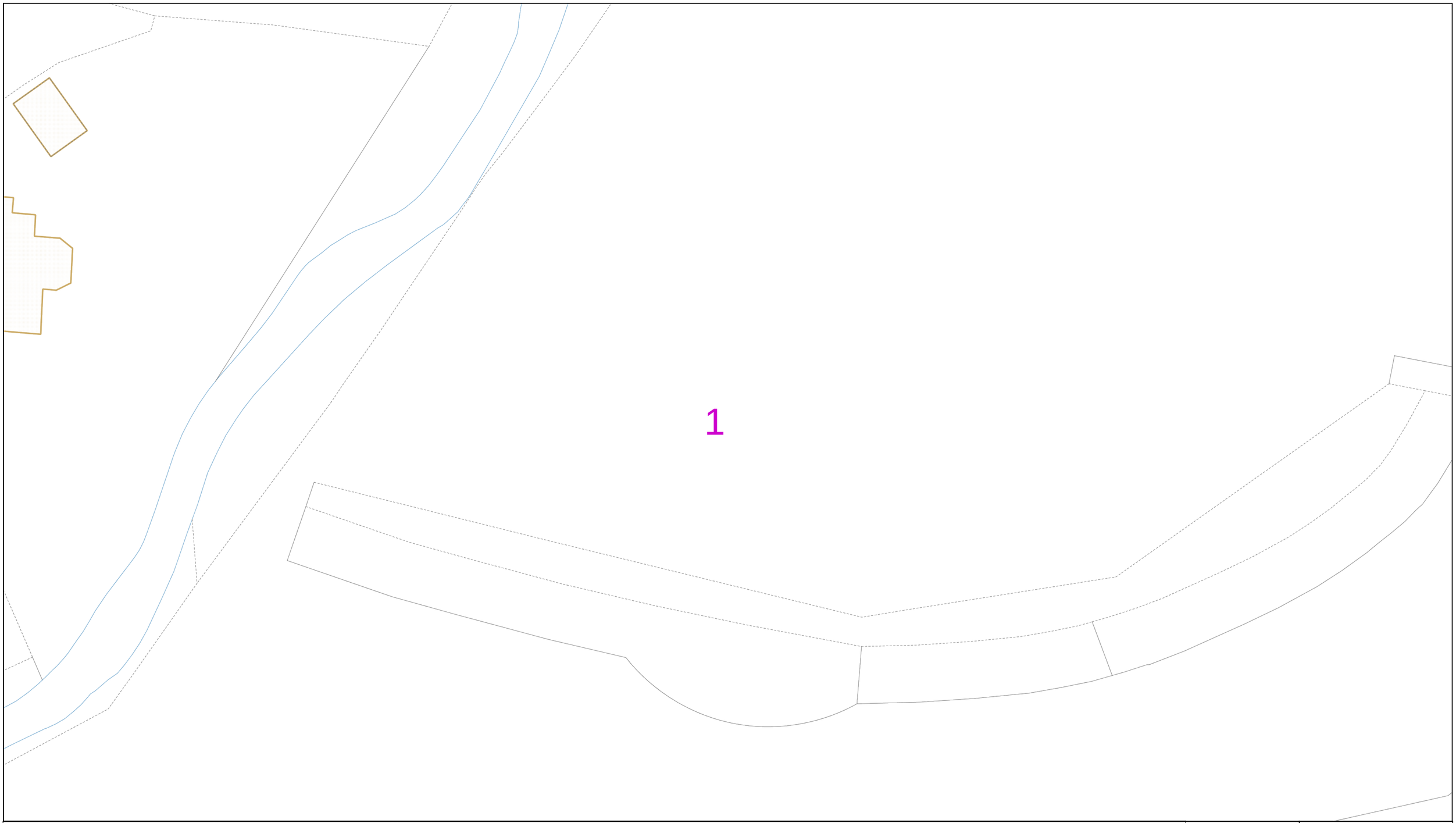
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0 25 50

metres

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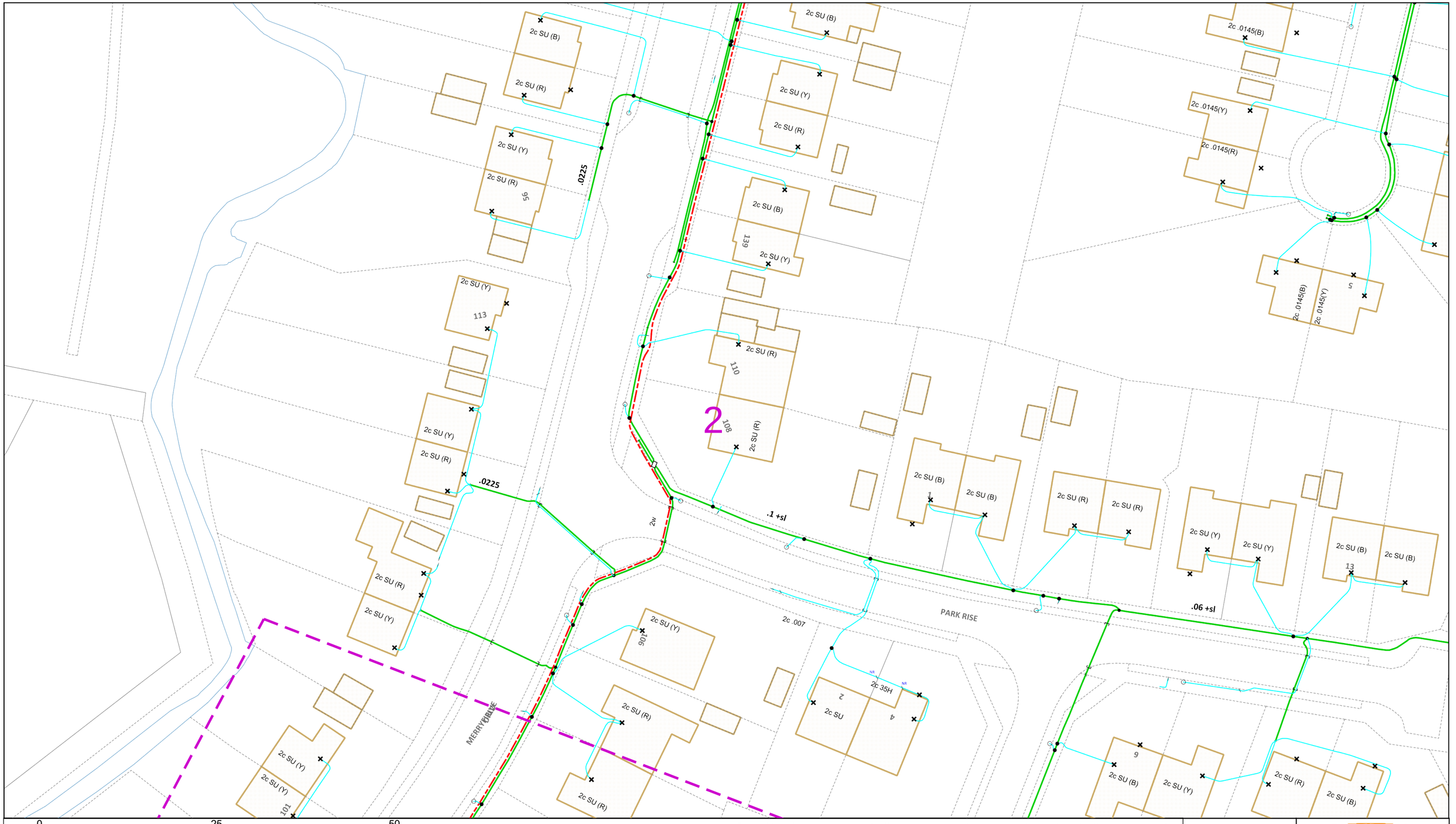
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N NE E SE S SW W NW

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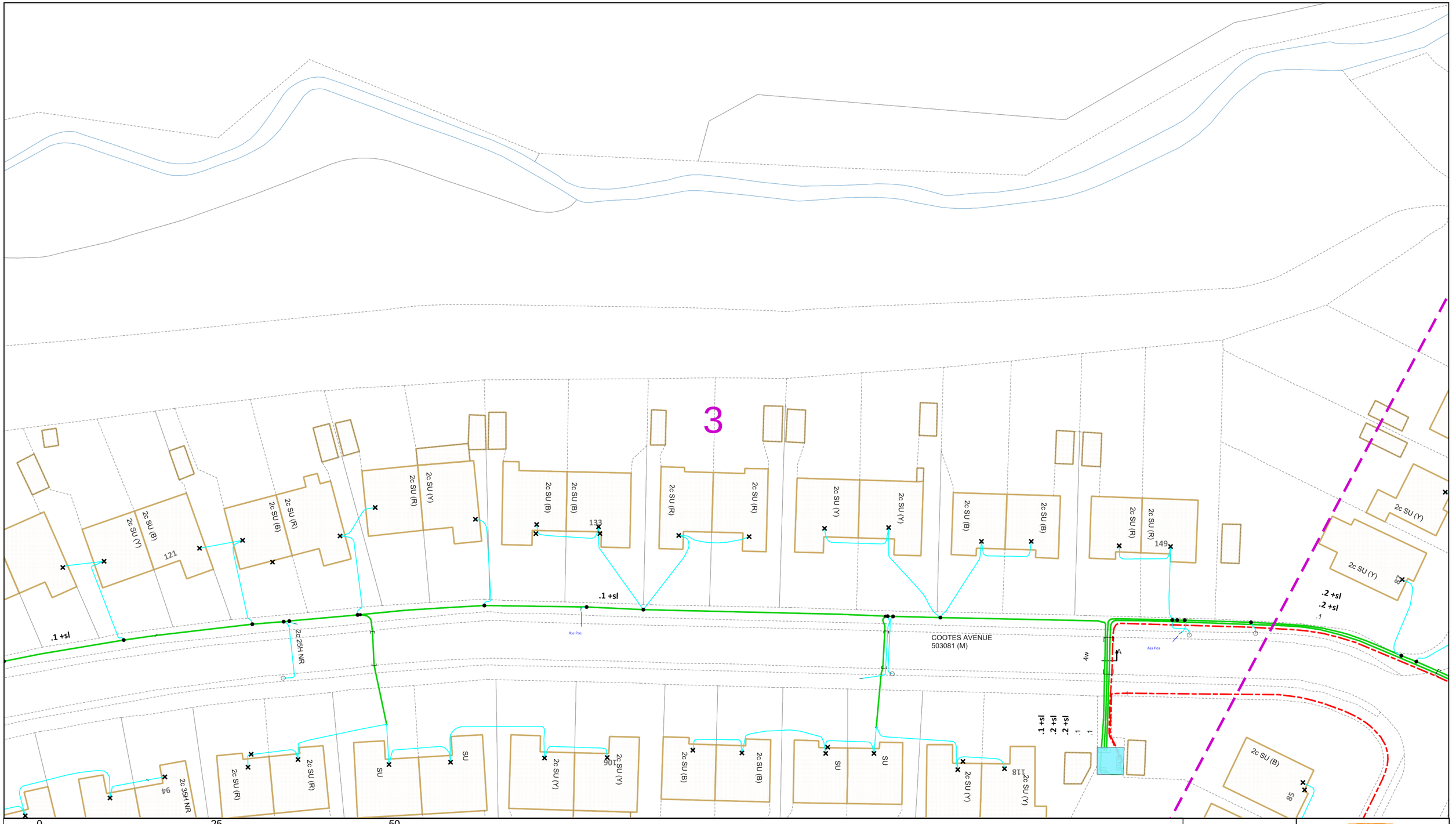
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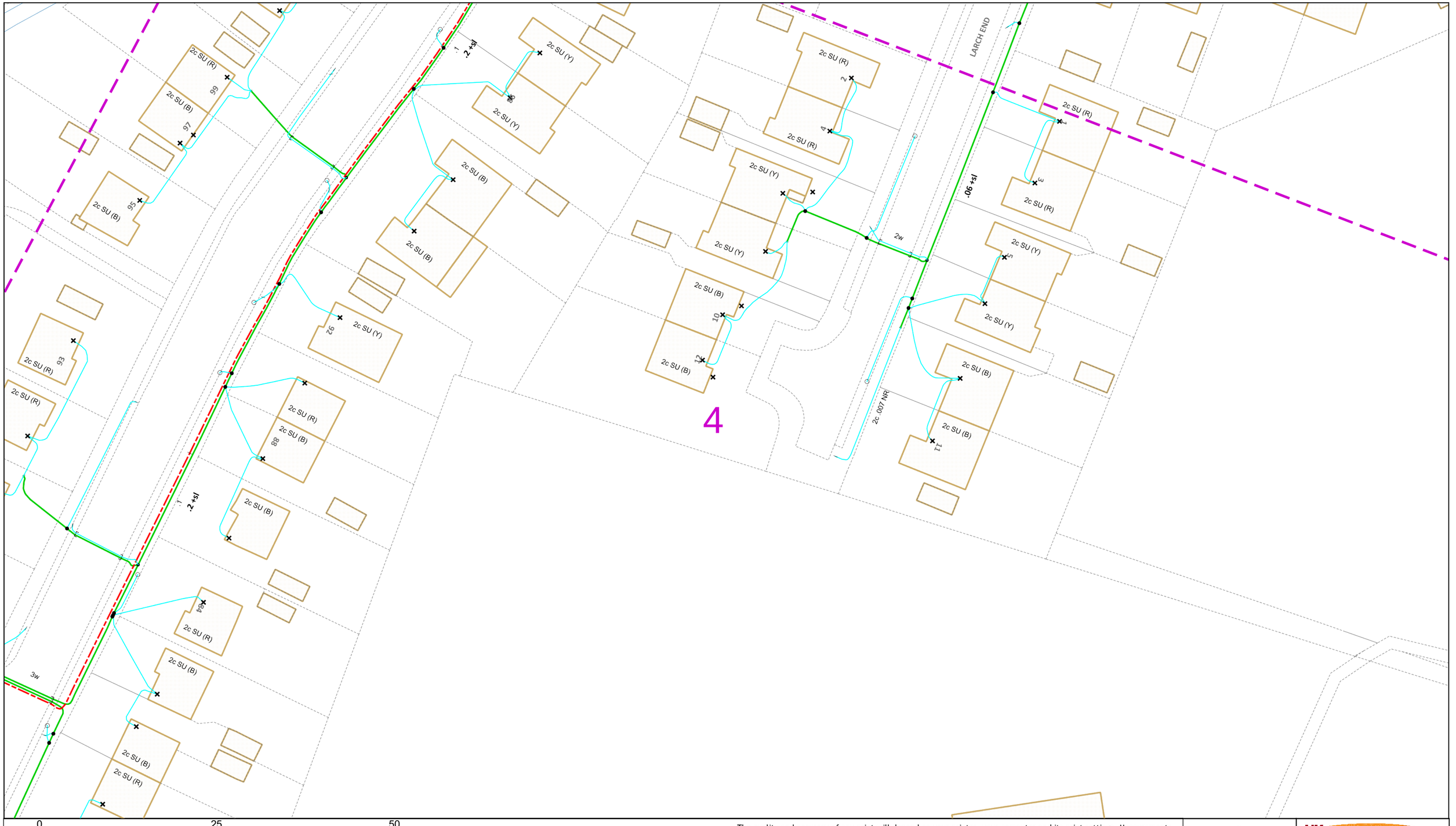
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0 25 50
metres

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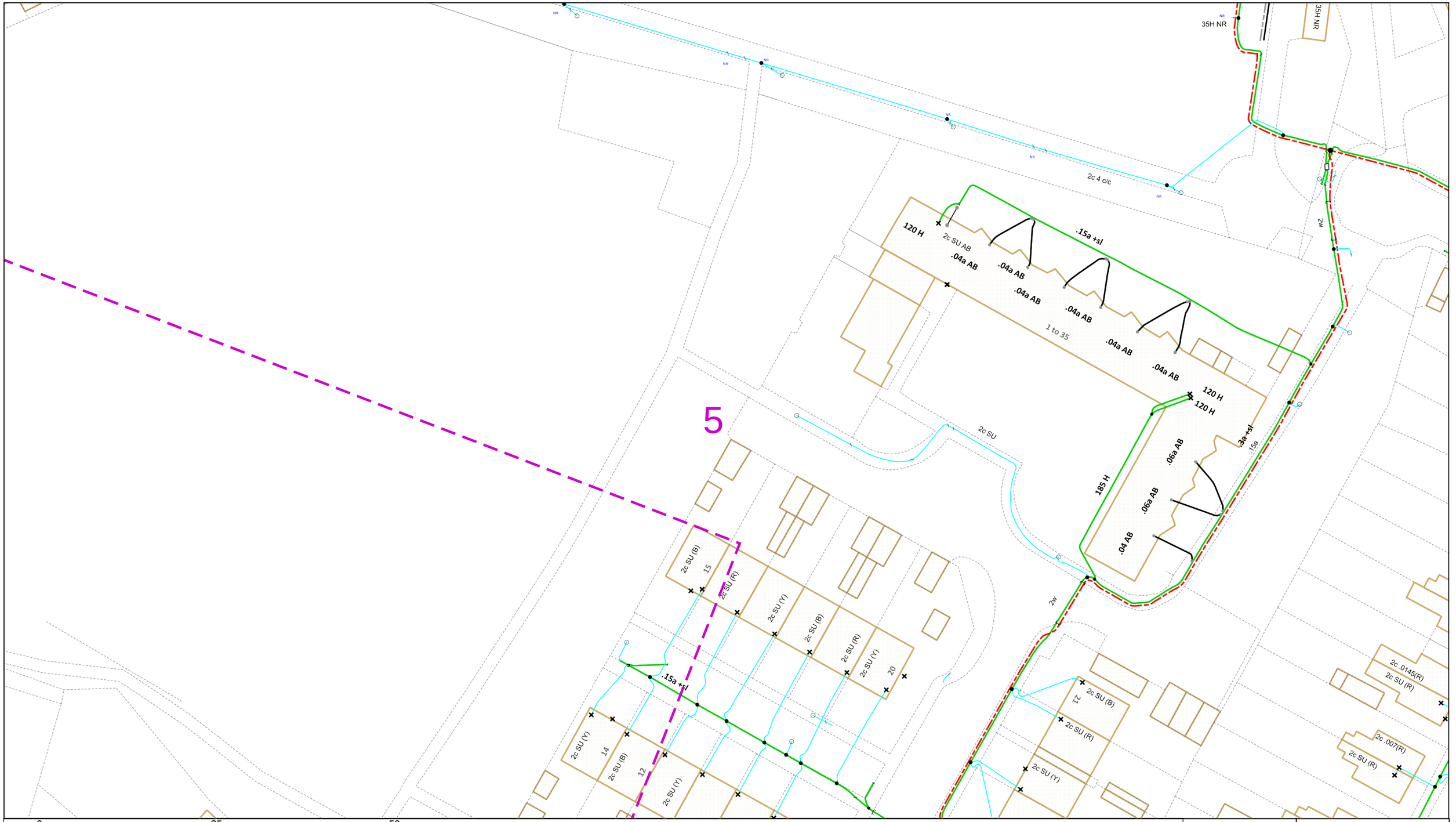
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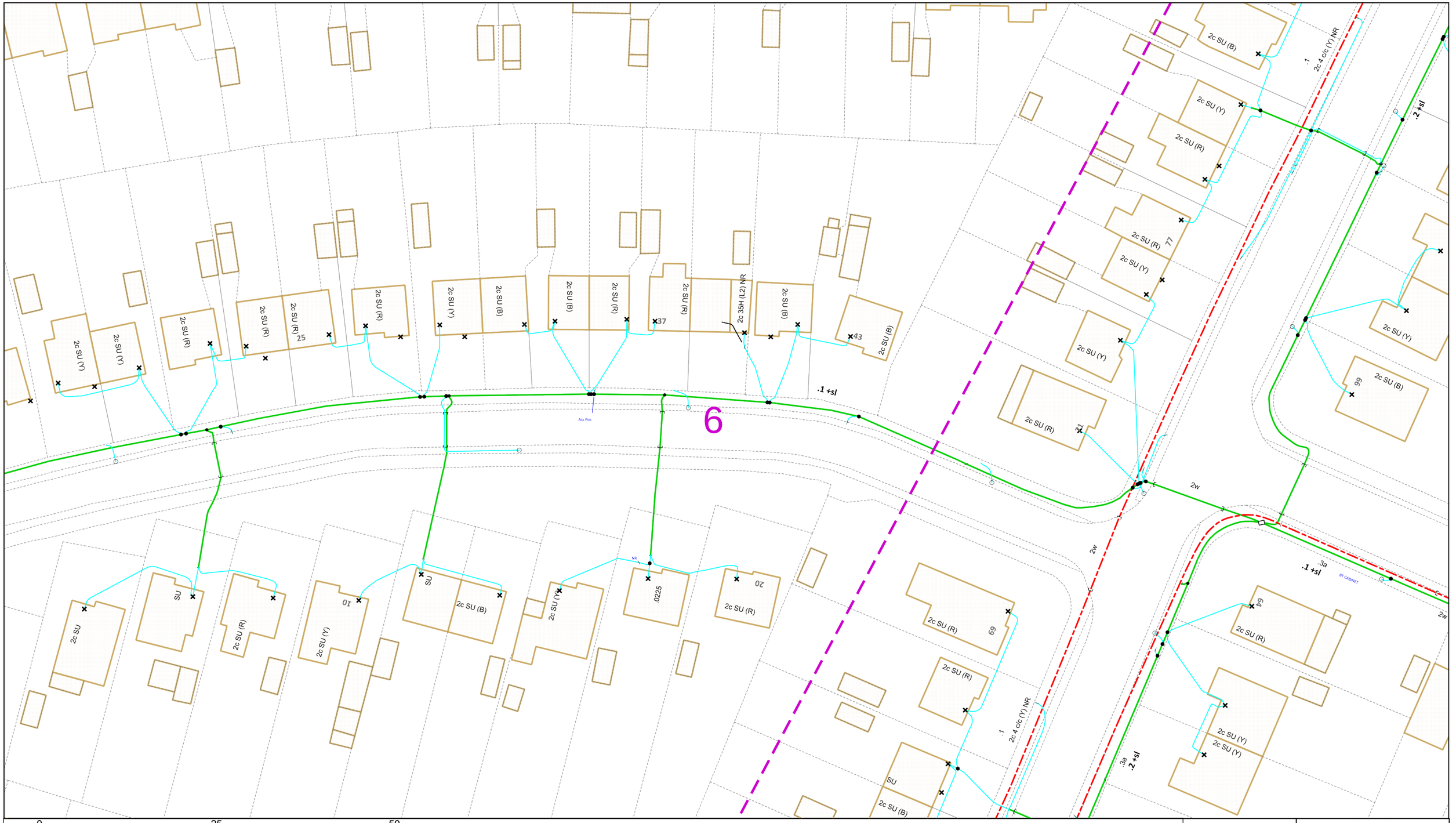
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N NE E SE S SW W NW

UK Power Networks

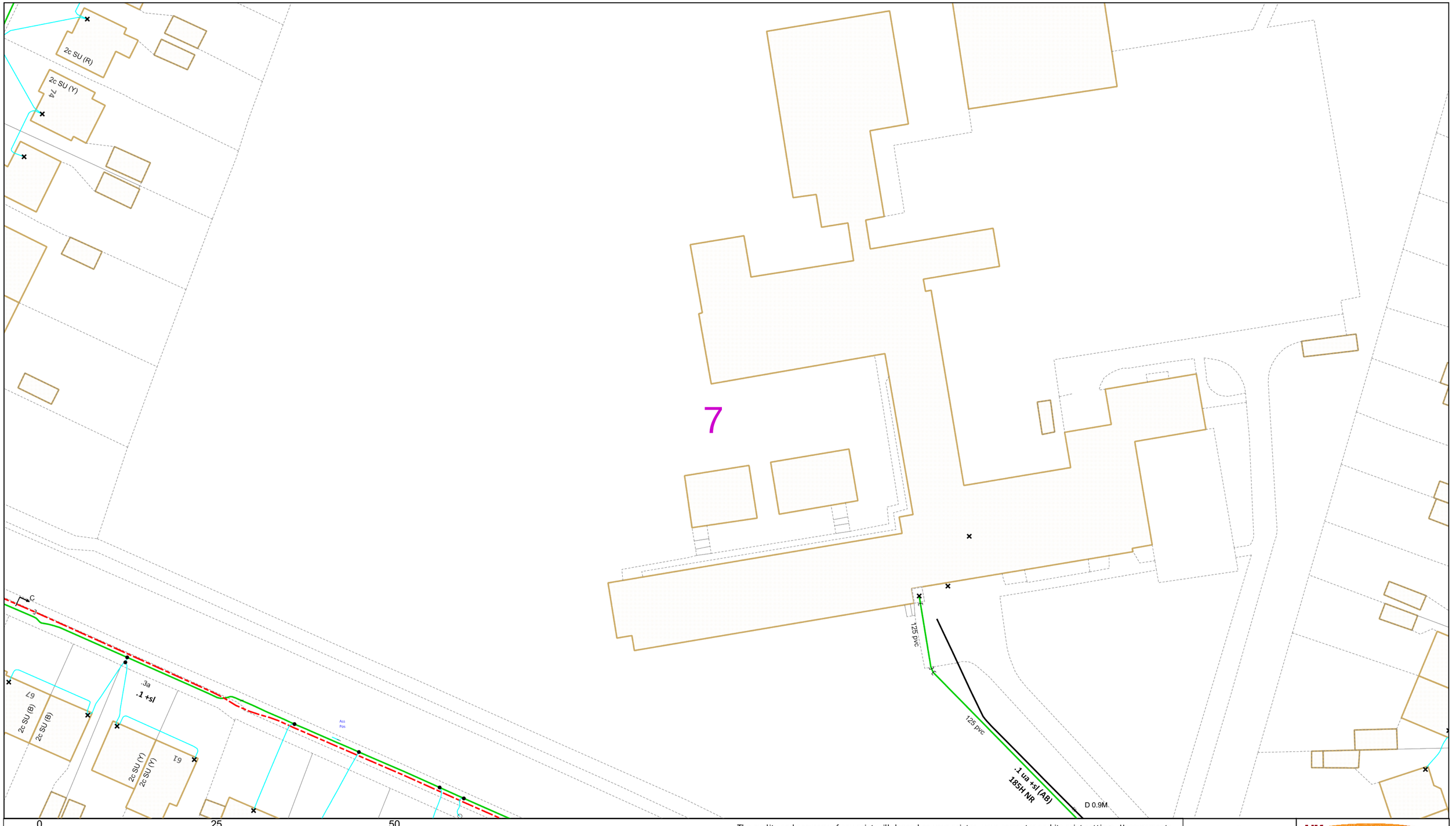
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Date Requested: 17/06/2021
Job Reference: 22424098
Site Location: 516174 131062
Requested by:
Miss Monique Elsom
Your Scheme/Reference: 2190563
Greenway Academy

Scale: 1:500 (When plotted at A3)

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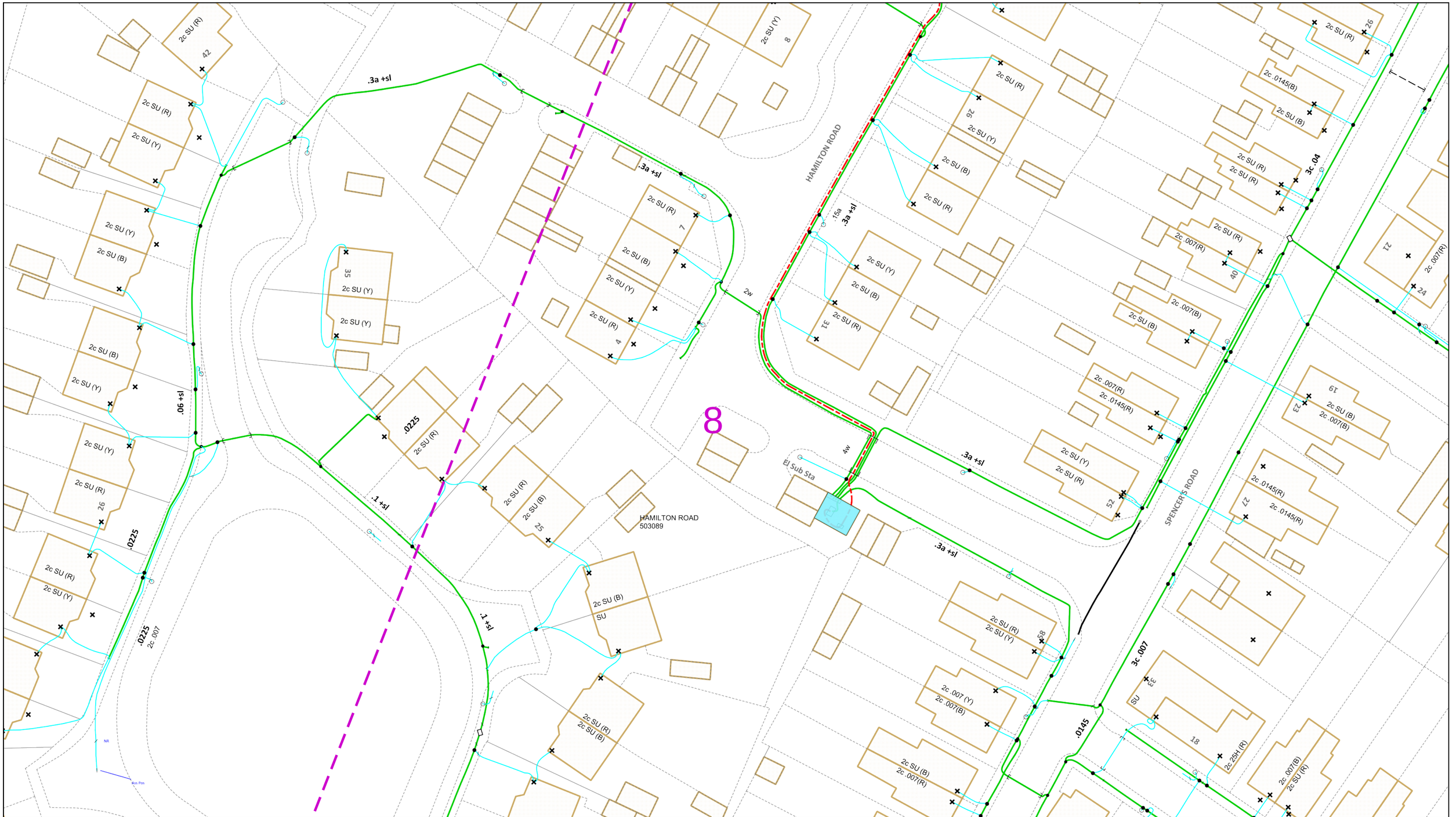
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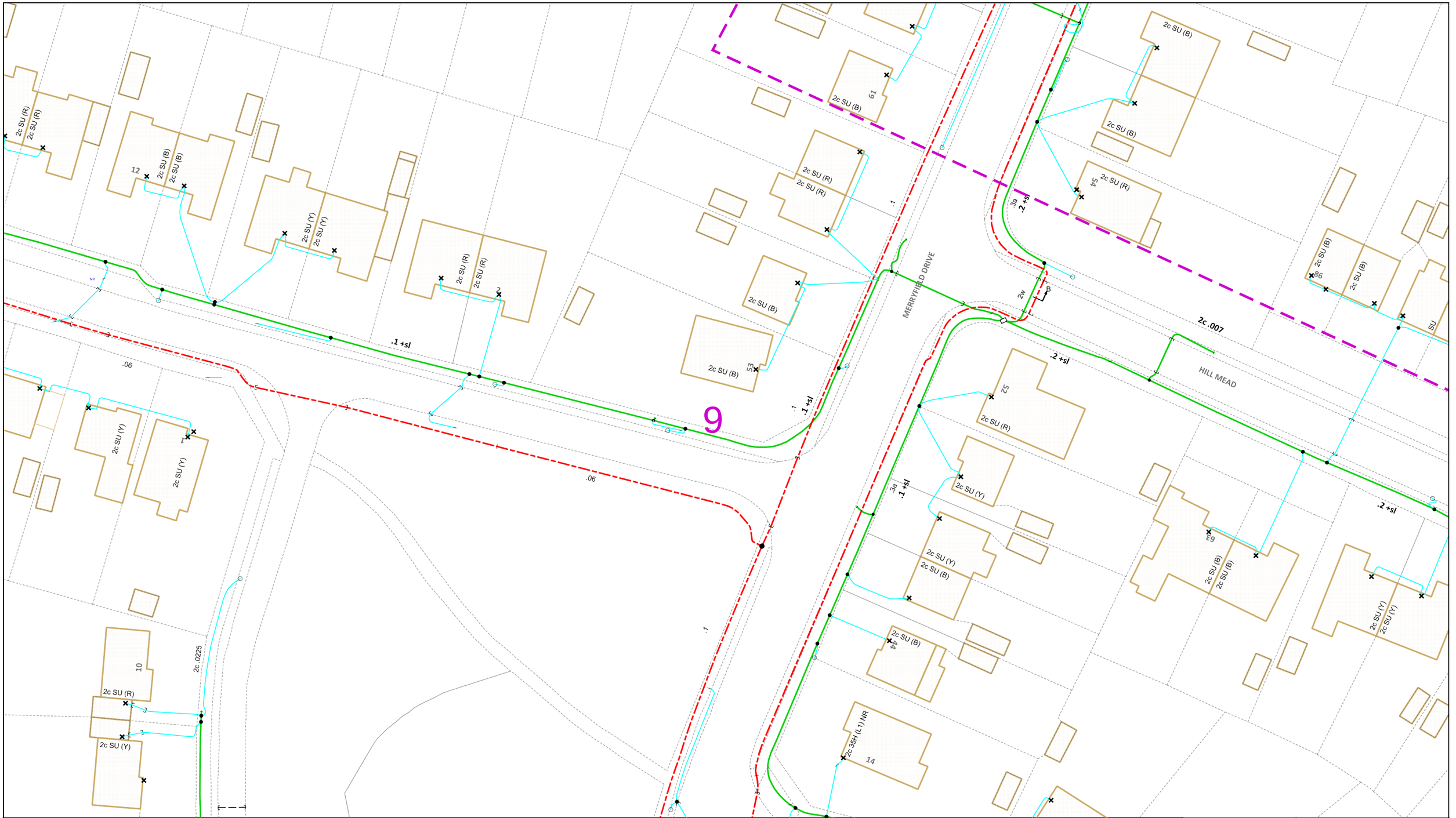
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metres

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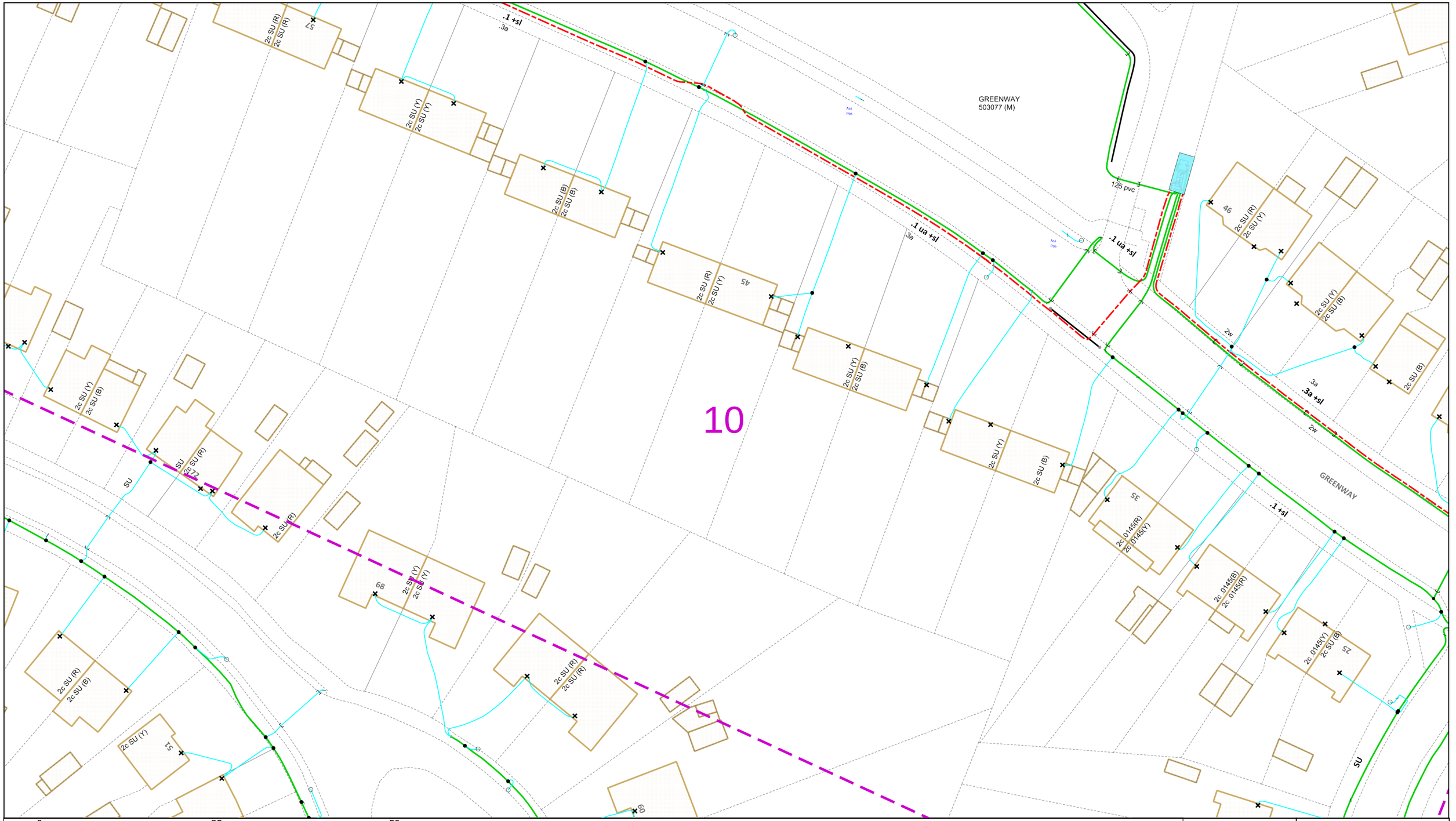
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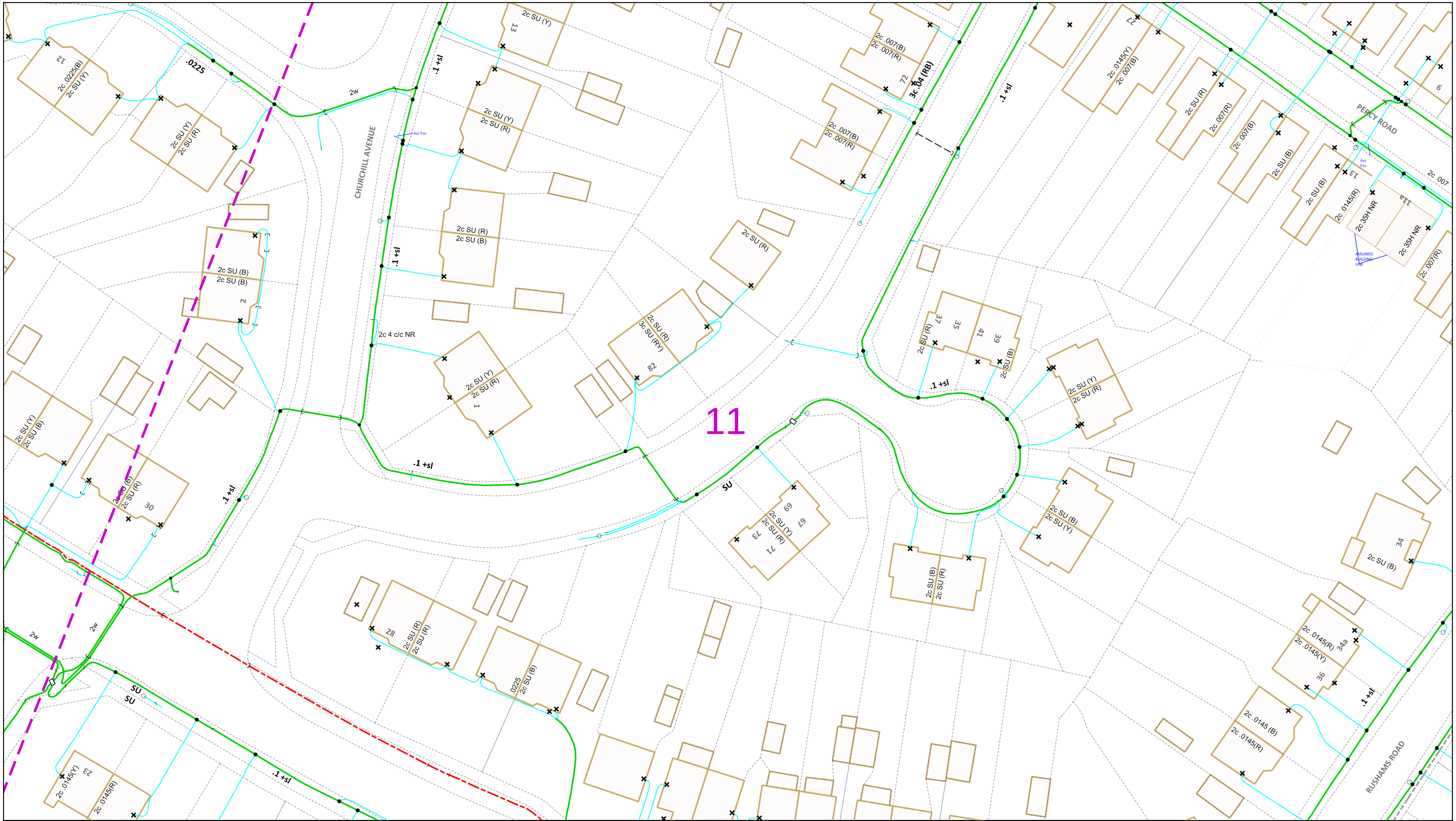
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0 25 50
metres

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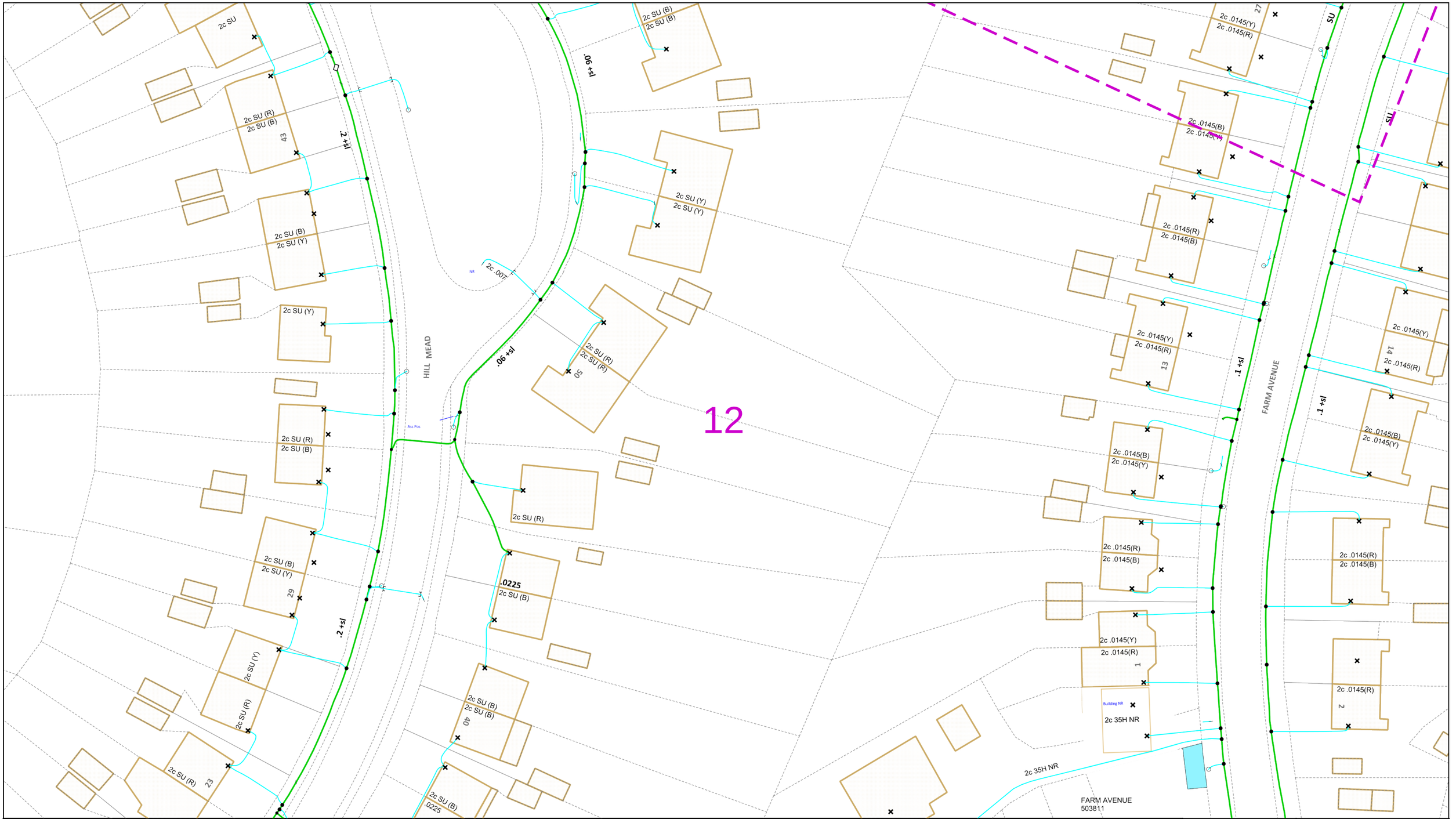
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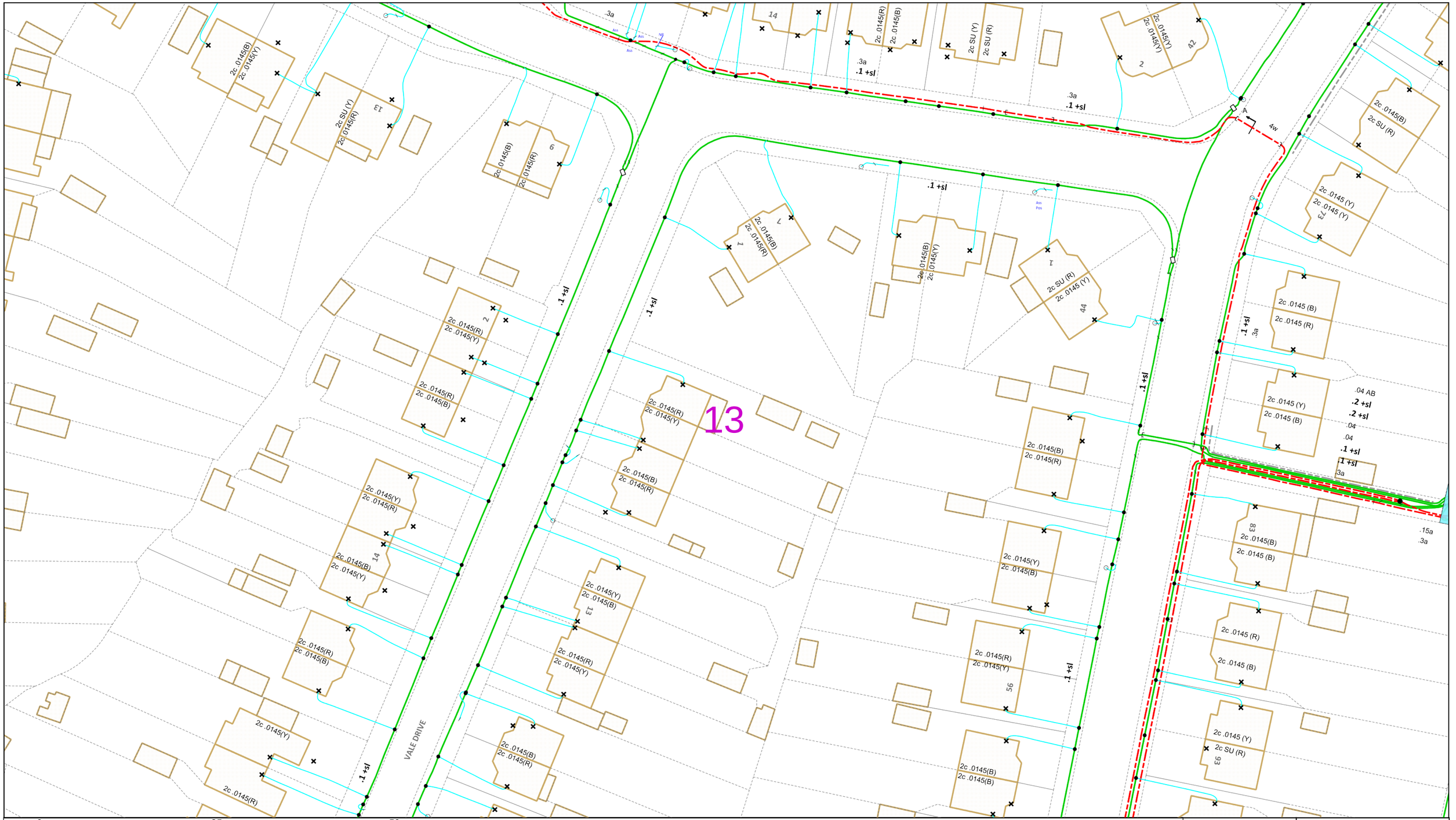
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(24hrs) URGENTLY

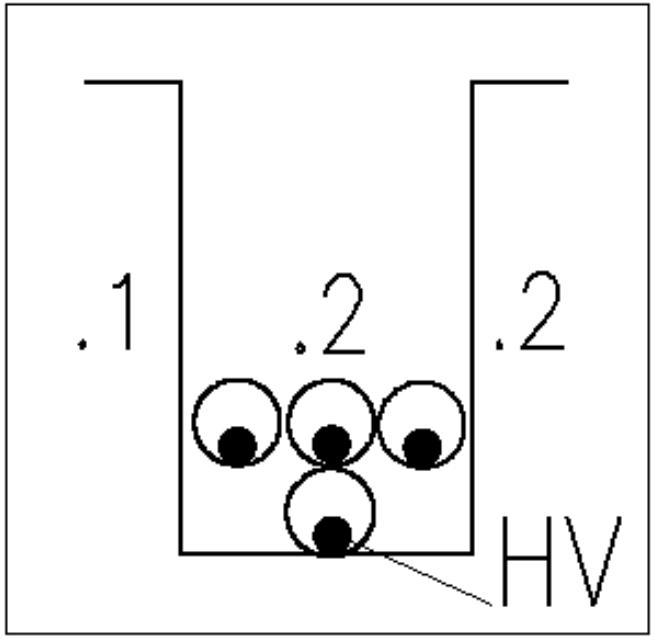
LOOK OUT LOOK UP

ALWAYS LOOK UP BEFORE YOU START WORK
Refer to HSE Guidance note GS6

Maps produced at 1:2500 scale are Geo-Schematics which show LV mains cables and overhead lines (in some cases all voltages). Prior to carrying out excavations you must refer to the 1:500 records to determine the location of all known underground plant and equipment.

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Cross Section : A



Cross Section

A

1. The position of the apparatus shown on this drawing is believed to be correct but the original landmarks may have been altered since the apparatus was installed.
2. The exact position of the apparatus should be verified - use approved cable avoidance tools prior to excavation using suitable hand tools.
3. It is essential that trial holes are carefully made avoiding the use of mechanical tools or picks until the exact location of all the cables have been determined.
4. It must be assumed that there is a service cable into each property, lamp column and street sign, etc.
5. All cables must be treated as being live unless proved otherwise by UK Power Networks.
6. The information proved must be given to all people working near UK Power Networks plant and equipment. Do not use plans more than 3 months after the issue date for excavation purposes.
7. Please be aware that electric cables/lines belonging to other owners of licensed electricity distribution systems may be present and it is your responsibility to identify their location.

1. UK Power Networks does not warrant that the information provided to you is correct. You rely upon it at your own risk.
2. UK Power Networks does not exclude or limit its liability if it causes the death of any persons or causes personal injury to a person.
3. Subject to paragraph 2 UK Power Networks has no liability to you in contract, in tort (including negligence), for breach of statutory duty or otherwise for any loss, damage, cost, claims, demands, or expenses that you or any third party may suffer or incur as a result of using the information provided whether for physical damage to property or for any economic loss (including without limitation loss of profit, loss of opportunity, loss of savings, loss of goodwill, loss of business, loss of use) or any special or consequential loss or damage whatsoever.
4. This plan has been provided to you on the basis of the terms of use set out in the covering letter that accompanies this plan. If you do not accept and/or do not understand the terms of use set out in the covering letter you must not use the plan and must return it to the sender of the letter.
5. You are responsible for the security of the information provided to you. It must not be given, sold or made available upon payment of a fee to a third party.

IF IN DOUBT - ASK! PHONE
0800 056 5866
EMERGENCY - If you damage a cable or line
Phone 0800 783 8838 (24hrs)
URGENTLY

UK Power Networks

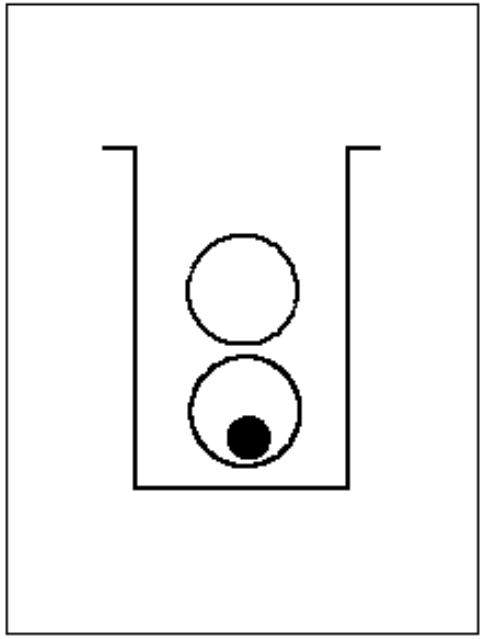
LOOK OUT LOOK UP

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Cross Section : B



Cross Section
B

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Phone 0800 783 8838 (24hrs)
URGENTLY

UK Power Networks

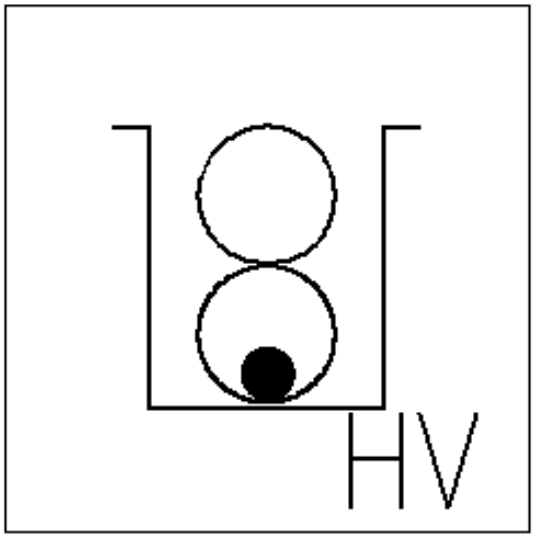
LOOK OUT LOOK UP

ALWAYS LOOK UP BEFORE YOU START WORK
Refer to HSE Guidance note GS6

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Cross Section : C



Cross Section C

1. The position of the apparatus shown on this drawing is believed to be correct but the original landmarks may have been altered since the apparatus was installed.
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UK Power Networks Feedback Tool

Please help UK Power Networks improve the accuracy of their network records and help make it safer for all those working around them in future.

All you need to do is:

1. Use your phone camera to scan the QR code:
2. Provide feedback on what you have found on site (good or bad)
3. Upload a photo if needed

Thank you for making the area a safer place to dig.

UK Power Networks, working with LSBUD

APPENDIX E
SITE PHOTOGRAPHS

PHOTOGRAPHIC LOG		
Photo no. **1**	**Date:** 27/10/2021	
Description: Arisings from hand dug inspection pit at BH101.		

Photo No. **2**	**Date:** 28/10/2021	
Description: Position of WS104 in right foreground. Rig on position of BH101 in background.		

Photo No.	Date:
3	28/10/2021



Description:

WS103 arisings

Photo No.	Date:
4	28/10/2021



Description:

Position of WS103

Photo No.	Date:
5	27/10/2021



Description:

Position of WS101

Photo No.	Date:
6	27/10/2021



Description:

Position of WS102, marked by well installation cover to left of white cone in foreground.

APPENDIX F
TECHNICAL BACKGROUND

H1 Desk Study

Aquifer designation and Source protection zones

Principal aquifer: layers of rock or drift deposit that have high intergranular and/or fracture permeability (usually providing a high level of water storage). They may support water supply and/or river base flow on a strategic scale.

Secondary A aquifer: permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

Secondary B aquifer: predominantly lower permeability layers that may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

Secondary undifferentiated aquifer: it has not been possible to attribute either a category A or B to a rock type. In most cases this means that it was previously designated as both a minor and non-aquifer in different locations owing to the variable characteristics.

Unproductive' strata: low permeability with negligible significance for water supply or river base flow.

The EA generally adopts a three-fold classification of source protection zones (SPZ) surround abstractions for public water supply. The Site is situated in an area defined as follows:

- Zone 1 or the 'inner protection zone' is located immediately adjacent to the groundwater source and is based on a 50-day travel time from any point below the water table to the source. It is designed to protect against the effects of human activity and biological/chemical contaminants that may have an immediate effect on the source
- Zone 2 or the 'outer protection zone' is defined by a 400-day travel time from a point below the water table to the source. The travel time is designed to provide delay and attenuation of slowly degrading pollutants
- Zone 3 or the 'total catchment' is the area around the source within which all groundwater recharge is presumed to be discharged at the source.

Preliminary risk assessment methodology

LCRM outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. An outline conceptual model should be formed at the preliminary risk assessment stage that collates all the existing information pertaining to a site in text, tabular or diagrammatic form. The outline conceptual model identifies potentially complete (termed possible) contaminant linkages (contaminant–pathway–receptor) and is used as the basis for the design of the site investigation. The outline conceptual model is updated as further information becomes available, for example as a result of the site investigation.

Production of a conceptual model requires an assessment of risk to be made. Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the

likelihood and the consequences of an event must be taken into account when assessing risk. RSK has adopted guidance provided in CIRIA C552 for use in the production of conceptual models.

The likelihood of an event can be classified on a four-point system using the following terms and definitions based on CIRIA C552:

- highly likely: the event appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution
- likely: it is probable that an event will occur or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term
- low likelihood: circumstances are possible under which an event could occur, but it is not certain even in the long term that an event would occur and it is less likely in the short term
- unlikely: circumstances are such that it is improbable the event would occur even in the long term.

The severity can be classified using a similar system also based on CIRIA C552. The terms and definitions relating to severity are:

- severe: short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short-term risk to an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000)
- medium: chronic damage to human health ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000), pollution of sensitive water resources, significant change in an ecosystem or organism forming part of that ecosystem
- mild: pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures or the environment
- minor: harm, not necessarily significant, but that could result in financial loss or expenditure to resolve. Non-permanent human health effects easily prevented by use of personal protective clothing. Easily repairable damage to buildings, structures and services.

Once the probability of an event occurring and its consequences have been classified, a risk category can be assigned according to the table below.

		Consequences			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**Highly likely**	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very low	Very low

Definitions of these risk categories are as follows together with an assessment of the further work that may be required:

- very high: there is a high probability that severe harm could occur or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability; urgent investigation and remediation are likely to be required
- high: harm is likely to occur. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required. Remedial works may be necessary in the short term and are likely over the long term
- moderate: it is possible that harm could arise, but it is unlikely that the harm would be severe and it is more likely that the harm would be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term
- low: it is possible that harm could occur, but it is likely that if realised this harm would at worst normally be mild
- very low: there is a low possibility that harm could occur and if realised the harm is unlikely to be severe.

H2 Site Investigation Methodology

Ground gas monitoring

An infrared gas meter was used to measure gas flow, concentrations of carbon dioxide (CO_2), methane (CH_4) and oxygen (O_2) in percentage by volume, while hydrogen sulphide (H_2S) and carbon monoxide (CO) were recorded in parts per million. Initial and steady state concentrations were recorded. In addition, during the first monitoring round, all wells were screened with a PID to establish if there are any interferences and cross-sensitivity of other hydrocarbons with the infrared gas meter.

Low flow groundwater sampling

Groundwater samples were retrieved using a United States Environment Protection Agency (USEPA) approved low-flow purging and sampling methodology.

The low-flow method relies on moving groundwater through the well screen at approximately the same rate as it flows through the geological formation. This results in a significant reduction in the volume of water extracted before sampling and significantly reduces the amount of disturbance of the water in the monitoring well during purging and sampling. Drawdown levels in the monitoring well and water quality indicator parameters (pH, temperature, electrical conductivity, redox potential and dissolved oxygen) are monitored during low-flow purging and sampling, with stabilisation indicating that purging is complete and sampling can begin. As the flow rate used for purging, in most cases, is the same or only slightly higher than the flow rate used for sampling, and because purging and sampling are conducted as one continuous operation in the field, the process is referred to as low-flow purging and sampling.

Reuse of suitable materials

The Definition of Waste: Development Industry Code of Practice (CL:AIRE, 2011) (CoP) was developed in cons**u**ltation with the Environment Agency and development industry to enable the

re-use of materials under certain scenarios and subject to demonstrating that specific criteria are met. The current reuse scenarios covered by the CoP comprise

- reuse on the site of origin (with or without treatment)
- direct transfer of clean and natural soils between sites
- use in the development of land other than the site of origin following treatment at an authorised Hub site (including a fixed soil treatment facility).

The importation of made ground soils (irrespective of contamination status) or crushed demolition materials is not permitted currently under the CoP and requires either a standard rules environmental permit or a U1 waste exemption (see below).

In the context of excavated materials used on-sites undergoing development, four factors are considered to be of particular relevance in determining if the material is a waste or when it ceases to be waste:

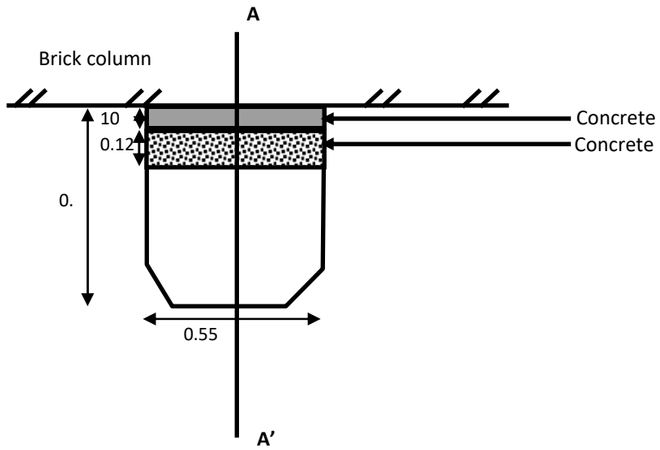
- the aim of the Waste Framework Directive is not undermined, i.e. if the use of the material will create an unacceptable risk of pollution of the environment or harm to human health it is likely to be waste
- the material is certain to be used
- the material is suitable for use both chemically and geotechnically
- only the required quantity of material will be used.

The CoP requires the preparation of a materials management plan (MMP) that confirms the above factors will be met. This plan needs to be reviewed by a 'Qualified Person' (QP) who will then issue a declaration form to the EA. As the project progresses, data must be collated and on completion a verification report produced that shows the MMP was followed and describes any changes.

The MMP establishes whether specific materials are classified as waste and how excavated materials will be treated and/or reused in line with the CoP. The MMP is likely to form part of the site waste management plan.

APPENDIX G
EXPLORATORY HOLE RECORDS

PLAN

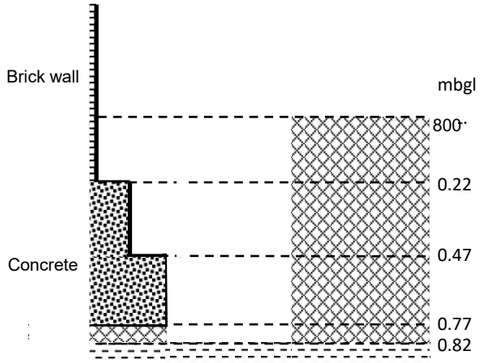


PHOTOS





SECTION A - A'



0.00m - MADE GROUND (Woodchip cover)
0.10m - MADE GROUND (Light grey concrete with fine aggregate of chert)

0.10m - MADE GROUND (Orangish brown mottled light grey silty clay with rare gravel of brick and charcoal)

0.82m - Firm orangish brown mottled light grey silty CLAY.

General Remarks

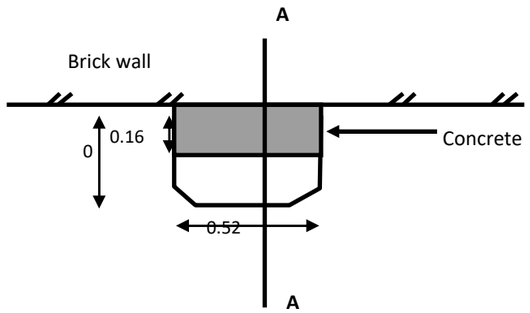
RSK Environment Ltd
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT
United Kingdom
Tel: +44 (0)1442 437500
Fax: +44 (0)1442 437550

Drawing Title: **FP101**

Project Title: **Greenway Academy, Horsham**

Dimensions	Level (mAOD)	Scale	Client	Project Number
mm	43.81	NTS	Department for Education	1921968

PLAN

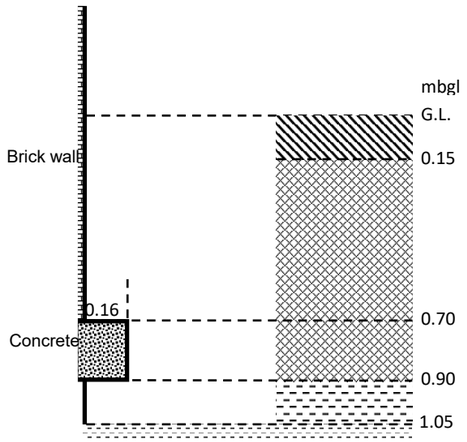


PHOTOS





SECTION A - A'



0.00m - Black bituminous surface

0.15m - MADE GROUND (Light grey and orangish brown silty clay. Rare half and whole bricks and pockets of fine sand).

0.90 m - Firm orangish brown mottled light grey silty CLAY.

General Remarks

RSK Environment Ltd
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT
United Kingdom
Tel: +44 (0)1442 437500
Fax: +44 (0)1442 437550

Drawing Title: **FP102**

Project Title: **Greenway Academy, Horsham**

Dimensions	Level (mAOD)	Scale	Client	Project Number
mm	43.30	NTS	Department for Education	1921968

RSK GEOSCIENCES

BOREHOLE LOG

Contract:	Client:	Borehole:
Greenway Academy	**Department of Education**	**BH101**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921968	**27.10.21** End: **29.10.21**	**43.28**	**E:516596.0 N:131309.8**	**1** of **1**

Samples and In-situ Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.00-0.50	1	B				TOPSOIL: Brown clayey topsoil with fine roots and rootlets.	0.30	
0.00-0.30	1	ES						
0.40-0.50	2	ES				Firm light grey mottled orangish brown silty CLAY with rare fine roots. (UPPER TUNBRIDGE SAND- MUDSTONE)	(0.90)	
0.50	1	D						
0.80-1.20	3	ES					1.20	
1.20-1.65	2	$U_{(100)}$	40 blows			Stiff greyish brown silty CLAY (UPPER TUNBRIDGE SAND-MUDSTONE)		
1.70	3	D						
2.00-2.45	4	SPT	N=97				(1.90)	
2.00-2.45	4	D						
2.50	5	D					3.10	
3.00-3.45	6	SPT	N=123			Very stiff brownish grey silty CLAY with bands of very hard siltstone. Becoming grey in colour with depth. (UPPER TUNBRIDGE SAND-MUDSTONE)		
3.00-3.45	6	D						
3.75	7	D						
4.00-4.15	8	SPT(c)	25/50 for 75mm					
4.00-4.20	8	D						
4.75	9	D						
5.00-5.15	10	SPT(c)	25/50 for 75mm				(3.90)	
5.00	10	D						
6.00	11	D						
6.50-6.65	12	SPT(c)	25/50 for 75mm					
6.50	12	D					7.00	
						Refusal at 7.00 mbgl.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

1. Hand dug inspection pit to 1.20 mbgl
2. Groundwater encountered at 5.00 mbgl. Rose to 4.50 mbgl.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Hand tools + Cable percussion	**Unknown**	**P.J. Drilling**	**CDuffield**	AGS

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log CABLE PERCUSSION LOG - A4P | 1921968_GREENWAY_ACADEMY.GPJ - v10_01.
RSK Environment Ltd, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442 437500, Fax: 01442 437550, Web: www.rsk.co.uk. | 03/12/21 - 11:57 | CD7 |

BOREHOLE LOG

Contract:	Client:	Borehole:
Greenway Academy	**Department of Education**	**BH102**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921968	**27.10.21** End: **29.10.21**	**43.44**	**E:516535.3 N:131337.4**	**1** of **1**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.00-0.30	1	ES				TOPSOIL: Greyish brown clayey with occasional fine roots. Rare fragments of brick.	0.34	
0.40-0.60	1	D				Firm grey and orangish brown silty CLAY. Rare pockets of fine sand. Rare fine roots.(UPPER TUNBRIDGE SAND- SANDSTONE AND SILTSTONE)	(0.86)	
0.40-0.60	2	ES						
0.50	1	B						
0.80-1.20	3	ES						
1.00-1.45	2	$U_{(100)}$	40 blows				1.20	
1.50	3	D				Stiff greyish brown mottled orangish brown silty CLAY. (UPPER TUNBRIDGE SAND- SANDSTONE AND SILTSTONE)		
1.50-1.95	4	$U_{(100)}$	60 blows					
2.00	5	D					(1.80)	
2.00-2.45	6	SPT	N=69					
2.00-2.45	6	D						
2.50-2.75	7	D						
3.00-3.30	8	SPT(c)	8,12/25,45 for 75mm				3.00	
3.00-3.45	8	D				Very stiff greyish brown silty CLAY with bands of very hard siltstone. (UPPER TUNBRIDGE SAND- SANDSTONE AND SILTSTONE)		
3.50	9	D						
4.00-4.15	10	SPT(c)	25/50 for 75mm				(2.45)	
4.00	10	D						
4.50	11	D						
5.00-5.15	12	SPT(c)	25/50 for 75mm					
5.00-5.45	12	D					5.45	
						Refusal at 5.45 mbgl.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

1. Hand dug inspection pit to 1.20 mbgl
2. Groundwater encountered at 5.00 mbgl. Rose to 4.50 mbgl. after 20 minutes.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Hand tools + Cable percussion	**Unknown**	**P.J. Drilling**	**CDuffield**	

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log CABLE PERCUSSION LOG - A4P | 1921968_GREENWAY_ACADEMY.GPJ - v10_01.
RSK Environment Ltd, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442 437500, Fax: 01442 437550, Web: www.rsk.co.uk. | 03/12/21 - 11:57 | CD7 |

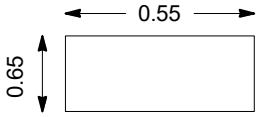
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Greenway Academy	**Department of Education**	**FP101**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921968	**27.10.21** End: **27.10.21**	**43.81**	**E:516559.1 N:131325.1**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Wood chip cover.	0.10	
						Light grey concrete. Rounded aggregate of chert. No rebar.	0.25	
0.25-0.82	1	ES				MADE GROUND: Orangish brown mottled light grey silty clay with rare gravel of brick and charcoal.	(0.52)	
0.25-0.82	1	D					0.77	
						Firm orangish brown mottled light grey silty CLAY. (UPPER TUNBRIDGE SAND- UNDIFFERENTIATED)	0.82	
						Trial pit terminated at 0.82m depth.		

Plan (Not to Scale)



General Remarks

1. Foundation Inspection Pit.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Hand dug	**Hand tools**	**CDuffield**	

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log XCUSTOM - 563029 - TRIAL PIT - A4P | 1921968_GREENWAY_ACADEMY.GPJ - v10_01.
RSK Environment Ltd, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442 437500, Fax: 01442 437550, Web: www.rsk.co.uk. | 03/12/21 - 11:44 | CD7 |

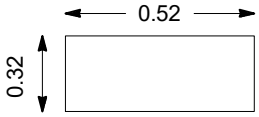
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Greenway Academy	**Department of Education**	**FP102**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921968	**27.10.21** End: **27.10.21**	**43.30**	**E:516605.2 N:131334.8**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark grey bituminous surface.	0.15	
0.15-1.00	1	D				MADE GROUND: Firm light grey and orangish brown silty clay. Rare pockets of fine sand. Rare half and whole bricks.	(0.75)	
							0.90	
						Firm orangish brown mottled light grey silty CLAY. (UPPER TUNBRIDGE SAND- UNDIFFERENTIATED)	1.05	
						Trial pit terminated at 1.05m depth.		

Plan (Not to Scale)



General Remarks

1. Foundation Inspection Pit.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Hand dug	**Hand tools**	**CDuffield**	

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log XCUSTOM - 563029 - TRIAL PIT - A4P | 1921968_GREENWAY_ACADEMY.GPJ - v10_01.
RSK Environment Ltd, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442 437500, Fax: 01442 437550, Web: www.rsk.co.uk. | 03/12/21 - 11:44 | CD7 |

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Greenway Academy	**Department of Education**	**WS101**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921968	**28.10.21** End: **28.10.21**	**43.49**	**E:516578.0 N:013131.8**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.00-0.25	1	ES				Brown silty clayey TOPSOIL with fine roots and rootlets.	0.25	
	0.25-0.50	2	ES				MADE GROUND: Soft brown slightly fine sandy clay with rare brick fragments and charcoal.	0.50	
	0.50	1	D				Firm grey mottled orangish brown silty CLAY. Slightly fine sandy in parts. (UPPER TUNBRIDGE SAND-UNDIFFERENTIATED)		
	0.50-0.70	3	ES						
	0.50		V	c_u=90/75/80					
	1.00-1.45	1	SPT	N=8					
	1.20	1	DSPT						
	1.20	2	D						
							. . . From 1.60mbgl: Stiff.		
	1.70		V	c_u=80				(2.65)	
	1.80	3	D						
	2.00-2.45	2	SPT	N=37			. . . From 2.00mbgl: Friable/brittle.		
	2.00	2	DSPT						
	2.50	4	D						
	2.70-3.15	3	SPT	N=63					
	2.70	3	DSPT						
								3.15	
							Refusal at 3.15 mbgl.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Handpit to 1.20mbgl.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Window sampling	**Premier 110**	**P.J. Drilling**	**CDuffield**	

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log XCUSTOM - LTC - WINDOW SAMPLE LOG - A4P | 1921968_GREENWAY_ACADEMY.GPJ - v10_01.
RSK Environment Ltd, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442 437500, Fax: 01442 437550, Web: www.rsk.co.uk. | 03/12/21 - 12:01 | CD7 |

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Greenway Academy	**Department of Education**	**WS102**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921968	**28.10.21** End: **28.10.21**	**41.91**	**E:516564.2 N:131420.9**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.00-0.20	1	ES				Brown silty clayey TOPSOIL with fine roots and rootlets.	0.20	
	0.40-0.60	2	ES				Firm brown slightly fine sandy silty CLAY. Occasional orangish brown mottling.	(1.00)	
	0.50	1	D						
	1.00-1.45	1	SPT	N=7					
	1.00-1.20	3	ES					1.20	
	1.20	2	D				Stiff greyish brown slightly fine sandy CLAY with black flecks of decaying organic matter. (UPPER TUNBRIDGE SAND- UNDIFFERENTIATED)	(1.10)	
	1.65		V	c_u=85/81/89					
	1.80-2.00	3	D						
	2.00-2.30	2	SPT	18,21/25,29 for 75mm				2.30	
							Refusal at 2.30 mbgl.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Handpit to 1.20mbgl.
2. No groundwater encountered.
3. Installs: 0.50m plain- 2.00m slotted.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Hand tools + Window sampling	**Premier 110**	**P.J. Drilling**	**CDuffield**	

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log XCUSTOM - LTC - WINDOW SAMPLE LOG - A4P | 1921968_GREENWAY_ACADEMY.GPJ - v10_01.
RSK Environment Ltd, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442 437500, Fax: 01442 437550, Web: www.rsk.co.uk. | 03/12/21 - 12:01 | CD7 |

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Greenway Academy	**Department of Education**	**WS103**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921968	**28.10.21** End: **28.10.21**	**42.85**	**E:516524.9 N:131371.6**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.00-0.30	1	ES				Brown silty clayey TOPSOIL with fine roots and rootlets.	(0.30)	
								0.30	
	0.40-0.60	2	ES				Firm grey and orangish brown slighty fine sandy silty CLAY. (UPPER TUNBRIDGE SAND- UNDIFFERENTIATED)		
	0.50	1	D					(0.70)	
	0.80-1.00	3	ES						
								1.00	
	1.00-1.45	1	SPT	N=7			Stiff grey mottled orangish brown and reddish brown silty CLAY. (UPPER TUNBRIDGE SAND- UNDIFFERENTIATED)		
	1.20-1.65	1	DSPT						
	1.20	2	D					(0.90)	
	1.70-1.90	3	D						
	1.70		V	c_u=75/85/75					
								1.90	
	2.00-2.45	2	SPT	N=55			Very stiff light grey and light brown silty CLAY. (UPPER TUNBRIDGE SAND- UNDIFFERENTIATED)		
	2.00-2.45	2	DSPT				. . . From 2.00mbgl: Recovered as silty sandy gravel, friable/ brittle.		
	2.00-2.50	4	D					(1.05)	
	2.50-2.95	3	SPT	N=64					
	2.50	3	DSPT						
								2.95	
							Refusal at 2.95 mbgl.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Handpit to 1.20mbgl.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Hand tools + Window sampling	**Premier 110**	**P.J. Drilling**	**CDuffield**	

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log XCUSTOM - LTC - WINDOW SAMPLE LOG - A4P | 1921968_GREENWAY_ACADEMY.GPJ - v10_01.
RSK Environment Ltd, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442 437550, Fax: 01442 437500, Web: www.rsk.co.uk. | 03/12/21 - 12:02 | CD7 |

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Greenway Academy	**Department of Education**	**WS104**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
1921968	**28.10.21** End: **28.10.21**	**42.93**	**E:516616.8 N:131316.2**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.00-0.25	1	ES				Brown silty clayey TOPSOIL with fine roots and rootlets.	0.25	
	0.40-0.60	2	ES				Firm grey mottled orangish brown silty CLAY. Occasional fine roots. (UPPER TUNBRIDGE SAND-UNDIFFERENTIATED)		
	1.00-1.45	1	SPT	N=7					
	1.20-1.65 1.20-1.40	1 1	DSPT D						
							. . . From 1.50mgl: Stiff.	(2.70)	
	1.80-2.00 1.80	2	D V	c_u=55/72/75/50/61					
	2.00-2.45 2.00-2.50	2 3	SPT D	N=55			. . . From 2.00mbgl: Occasional pockets of fine orangish brown sand.		
	2.50-2.95	3	SPT	N=83					
								2.95	
							Refusal at 2.95 mbgl.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Handpit to 1.20mbgl.
2. Damp from 2.40mbgl.
3. Install: 0.5m - plain - 2.00m slotted.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Hand tools + Window sampling	**Premier 110**	**P.J. Drilling**	**CDuffield**	

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log XCUSTOM - LTC - WINDOW SAMPLE LOG - A4P | 1921968_GREENWAY_ACADEMY.GPJ - v10_01.
RSK Environment Ltd, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442 437550, Fax: 01442 437500, Web: www.rsk.co.uk. | 03/12/21 - 12:02 | CD7 |

APPENDIX H
GROUND GAS MONITORING DATA AND SITE CONDITIONS

GAS MONITORING FIELD SHEET

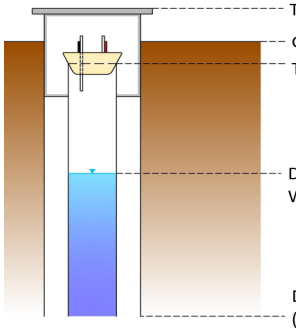
Monitoring Date:	11/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		Flush Cover
Pre-Testing Remarks:		Air Temperature: °C	13	Device:		GA5000
none		Weather:	Partly Cloudy	Serial Number:		HH370
		Ground Conditions:	Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG		None		
		Tidal State: (if applicable) High / Low / Rising / Falling		N/A		
Exploratory Position ID:	BH101	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	11:05	11:04	1021	0.04	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:05	11:05				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	-0.2	0	0.1	0.4	17.0	2	0		
5	-0.2	15	0.1	0.2	19.0	2	0		
10	-0.2	30	0.1	0.1	19.3	2	0		
15	-0.2	60	0.1	0.2	19.1	2	0		
20	-0.1	90							
25	-0.1	120							
30	-0.1	180							
40									
50									
60									
90									
120									

Stage 1 gas flow - Peak (l/h)	-0.1	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	-0.1	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	3.94	Time:	11:06	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	4.86	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	NO
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Greenway Academy	Data Collected By:	CD
	Project Manager / Engineer:	AG	Checked:	AG
	Contract Ref:	1921968	Page number:	1

GAS MONITORING FIELD SHEET

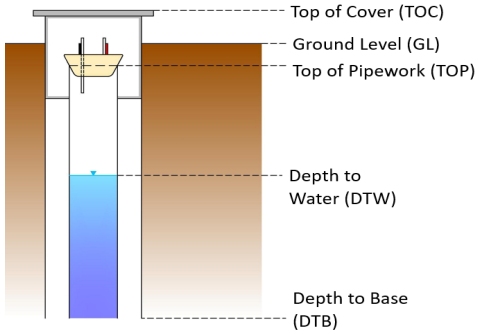
Monitoring Date:	11/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		Flush Cover
Pre-Testing Remarks:		Air Temperature: °C	13	Device:		GA5000
none		Weather:	Partly Cloudy	Serial Number:		HH370
		Ground Conditions:	Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG		None		
		Tidal State: (if applicable) High / Low / Rising / Falling		N/A		
Exploratory Position ID:	BH102	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	11:36	11:35	1020	-0.02	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:36	11:36				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0.2	0	0.1	0.2	20.8	1	0		
5	0.2	15	0.1	0.2	20.7	1	0		
10	0.2	30	0.1	0.2	20.8	1	0		
15	0.2	60	0.1	0.2	20.8	1	0		
20	0.3	90							
25	0.3	120							
30	0.3	180							
40									
50									
60									
90									
120									

Stage 1 gas flow - Peak (l/h)	0.3	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0.3	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	2.04	Time:	11:37	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	2.1	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:

Samples Taken: Yes / No	NO
Sample Media: Gas/Water	
Gas Cannister Start (mb)	
Gas Cannister End (mb)	
Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

Contract Name:	Greenway Academy	Data Collected By:	CD
Project Manager / Engineer:	AG	Checked:	AG
Contract Ref:	1921968	Page number:	2

GAS MONITORING FIELD SHEET

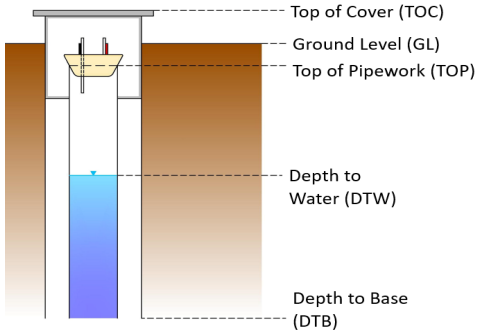
Monitoring Date:	11/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		Flush Cover
Pre-Testing Remarks:		Air Temperature: °C	13	Device:		GA5000
none		Weather:	Partly Cloudy	Serial Number:		HH370
		Ground Conditions:	Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		N/A		
Exploratory Position ID:	WS101	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	12:24	12:22	1020	0.04	Observations (e.g. on-site activities):	
Time End (hh:mm)	12:24	12:23				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	-0.1	0	0.1	0.8	12.6	4	0		
5	-0.1	15	0.1	0.2	16.6	0	0		
10	-0.1	30	0.1	0.4	16.8	0	0		
15	-0.1	60	0.1	0.4	16.8	0	0		
20	-0.1	90							
25	0	120							
30	0	180							
40									
50									
60									
90									
120									

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	-0.1	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	Dry	Time:	12:25	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	2.52	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:

Samples Taken: Yes / No	NO
Sample Media: Gas/Water	
Gas Cannister Start (mb)	
Gas Cannister End (mb)	
Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Greenway Academy	Data Collected By:	CD
	Project Manager / Engineer:	AG	Checked:	AG
	Contract Ref:	1921968	Page number:	3

GAS MONITORING FIELD SHEET

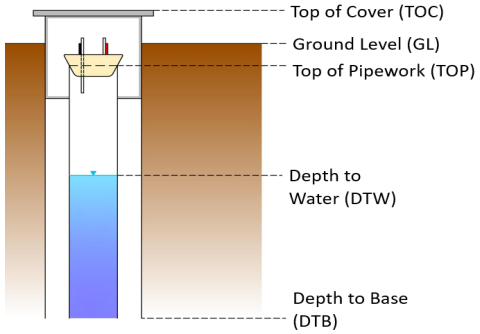
Monitoring Date:	11/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		Flush Cover
Pre-Testing Remarks:		Air Temperature: °C	13	Device:		GA5000
none		Weather:	Partly Cloudy	Serial Number:		HH370
		Ground Conditions:	Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		N/A		
Exploratory Position ID:	WS102	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	12:08	12:07	1020	0.0	Observations (e.g. on-site activities):	
Time End (hh:mm)	12:09	12:08				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	-0.0	0	0.1	0.6	14.1	1	0		
5	-0.0	15	0.1	0.6	13.5	1	0		
10	-0.0	30	0.1	0.6	13	1	0		
15	-0.0	60	0.1	0.6	11.9	1	0		
20	-0.0	90							
25	-0.0	120							
30	-0.0	180							
40									
50									
60									
90									
120									

Stage 1 gas flow - Peak (l/h)	-0.0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	-0.0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	Dry	Time:	12:10	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	1.00	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:		
Samples Taken: Yes / No	NO	
Sample Media: Gas/Water		
Gas Cannister Start (mb)		
Gas Cannister End (mb)		
Gas Cannister Duration (mins)		

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Greenway Academy	Data Collected By:	CD
	Project Manager / Engineer:	AG	Checked:	AG
	Contract Ref:	1921968	Page number:	4

GAS MONITORING FIELD SHEET

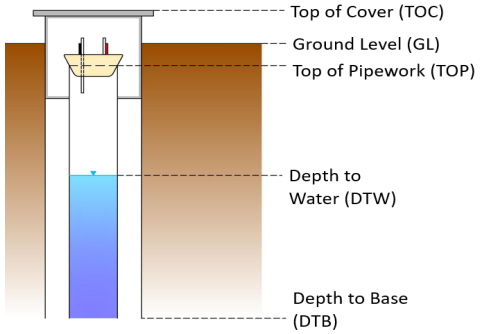
Monitoring Date:	11/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		Flush Cover
Pre-Testing Remarks:		Air Temperature: °C	13	Device:		GA5000
none		Weather:	Partly Cloudy	Serial Number:		HH370
		Ground Conditions:	Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		N/A		
Exploratory Position ID:	WS103	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	11:51	11:49	1020	0.05	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:54	11:50				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	-1.8	0	0.1	3.0	18.0	0	0		
5	-1.7	15	0.1	3.0	17.5	0	0		
10	-1.6	30	0.1	3.0	17.2	0	0		
15	-1.6	60	0.1	3.0	17.1	0	0		
20	-1.5	90							
25	-1.4	120							
30	-1.2	180							
40	-1.0								
50	-0.7								
60	-0.5								
90	-0.3								
120	-0.1								
150	-0.1								
180	-0.1								

Stage 1 gas flow - Peak (l/h)	-0.1	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	-0.1	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	0.42	Time:	11:55	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	2.04	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	NO
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Greenway Academy	Data Collected By:	CD
	Project Manager / Engineer:	AG	Checked:	AG
	Contract Ref:	1921968	Page number:	5

GAS MONITORING FIELD SHEET

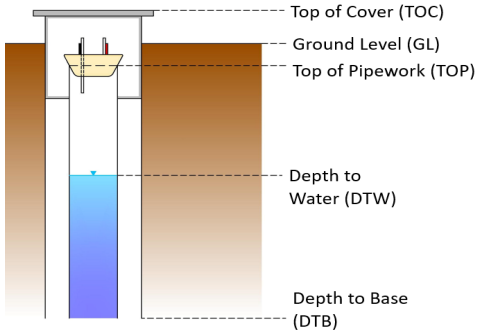
Monitoring Date:	11/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):			Flush Cover
Pre-Testing Remarks:		Air Temperature: °C		13	Device:		GA5000
none		Weather:		Partly Cloudy	Serial Number:		HH370
		Ground Conditions:		Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG			Light		
		Tidal State: (if applicable) High / Low / Rising / Falling			N/A		
Exploratory Position ID:	WS104	Monitoring Round Number:		1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep		N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	10:49	10:47	1021	0.07	Observations (e.g. on-site activities):	
Time End (hh:mm)	10:49	10:49				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	-0.1	0	0.2	0.4	17.4	2	0		
5	-0.0	15	0.2	0.4	16.8	2	0		
10	-0.0	30	0.1	0.4	16.7	1	0		
15	0.0	60	0.1	0.4	16.6	1	0		
20	0.0	90							
25	0.0	120							
30	0.0	180							
40									
50									
60									
90									
120									
150									
180									

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	Dry	Time:	10:50	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	2.02	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:		
Samples Taken: Yes / No	NO	
Sample Media: Gas/Water		
Gas Cannister Start (mb)		
Gas Cannister End (mb)		
Gas Cannister Duration (mins)		

Depth (from datum)	Sample Ref	Type (EW / G)	Container

Contract Name:	Greenway Academy		Data Collected By:	CD
Project Manager / Engineer:		AG	Checked:	AG
Contract Ref:	1921968		Page number:	6

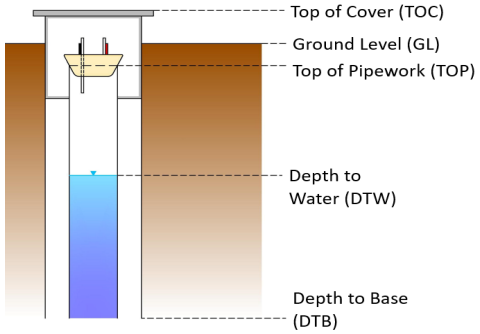
GAS MONITORING FIELD SHEET

Monitoring Date:	19/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):			Flush Cover
Pre-Testing Remarks:		Air Temperature: °C		12	Device:		GA5000
none		Weather:		Overcast	Serial Number:		HH370
		Ground Conditions:		Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG			None		
		Tidal State: (if applicable) High / Low / Rising / Falling			N/A		
Exploratory Position ID:	BH101	Monitoring Round Number:		1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep		N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50
Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single	
Time Start (hh:mm)	10:20	10:17	1029	0	Observations (e.g. on-site activities):		
Time End (hh:mm)	10:20	10:19					

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0.0	0	0.1	0.6	18.2	1	0		
5	0.0	15	0.1	0.5	19.3	0	0		
10	0.0	30	0.1	0.4	19.9	0	0		
15	0.0	60	0.1	0.5	20.0	0	0		
20	0.0	90	0.1	0.5	20.0	0	0		
25	0.0	120							
30	0.0	180							
40									
50									
60									
90									
120									

Stage 1 gas flow - Peak (l/h)	0.0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0.0	

STAGE 3 WATER LEVEL OBSERVATION	Depth (from datum) to water (DTW): (m)	1.895	Time:	10:21	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	4.68	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:

Samples Taken: Yes / No	NO
Sample Media: Gas/Water	
Gas Cannister Start (mb)	
Gas Cannister End (mb)	
Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Greenway Academy	Data Collected By:	CD
	Project Manager / Engineer:	AG/CD	Checked:	AG
	Contract Ref:	1921968	Page number:	1

GAS MONITORING FIELD SHEET

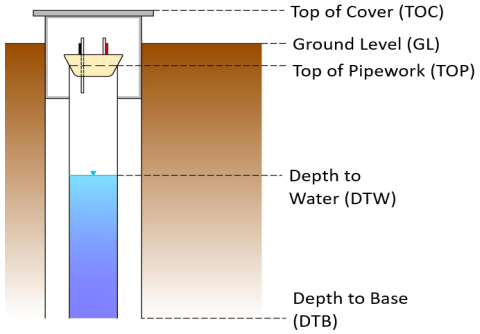
Monitoring Date:	19/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		Flush Cover
Pre-Testing Remarks:		Air Temperature: °C	12	Device:		GA5000
Well cover damaged and sunken in to ground. Well appeared undamaged. Repair to cover made.		Weather:	Overcast	Serial Number:		HH370
		Ground Conditions:	Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG		None		
		Tidal State: (if applicable) High / Low / Rising / Falling		N/A		
Exploratory Position ID:	BH102	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	10:55	10:51	1028	0.04	Observations (e.g. on-site activities):	
Time End (hh:mm)	10:55	10:54				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0.0	0	0.1	0	21.1	3			
5	0.0	15	0.1	1.9	19.8	2	0		
10	0.0	30	0.1	1.7	19.7	1	0		
15	0.0	60	0.1	0.7	20.5	1	0		
20	0.0	90	0.1	0.4	20.7	1	0		
25	-0.1	120	0.1	0.3	20.9	1	0		
30	0.0	180	0.1	0.2	21	1	0		
40									
50									
60									
90									
120									

Stage 1 gas flow - Peak (l/h)	0.0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0.0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	0.82	Time:	11:37	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	2.18	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	NO
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Greenway Academy	Data Collected By:	CD
	Project Manager / Engineer:	AG/CD	Checked:	AG
	Contract Ref:	1921968	Page number:	2

GAS MONITORING FIELD SHEET

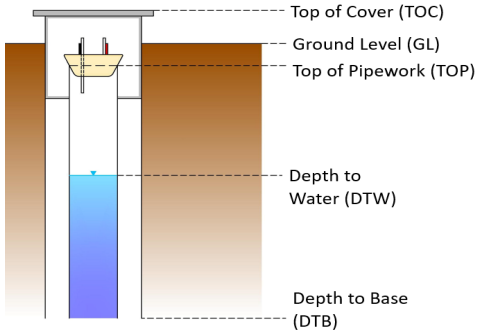
Monitoring Date:	19/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		Flush Cover
Pre-Testing Remarks:		Air Temperature: °C	12	Device:		GA5000
none		Weather:	overcast	Serial Number:		HH370
		Ground Conditions:	Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		N/A		
Exploratory Position ID:	WS101	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	11:57	11:54	1028	0.02	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:57	11:56				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0.1	0	0.1	1.2	10.9	0	0		
5	0.1	15	0.1	0.3	17.7	0	0		
10	0.1	30	0.1	0.3	18.1	0	0		
15	0.1	60	0.1	0.3	17.6	0	0		
20	0.1	90	0.1	0.4	17.4	0	0		
25	0.1	120	0.1	0.4	17.1	0	0		
30	0.1	180							
40									
50									
60									
90									
120									

Stage 1 gas flow - Peak (l/h)	0.1	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0.1	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	2.53	Time:	11:58	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	2.57	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:

Samples Taken: Yes / No	NO
Sample Media: Gas/Water	
Gas Cannister Start (mb)	
Gas Cannister End (mb)	
Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Greenway Academy	Data Collected By:	CD
	Project Manager / Engineer:	AG/CD	Checked:	AG
	Contract Ref:	1921968	Page number:	3

GAS MONITORING FIELD SHEET

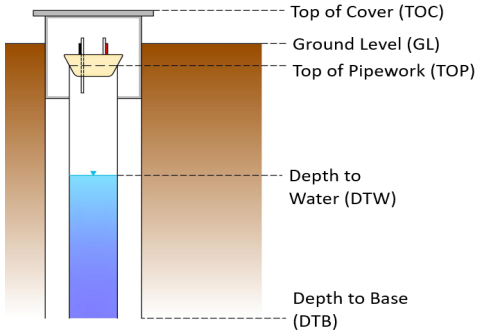
Monitoring Date:	19/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):			Flush Cover
Pre-Testing Remarks:		Air Temperature: °C		12	Device:		GA5000
none		Weather:		Overcast	Serial Number:		HH370
		Ground Conditions:		Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG			Light		
		Tidal State: (if applicable) High / Low / Rising / Falling			N/A		
Exploratory Position ID:	WS102	Monitoring Round Number:		1	Test Number:		1
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep		N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	11:42	11:40	1028	-0.1	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:43	11:42				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.1	1	20.4	2	0		
5	0	15	0.1	1	16.0	2	0		
10	0	30	0.1	1.1	12.3	1	0		
15	0	60	0.1	1.2	10.9	2	0		
20	0.1	90	0.1	1.3	10	1	0		
25	0.1	120							
30	0.1	180							
40	0.1								
50	0.1								
60									
90									
120									

Stage 1 gas flow - Peak (l/h)	-0.0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	-0.0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	Dry	Time:	11:45	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	1.67	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:		
Samples Taken: Yes / No	NO	
Sample Media: Gas/Water		
Gas Cannister Start (mb)		
Gas Cannister End (mb)		
Gas Cannister Duration (mins)		

Depth (from datum)	Sample Ref	Type (EW / G)	Container

Contract Name:	Greenway Academy		Data Collected By:	CD
Project Manager / Engineer:		AG/CD	Checked:	AG
Contract Ref:	1921968		Page number:	4

GAS MONITORING FIELD SHEET

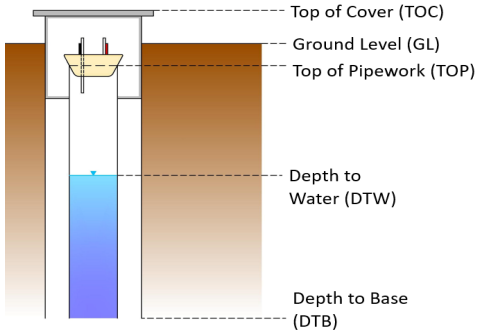
Monitoring Date:	19/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):			Flush Cover
Pre-Testing Remarks:		Air Temperature: °C		12	Device:		GA5000
none		Weather:		Partly Cloudy	Serial Number:		HH370
		Ground Conditions:		Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG			Light		
		Tidal State: (if applicable) High / Low / Rising / Falling			N/A		
Exploratory Position ID:	WS103	Monitoring Round Number:		1	Test Number:		1
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep		N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	11:31	11:19	1028	0.05	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:31	11:21				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0.0	0	0.1	3.0	18.0	0	0		
5	0.0	15	0.1	3.0	17.5	0	0		
10	0.0	30	0.1	3.0	17.2	0	0		
15	0.0	60	0.1	3.0	17.1	0	0		
20	0.0	90							
25	0.0	120							
30	0.0	180							
40									
50									
60									
90									
120									
150									
180									

Stage 1 gas flow - Peak (l/h)	0.0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0.0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	0.455	Time:	11:32	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	2.09	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:		
Samples Taken: Yes / No	NO	
Sample Media: Gas/Water		
Gas Cannister Start (mb)		
Gas Cannister End (mb)		
Gas Cannister Duration (mins)		

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Greenway Academy	Data Collected By:	CD
	Project Manager / Engineer:	AG/CD	Checked:	AG
	Contract Ref:	1921968	Page number:	5

GAS MONITORING FIELD SHEET

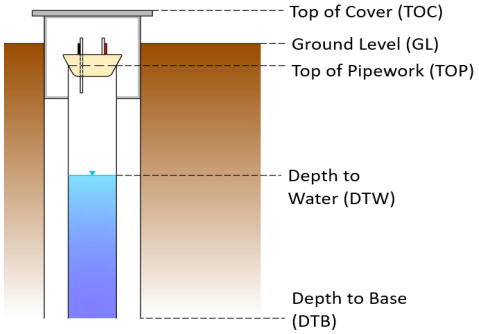
Monitoring Date:	19/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		Flush Cover
Pre-Testing Remarks:		Air Temperature: °C	12	Device:		GA5000
none		Weather:	Overcast	Serial Number:		HH370
		Ground Conditions:	Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		N/A		
Exploratory Position ID:	WS104	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	10:07	10:05	1028	0.05	Observations (e.g. on-site activities):	
Time End (hh:mm)	10:07	10:07				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	-	-	-	-	-		
5	0	15	0.1	0.7	18.7	0	0		
10	0	30	0.1	0.7	18.2	0	0		
15	0.0	60	0.1	0.7	18	0	0		
20	0.0	90	0.1	0.7	17.9	0	0		
25	0.0	120							
30	0.0	180							
40	0.0								
50									
60									
90									
120									
150									
180									

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.27	Time:	10:08	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	2.12	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:		
Samples Taken: Yes / No	NO	
Sample Media: Gas/Water		
Gas Cannister Start (mb)		
Gas Cannister End (mb)		
Gas Cannister Duration (mins)		

Depth (from datum)	Sample Ref	Type (EW / G)	Container

Contract Name:	Greenway Academy		Data Collected By:	CD
Project Manager / Engineer:	AG/CD		Checked:	AG
Contract Ref:	1921968		Page number:	6

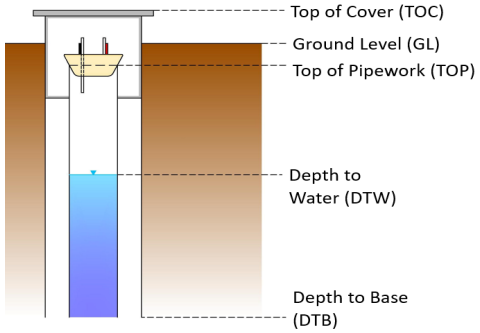
GAS MONITORING FIELD SHEET

Monitoring Date:	25/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):			Flush Cover
Pre-Testing Remarks:		Air Temperature: °C		5	Device:		GA5000
none		Weather:		Clear	Serial Number:		HH370
		Ground Conditions:		Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG			None		
		Tidal State: (if applicable) High / Low / Rising / Falling			N/A		
Exploratory Position ID:	BH101	Monitoring Round Number:		3	Test Number:		2
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep		N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50
Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE		Single
Time Start (hh:mm)	10:58	10:58	1014	0	Observations (e.g. on-site activities):		
Time End (hh:mm)	10:58	11:00					

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0.0	0	0.1	0.1	21.2	0	0		0
5	0.0	15	0.1	0.4	20.8	0	0		0
10	0.0	30	0.1	0.4	20.7	0	0		0
15	0.0	60	0.1	0.4	20.7	0	0		0
20	0.0	90	0.1	0.4	20.7	0	0		0
25	0.0	120							
30	0.0	180							
40									
50									
60									
90									
120									

Stage 1 gas flow - Peak (l/h)	0.0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0.0	

STAGE 3 WATER LEVEL OBSERVATION	Depth (from datum) to water (DTW): (m)	1.92	Time:	11:01	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	4.72	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	NO		
	Sample Media: Gas/Water			
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Greenway Academy	Data Collected By:	LR
	Project Manager / Engineer:	AG	Checked:	
	Contract Ref:	1921968	Page number:	1

GAS MONITORING FIELD SHEET

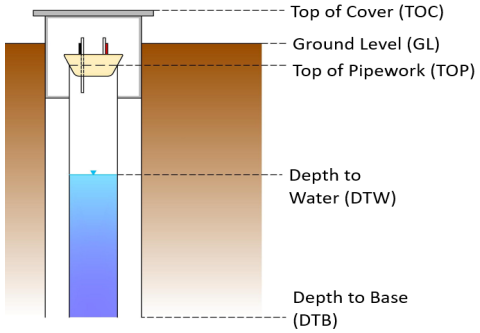
Monitoring Date:	25/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		Flush Cover
Pre-Testing Remarks:		Air Temperature: °C	5	Device:		GA5000
Well cover damaged and sunken in to ground. Well appeared undamaged. Repair to cover made.		Weather:	Clear	Serial Number:		HH370
		Ground Conditions:	Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG		None		
		Tidal State: (if applicable) High / Low / Rising / Falling		N/A		
Exploratory Position ID:	BH102	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	11:26	10:51	1013	0	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:26	10:54				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0.0	0	0.1	0	20.1	0	0		0
5	0.1	15	0.1	0.8	19.7	0	0		0
10	0.1	30	0.1	0.8	20.2	0	0		0
15	0.1	60	0.1	0.6	20.5	0	0		0
20	0.1	90	0.1	0.5	20.6	0	0		0
25	0.1	120	0.1	0.3	20.9	0	0		0
30	0.1	180							
40									
50									
60									
90									
120									

Stage 1 gas flow - Peak (l/h)	0.1	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0.1	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	2.14	Time:	11:27	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	2.16	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	NO
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Greenway Academy	Data Collected By:	LR
	Project Manager / Engineer:	AG	Checked:	
	Contract Ref:	1921968	Page number:	2

GAS MONITORING FIELD SHEET

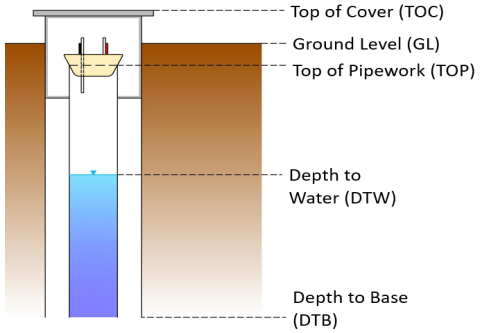
Monitoring Date:	25/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		Flush Cover
Pre-Testing Remarks:		Air Temperature: °C	5	Device:		GA5000
none		Weather:	Clear	Serial Number:		HH370
		Ground Conditions:	Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		N/A		
Exploratory Position ID:	WS101	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	12:17	12:14	1013	0.11	Observations (e.g. on-site activities):	
Time End (hh:mm)	12:17	12:16				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0.1	0	0	1.2	13.6	0	0		0
5	0.1	15	0.1	0.8	19.9	0	0		0
10	0.1	30	0	0.5	19.1	0	0		0
15	0.1	60	0	0.5	17.6	0	0		0
20	0.1	90	0	0.5	17.5	0	0		0
25	0.1	120							
30	0.1	180							
40									
50									
60									
90									
120									

Stage 1 gas flow - Peak (l/h)	2.57	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	2.6	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	2.53	Time:	12:18	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	2.57	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	NO
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Greenway Academy	Data Collected By:	LR
	Project Manager / Engineer:	AG	Checked:	AG
	Contract Ref:	1921968	Page number:	3

GAS MONITORING FIELD SHEET

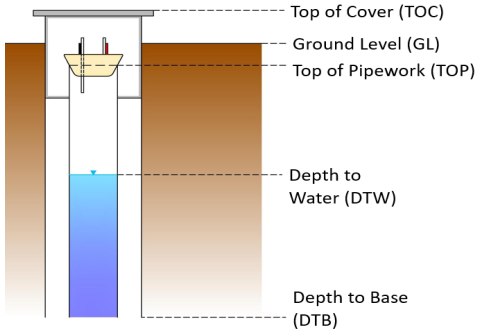
Monitoring Date:	25/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		Flush Cover
Pre-Testing Remarks:		Air Temperature: °C	5	Device:		GA5000
none		Weather:	Clear	Serial Number:		HH370
		Ground Conditions:	Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		N/A		
Exploratory Position ID:	WS102	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	12:17	12:14	1013	0.0	Observations (e.g. on-site activities):	
Time End (hh:mm)	12:17	12:16				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0	1.2	13.6	0	0		0
5	0.1	15	0.1	0.8	19.9	0	0		0
10	0.1	30	0	0.5	19	0	0		0
15	0.1	60	0	0.5	17.6	0	0		0
20	0.1	90	0	0.5	17.5	0	0		0
25	0.1								
30									
40									
50									
60									
90									
120									

Stage 1 gas flow - Peak (l/h)	-0.0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	-0.0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	2.57	Time:	12:18	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	2.60	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	NO
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Greenway Academy	Data Collected By:	LR
	Project Manager / Engineer:	AG	Checked:	AG
	Contract Ref:	1921968	Page number:	4

GAS MONITORING FIELD SHEET

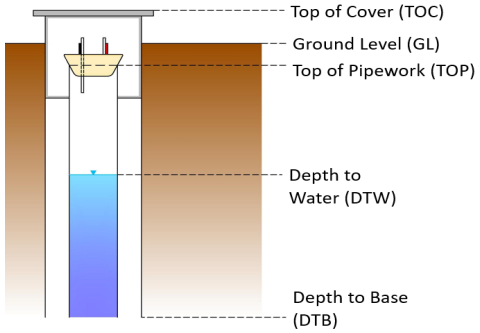
Monitoring Date:	25/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		Flush Cover
Pre-Testing Remarks:		Air Temperature: °C	5	Device:		GA5000
none		Weather:	Clear	Serial Number:		HH370
		Ground Conditions:	Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		N/A		
Exploratory Position ID:	WS103	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	11:49	11:47	1014	-0.02	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:49	11:48				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0.0	0	0.1	0.3	21.1	0	0		0
5	0.1	15	0.1	0.0	21.7	0	0		0
10	0.1	30	0.1	0.0	21.8	0	0		0
15	0.1	60	0.1	0.0	21.8	0	0		0
20	0.1	90							
25	0.1	120							
30		180							
40									
50									
60									
90									
120									
150									
180									

Stage 1 gas flow - Peak (l/h)	0.1	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0.0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	0.59	Time:	11:50	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	2.11	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	NO
	Sample Media: Gas/Water	
	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Greenway Academy	Data Collected By:	LR
	Project Manager / Engineer:	AG	Checked:	AG
	Contract Ref:	1921968	Page number:	5

GAS MONITORING FIELD SHEET

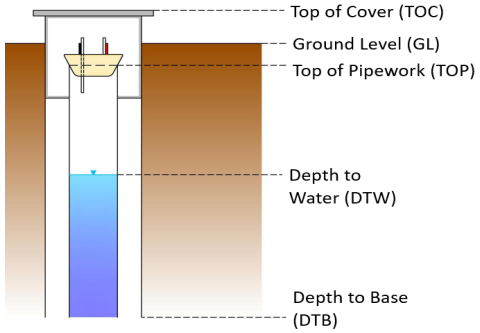
Monitoring Date:	25/11/2021	Measurement datum: TOC / GL / TOP / Other	GL	Offset to GL (m):		Flush Cover
Pre-Testing Remarks:		Air Temperature: °C	5	Device:		GA5000
none		Weather:	Clear	Serial Number:		HH370
		Ground Conditions:	Wet	Daily Check:		Yes
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		N/A		
Exploratory Position ID:	WS104	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	N/A	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Single
Time Start (hh:mm)	10:34	10:31	1014	0.02	Observations (e.g. on-site activities):	
Time End (hh:mm)	10:35	10:33				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.1	0.0	21.1	0	0		0
5	0	15	0.1	0.9	20.0	0	0		0
10	0	30	0.1	0.9	19.4	0	0		0
15	0.0	60	0.1	0.9	19.2	0	0		0
20	0.0	90	0.1	0.9	19.2	0	0		0
25	0.0	120	0.1	0.9	19.2	0	0		0
30	0.0	180							
40									
50									
60									
90									
120									
150									
180									

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.23	Time:	10:36	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	2.12	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	N	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:		
Samples Taken: Yes / No	NO	
Sample Media: Gas/Water		
Gas Cannister Start (mb)		
Gas Cannister End (mb)		
Gas Cannister Duration (mins)		

Depth (from datum)	Sample Ref	Type (EW / G)	Container

Contract Name:	Greenway Academy		Data Collected By:	LR
Project Manager / Engineer:	AG		Checked:	AG
Contract Ref:	1921968		Page number:	6

APPENDIX I
LABORATORY CERTIFICATES FOR SOIL ANALYSIS

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 21/11850
Issue Number: 1 **Date:** 09 November, 2021

Client:
RSK Environment Ltd Hemel
18 Frogmore Road
Hemel Hempstead
Hertfordshire
UK
HP3 9RT

Project Manager: Chris Duffield
Project Name: Greenway Academy
Project Ref: 1921968
Order No: N/A
Date Samples Received: 01/11/21
Date Instructions Received: 01/11/21
Date Analysis Completed: 09/11/21

Approved by:



Holly Neary-King
Client Services Supervisor

Envirolab Job Number: 21/11850

Client Project Name: Greenway Academy

Client Project Ref: 1921968

Lab Sample ID	21/11850/1	21/11850/3	21/11850/4	21/11850/6	21/11850/9	21/11850/10	21/11850/12	Units	Limit of Detection	Method ref
Client Sample No	1	2	3	2	2	3	2			
Client Sample ID	FP101	BH101	BH101	BH102	WS101	WS101	WS102			
Depth to Top	0.25	0.40	0.80	0.40	0.25	0.50	0.40			
Depth To Bottom	0.82	0.50	1.20	0.60	0.50	0.70	0.60			
Date Sampled	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6A	6AE	6A	6A	6A	6A	6A			
% Stones >10mm$_A$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
pH$_D^{M\#}$	7.86	6.88	6.67	6.64	6.40	6.98	5.91	pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_D^{M\#}$	<0.01	<0.01	0.01	<0.01	0.02	<0.01	<0.01	g/l	0.01	A-T-026s
Sulphate (acid soluble)$_D^{M\#}$	<200	<200	<200	280	280	<200	230	mg/kg	200	A-T-028s
Organic matter$_D^{M\#}$	-	-	-	-	1.3	-	0.9	% w/w	0.1	A-T-032 OM
Arsenic$_D^{M\#}$	<1	21	25	3	6	9	6	mg/kg	1	A-T-024s
Cadmium$_D^{M\#}$	0.9	<0.5	<0.5	0.6	<0.5	0.5	0.7	mg/kg	0.5	A-T-024s
Copper$_D^{M\#}$	27	14	17	13	12	13	17	mg/kg	1	A-T-024s
Chromium$_D^{M\#}$	49	28	25	23	19	26	24	mg/kg	1	A-T-024s
Lead$_D^{M\#}$	20	17	16	30	35	15	31	mg/kg	1	A-T-024s
Mercury$_D$	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	mg/kg	0.17	A-T-024s
Nickel$_D^{M\#}$	27	11	12	12	9	14	19	mg/kg	1	A-T-024s
Selenium$_D^{M\#}$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-024s
Zinc$_D^{M\#}$	69	39	35	51	49	41	60	mg/kg	5	A-T-024s

Envirolab Job Number: 21/11850

Client Project Name: Greenway Academy

Client Project Ref: 1921968

Lab Sample ID	21/11850/1	21/11850/3	21/11850/4	21/11850/6	21/11850/9	21/11850/10	21/11850/12	Units	Limit of Detection	Method ref
Client Sample No	1	2	3	2	2	3	2			
Client Sample ID	FP101	BH101	BH101	BH102	WS101	WS101	WS102			
Depth to Top	0.25	0.40	0.80	0.40	0.25	0.50	0.40			
Depth To Bottom	0.82	0.50	1.20	0.60	0.50	0.70	0.60			
Date Sampled	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6A	6AE	6A	6A	6A	6A	6A			
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	-	-	-	NAD	-	NAD			A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-	-	-	-	-			A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	-	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	-	-	-	N/A	-	N/A			A-T-045

Envirolab Job Number: 21/11850

Client Project Name: Greenway Academy

Client Project Ref: 1921968

Lab Sample ID	21/11850/1	21/11850/3	21/11850/4	21/11850/6	21/11850/9	21/11850/10	21/11850/12	Units	Limit of Detection	Method ref
Client Sample No	1	2	3	2	2	3	2			
Client Sample ID	FP101	BH101	BH101	BH102	WS101	WS101	WS102			
Depth to Top	0.25	0.40	0.80	0.40	0.25	0.50	0.40			
Depth To Bottom	0.82	0.50	1.20	0.60	0.50	0.70	0.60			
Date Sampled	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6A	6AE	6A	6A	6A	6A	6A			
PAH-16MS										
Acenaphthene$_A^{M\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	<0.04	<0.04	<0.04	<0.04	0.11	<0.04	0.15	mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	<0.04	<0.04	<0.04	<0.04	0.13	<0.04	0.14	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	<0.05	<0.05	<0.05	<0.05	0.15	<0.05	0.17	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	<0.06	<0.06	<0.06	<0.06	0.13	<0.06	0.14	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	<0.08	<0.08	<0.08	<0.08	0.17	<0.08	0.21	mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	<0.03	<0.03	<0.03	<0.03	0.08	<0.03	0.07	mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	<0.03	<0.03	<0.03	<0.03	0.05	<0.03	0.08	mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	<0.07	<0.07	<0.07	<0.07	0.15	<0.07	0.18	mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	<0.08	<0.08	<0.08	<0.08	1.04	<0.08	1.14	mg/kg	0.01	A-T-019s

Envirolab Job Number: 21/11850

Client Project Name: Greenway Academy

Client Project Ref: 1921968

Lab Sample ID	21/11850/1	21/11850/3	21/11850/4	21/11850/6	21/11850/9	21/11850/10	21/11850/12	Units	Limit of Detection	Method ref
Client Sample No	1	2	3	2	2	3	2			
Client Sample ID	FP101	BH101	BH101	BH102	WS101	WS101	WS102			
Depth to Top	0.25	0.40	0.80	0.40	0.25	0.50	0.40			
Depth To Bottom	0.82	0.50	1.20	0.60	0.50	0.70	0.60			
Date Sampled	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6A	6AE	6A	6A	6A	6A	6A			
TPH CWG										
Ali >C5-C6$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C21-C35$_A^{M\#}$	<1	<1	<1	<1	1	<1	<1	mg/kg	1	A-T-055s
Total Aliphatics$_A$	<1	<1	<1	<1	1	<1	<1	mg/kg	1	A-T-055s
Aro >C5-C7$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C10-C12$_A$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C12-C16$_A$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	<1	<1	<1	2	6	<1	2	mg/kg	1	A-T-055s
Total Aromatics$_A$	<1	<1	<1	2	6	<1	2	mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_A$	<1	<1	<1	2	7	<1	2	mg/kg	1	A-T-055s
BTEX - Benzene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s

Envirolab Job Number: 21/11850

Client Project Name: Greenway Academy

Client Project Ref: 1921968

Lab Sample ID	21/11850/1	21/11850/3	21/11850/4	21/11850/6	21/11850/9	21/11850/10	21/11850/12	Units	Limit of Detection	Method ref
Client Sample No	1	2	3	2	2	3	2			
Client Sample ID	FP101	BH101	BH101	BH102	WS101	WS101	WS102			
Depth to Top	0.25	0.40	0.80	0.40	0.25	0.50	0.40			
Depth To Bottom	0.82	0.50	1.20	0.60	0.50	0.70	0.60			
Date Sampled	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6A	6AE	6A	6A	6A	6A	6A			
SVOC										
4-Bromophenyl phenyl ether$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
Hexachlorobenzene$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
Diethyl phthalate$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
Dimethyl phthalate$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
Dibenzofuran$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
Carbazole$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
Butylbenzyl phthalate$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
Bis(2-ethylhexyl)phthalate$_A$	<500	<500	-	-	<500	-	-	µg/kg	500	A-T-052s
Bis(2-chloroethoxy)methane$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
Bis(2-chloroethyl)ether$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
4-Nitrophenol$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
3+4-Methylphenol$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
4-Chloro-3-methylphenol$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
2-Nitrophenol$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
2-Methylphenol$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
2-Chlorophenol$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
2,6-Dinitrotoluene$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
2,4-Dinitrotoluene$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
2,4-Dimethylphenol$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
2,4-Dichlorophenol$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
2,4,6-Trichlorophenol$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
2,4,5-Trichlorophenol$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
2-Chloronaphthalene$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
2-Methylnaphthalene$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
Bis(2-chloroisopropyl)ether$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
Phenol$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
Pentachlorophenol (SVOC)$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
n-Nitroso-n-dipropylamine$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
n-Dioctylphthalate$_A$	<500	<500	-	-	<500	-	-	µg/kg	500	A-T-052s
n-Dibutylphthalate$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
Nitrobenzene$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
Isophorone$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s

Envirolab Job Number: 21/11850

Client Project Name: Greenway Academy

Client Project Ref: 1921968

Lab Sample ID	21/11850/1	21/11850/3	21/11850/4	21/11850/6	21/11850/9	21/11850/10	21/11850/12	Units	Limit of Detection	Method ref
Client Sample No	1	2	3	2	2	3	2			
Client Sample ID	FP101	BH101	BH101	BH102	WS101	WS101	WS102			
Depth to Top	0.25	0.40	0.80	0.40	0.25	0.50	0.40			
Depth To Bottom	0.82	0.50	1.20	0.60	0.50	0.70	0.60			
Date Sampled	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6A	6AE	6A	6A	6A	6A	6A			
Hexachloroethane$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
Hexachlorocyclopentadiene$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s
Perylene$_A$	<100	<100	-	-	<100	-	-	µg/kg	100	A-T-052s

Envirolab Job Number: 21/11850

Client Project Name: Greenway Academy

Client Project Ref: 1921968

Lab Sample ID	21/11850/1	21/11850/3	21/11850/4	21/11850/6	21/11850/9	21/11850/10	21/11850/12	Units	Limit of Detection	Method ref
Client Sample No	1	2	3	2	2	3	2			
Client Sample ID	FP101	BH101	BH101	BH102	WS101	WS101	WS102			
Depth to Top	0.25	0.40	0.80	0.40	0.25	0.50	0.40			
Depth To Bottom	0.82	0.50	1.20	0.60	0.50	0.70	0.60			
Date Sampled	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6A	6AE	6A	6A	6A	6A	6A			
VOC										
Dichlorodifluoromethane$_{A}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Chloromethane$_{A}$	<10	<10	-	-	<10	-	-	µg/kg	10	A-T-006s
Vinyl Chloride (Chloroethene)$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Bromomethane$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Chloroethane$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Trichlorofluoromethane$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
1,1-Dichloroethene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Carbon Disulphide$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Dichloromethane$_{A}$	<5	<5	-	-	<5	-	-	µg/kg	5	A-T-006s
trans 1,2-Dichloroethene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
1,1-Dichloroethane$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
cis 1,2-Dichloroethene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
2,2-Dichloropropane$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Bromochloromethane$_{A}^{\#}$	<5	<5	-	-	<5	-	-	µg/kg	5	A-T-006s
Chloroform$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
1,1,1-Trichloroethane$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
1,1-Dichloropropene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Carbon Tetrachloride$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
1,2-Dichloroethane$_{A}^{\#}$	<2	<2	-	-	<2	-	-	µg/kg	2	A-T-006s
Benzene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Trichloroethene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
1,2-Dichloropropane$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Dibromomethane$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Bromodichloromethane$_{A}^{\#}$	<10	<10	-	-	<10	-	-	µg/kg	10	A-T-006s
cis 1,3-Dichloropropene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Toluene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
trans 1,3-Dichloropropene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
1,1,2-Trichloroethane$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
1,3-Dichloropropane$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Tetrachloroethene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Dibromochloromethane$_{A}^{\#}$	<3	<3	-	-	<3	-	-	µg/kg	3	A-T-006s
1,2-Dibromoethane$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s

Lab Sample ID	21/11850/1	21/11850/3	21/11850/4	21/11850/6	21/11850/9	21/11850/10	21/11850/12	Units	Limit of Detection	Method ref
Client Sample No	1	2	3	2	2	3	2			
Client Sample ID	FP101	BH101	BH101	BH102	WS101	WS101	WS102			
Depth to Top	0.25	0.40	0.80	0.40	0.25	0.50	0.40			
Depth To Bottom	0.82	0.50	1.20	0.60	0.50	0.70	0.60			
Date Sampled	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6A	6AE	6A	6A	6A	6A	6A			
Chlorobenzene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
1,1,1,2-Tetrachloroethane$_{A}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Ethylbenzene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
m & p Xylene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
o-Xylene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Styrene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Bromoform$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Isopropylbenzene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
1,1,2,2-Tetrachloroethane$_{A}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
1,2,3-Trichloropropane$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
Bromobenzene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
n-Propylbenzene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
2-Chlorotoluene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
1,3,5-Trimethylbenzene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
4-Chlorotoluene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
tert-Butylbenzene$_{A}^{\#}$	<2	<2	-	-	<2	-	-	µg/kg	2	A-T-006s
1,2,4-Trimethylbenzene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
sec-Butylbenzene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
4-Isopropyltoluene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
1,3-Dichlorobenzene$_{A}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
1,4-Dichlorobenzene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
n-Butylbenzene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
1,2-Dichlorobenzene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
1,2-Dibromo-3-chloropropane (DCBP)$_{A}$	<2	<2	-	-	<2	-	-	µg/kg	2	A-T-006s
1,2,4-Trichlorobenzene$_{A}$	<3	<3	-	-	<3	-	-	µg/kg	3	A-T-006s
Hexachlorobutadiene$_{A}^{\#}$	<1	<1	-	-	<1	-	-	µg/kg	1	A-T-006s
1,2,3-Trichlorobenzene$_{A}$	<3	<3	-	-	<3	-	-	µg/kg	3	A-T-006s

Envirolab Job Number: 21/11850

Client Project Name: Greenway Academy

Client Project Ref: 1921968

Lab Sample ID	21/11850/14	21/11850/17	21/11850/18					Units	Limit of Detection	Method ref
Client Sample No	1	1	2							
Client Sample ID	WS103	WS104	WS104							
Depth to Top	0.00	0.00	0.40							
Depth To Bottom	0.30	0.25	0.60							
Date Sampled	28-Oct-21	28-Oct-21	28-Oct-21							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	6AE	6AE	6A							
% Stones >10mm$_A$	<0.1	<0.1	<0.1					% w/w	0.1	A-T-044
pH$_D$ M#	5.97	5.79	6.60					pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_D$ M#	<0.01	<0.01	<0.01					g/l	0.01	A-T-026s
Sulphate (acid soluble)$_D$ M#	580	610	<200					mg/kg	200	A-T-028s
Organic matter$_D$ M#	3.1	-	0.7					% w/w	0.1	A-T-032 OM
Arsenic$_D$ M#	7	5	5					mg/kg	1	A-T-024s
Cadmium$_D$ M#	0.6	0.5	<0.5					mg/kg	0.5	A-T-024s
Copper$_D$ M#	16	15	9					mg/kg	1	A-T-024s
Chromium$_D$ M#	21	21	19					mg/kg	1	A-T-024s
Lead$_D$ M#	56	52	20					mg/kg	1	A-T-024s
Mercury$_D$	<0.17	<0.17	<0.17					mg/kg	0.17	A-T-024s
Nickel$_D$ M#	12	11	9					mg/kg	1	A-T-024s
Selenium$_D$ M#	<1	<1	<1					mg/kg	1	A-T-024s
Zinc$_D$ M#	55	95	45					mg/kg	5	A-T-024s

Envirolab Job Number: 21/11850

Client Project Name: Greenway Academy

Client Project Ref: 1921968

Lab Sample ID	21/11850/14	21/11850/17	21/11850/18					Units	Limit of Detection	Method ref
Client Sample No	1	1	2							
Client Sample ID	WS103	WS104	WS104							
Depth to Top	0.00	0.00	0.40							
Depth To Bottom	0.30	0.25	0.60							
Date Sampled	28-Oct-21	28-Oct-21	28-Oct-21							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	6AE	6AE	6A							
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	-	NAD	-							A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-							A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	-							A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	-	N/A	-							A-T-045

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Lab Sample ID	21/11850/14	21/11850/17	21/11850/18					Units	Limit of Detection	Method ref
Client Sample No	1	1	2							
Client Sample ID	WS103	WS104	WS104							
Depth to Top	0.00	0.00	0.40							
Depth To Bottom	0.30	0.25	0.60							
Date Sampled	28-Oct-21	28-Oct-21	28-Oct-21							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	6AE	6AE	6A							
PAH-16MS										
Acenaphthene$_A^{M\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	<0.02	<0.02	<0.02					mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	0.07	<0.04	<0.04					mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	0.08	<0.04	<0.04					mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	0.10	<0.05	<0.05					mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.05	<0.05	<0.05					mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07	<0.07	<0.07					mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	0.10	<0.06	<0.06					mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	<0.04	<0.04					mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	0.12	<0.08	<0.08					mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	0.06	<0.03	<0.03					mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	<0.03	<0.03	<0.03					mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	0.04	<0.03	<0.03					mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	0.11	<0.07	<0.07					mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	0.68	<0.08	<0.08					mg/kg	0.01	A-T-019s

Envirolab Job Number: 21/11850

Client Project Name: Greenway Academy

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Lab Sample ID	21/11850/14	21/11850/17	21/11850/18					Units	Limit of Detection	Method ref
Client Sample No	1	1	2							
Client Sample ID	WS103	WS104	WS104							
Depth to Top	0.00	0.00	0.40							
Depth To Bottom	0.30	0.25	0.60							
Date Sampled	28-Oct-21	28-Oct-21	28-Oct-21							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	6AE	6AE	6A							
TPH CWG										
Ali >C5-C6$_{A}^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
Ali >C6-C8$_{A}^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
Ali >C8-C10$_{A}$	<1	<1	<1					mg/kg	1	A-T-055s
Ali >C10-C12$_{A}^{M\#}$	<1	<1	<1					mg/kg	1	A-T-055s
Ali >C12-C16$_{A}^{M\#}$	<1	<1	<1					mg/kg	1	A-T-055s
Ali >C16-C21$_{A}^{M\#}$	<1	<1	<1					mg/kg	1	A-T-055s
Ali >C21-C35$_{A}^{M\#}$	3	<1	2					mg/kg	1	A-T-055s
Total Aliphatics$_{A}$	3	<1	2					mg/kg	1	A-T-055s
Aro >C5-C7$_{A}^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
Aro >C7-C8$_{A}^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
Aro >C8-C10$_{A}$	<1	<1	<1					mg/kg	1	A-T-055s
Aro >C10-C12$_{A}$	<1	<1	<1					mg/kg	1	A-T-055s
Aro >C12-C16$_{A}$	<1	<1	<1					mg/kg	1	A-T-055s
Aro >C16-C21$_{A}^{M\#}$	<1	<1	<1					mg/kg	1	A-T-055s
Aro >C21-C35$_{A}^{M\#}$	8	<1	1					mg/kg	1	A-T-055s
Total Aromatics$_{A}$	8	<1	1					mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_{A}$	11	<1	4					mg/kg	1	A-T-055s
BTEX - Benzene$_{A}^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
BTEX - Toluene$_{A}^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_{A}^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_{A}^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
BTEX - o Xylene$_{A}^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s
MTBE$_{A}^{\#}$	<0.01	<0.01	<0.01					mg/kg	0.01	A-T-022s

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Lab Sample ID	21/11850/14	21/11850/17	21/11850/18					Units	Limit of Detection	Method ref
Client Sample No	1	1	2							
Client Sample ID	WS103	WS104	WS104							
Depth to Top	0.00	0.00	0.40							
Depth To Bottom	0.30	0.25	0.60							
Date Sampled	28-Oct-21	28-Oct-21	28-Oct-21							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	6AE	6AE	6A							
SVOC										
4-Bromophenyl phenyl ether$_A$	-	-	-					µg/kg	100	A-T-052s
Hexachlorobenzene$_A$	-	-	-					µg/kg	100	A-T-052s
Diethyl phthalate$_A$	-	-	-					µg/kg	100	A-T-052s
Dimethyl phthalate$_A$	-	-	-					µg/kg	100	A-T-052s
Dibenzofuran$_A$	-	-	-					µg/kg	100	A-T-052s
Carbazole$_A$	-	-	-					µg/kg	100	A-T-052s
Butylbenzyl phthalate$_A$	-	-	-					µg/kg	100	A-T-052s
Bis(2-ethylhexyl)phthalate$_A$	-	-	-					µg/kg	500	A-T-052s
Bis(2-chloroethoxy)methane$_A$	-	-	-					µg/kg	100	A-T-052s
Bis(2-chloroethyl)ether$_A$	-	-	-					µg/kg	100	A-T-052s
4-Nitrophenol$_A$	-	-	-					µg/kg	100	A-T-052s
3+4-Methylphenol$_A$	-	-	-					µg/kg	100	A-T-052s
4-Chloro-3-methylphenol$_A$	-	-	-					µg/kg	100	A-T-052s
2-Nitrophenol$_A$	-	-	-					µg/kg	100	A-T-052s
2-Methylphenol$_A$	-	-	-					µg/kg	100	A-T-052s
2-Chlorophenol$_A$	-	-	-					µg/kg	100	A-T-052s
2,6-Dinitrotoluene$_A$	-	-	-					µg/kg	100	A-T-052s
2,4-Dinitrotoluene$_A$	-	-	-					µg/kg	100	A-T-052s
2,4-Dimethylphenol$_A$	-	-	-					µg/kg	100	A-T-052s
2,4-Dichlorophenol$_A$	-	-	-					µg/kg	100	A-T-052s
2,4,6-Trichlorophenol$_A$	-	-	-					µg/kg	100	A-T-052s
2,4,5-Trichlorophenol$_A$	-	-	-					µg/kg	100	A-T-052s
2-Chloronaphthalene$_A$	-	-	-					µg/kg	100	A-T-052s
2-Methylnaphthalene$_A$	-	-	-					µg/kg	100	A-T-052s
Bis(2-chloroisopropyl)ether$_A$	-	-	-					µg/kg	100	A-T-052s
Phenol$_A$	-	-	-					µg/kg	100	A-T-052s
Pentachlorophenol (SVOC)$_A$	-	-	-					µg/kg	100	A-T-052s
n-Nitroso-n-dipropylamine$_A$	-	-	-					µg/kg	100	A-T-052s
n-Dioctylphthalate$_A$	-	-	-					µg/kg	500	A-T-052s
n-Dibutylphthalate$_A$	-	-	-					µg/kg	100	A-T-052s
Nitrobenzene$_A$	-	-	-					µg/kg	100	A-T-052s
Isophorone$_A$	-	-	-					µg/kg	100	A-T-052s

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Client Project Name: Greenway Academy

Client Project Ref: 1921968

Lab Sample ID	21/11850/14	21/11850/17	21/11850/18					Units	Limit of Detection	Method ref
Client Sample No	1	1	2							
Client Sample ID	WS103	WS104	WS104							
Depth to Top	0.00	0.00	0.40							
Depth To Bottom	0.30	0.25	0.60							
Date Sampled	28-Oct-21	28-Oct-21	28-Oct-21							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	6AE	6AE	6A							
Hexachloroethane$_A$	-	-	-					µg/kg	100	A-T-052s
Hexachlorocyclopentadiene$_A$	-	-	-					µg/kg	100	A-T-052s
Perylene$_A$	-	-	-					µg/kg	100	A-T-052s

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Lab Sample ID	21/11850/14	21/11850/17	21/11850/18					Units	Limit of Detection	Method ref
Client Sample No	1	1	2							
Client Sample ID	WS103	WS104	WS104							
Depth to Top	0.00	0.00	0.40							
Depth To Bottom	0.30	0.25	0.60							
Date Sampled	28-Oct-21	28-Oct-21	28-Oct-21							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	6AE	6AE	6A							
VOC										
Dichlorodifluoromethane$_{A}$	-	-	-					µg/kg	1	A-T-006s
Chloromethane$_{A}$	-	-	-					µg/kg	10	A-T-006s
Vinyl Chloride (Chloroethene)$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
Bromomethane$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
Chloroethane$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
Trichlorofluoromethane$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
1,1-Dichloroethene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
Carbon Disulphide$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
Dichloromethane$_{A}$	-	-	-					µg/kg	5	A-T-006s
trans 1,2-Dichloroethene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
1,1-Dichloroethane$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
cis 1,2-Dichloroethene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
2,2-Dichloropropane$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
Bromochloromethane$_{A}^{\#}$	-	-	-					µg/kg	5	A-T-006s
Chloroform$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
1,1,1-Trichloroethane$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
1,1-Dichloropropene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
Carbon Tetrachloride$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
1,2-Dichloroethane$_{A}^{\#}$	-	-	-					µg/kg	2	A-T-006s
Benzene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
Trichloroethene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
1,2-Dichloropropane$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
Dibromomethane$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
Bromodichloromethane$_{A}^{\#}$	-	-	-					µg/kg	10	A-T-006s
cis 1,3-Dichloropropene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
Toluene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
trans 1,3-Dichloropropene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
1,1,2-Trichloroethane$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
1,3-Dichloropropane$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
Tetrachloroethene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
Dibromochloromethane$_{A}^{\#}$	-	-	-					µg/kg	3	A-T-006s
1,2-Dibromoethane$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s

Envirolab Job Number: 21/11850

Client Project Name: Greenway Academy

Client Project Ref: 1921968

Lab Sample ID	21/11850/14	21/11850/17	21/11850/18					Units	Limit of Detection	Method ref
Client Sample No	1	1	2							
Client Sample ID	WS103	WS104	WS104							
Depth to Top	0.00	0.00	0.40							
Depth To Bottom	0.30	0.25	0.60							
Date Sampled	28-Oct-21	28-Oct-21	28-Oct-21							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	6AE	6AE	6A							
Chlorobenzene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
1,1,1,2-Tetrachloroethane$_{A}$	-	-	-					µg/kg	1	A-T-006s
Ethylbenzene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
m & p Xylene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
o-Xylene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
Styrene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
Bromoform$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
Isopropylbenzene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
1,1,2,2-Tetrachloroethane$_{A}$	-	-	-					µg/kg	1	A-T-006s
1,2,3-Trichloropropane$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
Bromobenzene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
n-Propylbenzene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
2-Chlorotoluene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
1,3,5-Trimethylbenzene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
4-Chlorotoluene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
tert-Butylbenzene$_{A}^{\#}$	-	-	-					µg/kg	2	A-T-006s
1,2,4-Trimethylbenzene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
sec-Butylbenzene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
4-Isopropyltoluene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
1,3-Dichlorobenzene$_{A}$	-	-	-					µg/kg	1	A-T-006s
1,4-Dichlorobenzene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
n-Butylbenzene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
1,2-Dichlorobenzene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
1,2-Dibromo-3-chloropropane (DCBP)$_{A}$	-	-	-					µg/kg	2	A-T-006s
1,2,4-Trichlorobenzene$_{A}$	-	-	-					µg/kg	3	A-T-006s
Hexachlorobutadiene$_{A}^{\#}$	-	-	-					µg/kg	1	A-T-006s
1,2,3-Trichlorobenzene$_{A}$	-	-	-					µg/kg	3	A-T-006s

REPORT NOTES

General
This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

v1

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: RSK Environment Ltd Hemel, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, UK, HP3 9RT

Project: Greenway Academy

Clients Project No: 1921968

Project No: 21/11850

Date Received: 01/11/2021 (am)

Cool Box Temperatures (°C): 12.3, 12.5

NO DEVIATIONS IDENTIFIED with respect to sampling dates or containers received.

Note: If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3 (for water samples 5 ± 3°C), ISO 18400-105:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	21/11850/1	21/11850/3	21/11850/4	21/11850/6	21/11850/9	21/11850/10	21/11850/12	21/11850/14	21/11850/17	21/11850/18
Client Sample No	1	2	3	2	2	3	2	1	1	2
Client Sample ID/Depth	FP101 0.25-0.82m	BH101 0.40-0.50m	BH101 0.80-1.20m	BH102 0.40-0.60m	WS101 0.25-0.50m	WS101 0.50-0.70m	WS102 0.40-0.60m	WS103 0.00-0.30m	WS104 0.00-0.25m	WS104 0.40-0.60m
Date Sampled	27/10/21	27/10/21	27/10/21	27/10/21	28/10/21	28/10/21	28/10/21	28/10/21	28/10/21	28/10/21
A-T-006s	05/11/2021	05/11/2021			05/11/2021					
A-T-019s	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021
A-T-022s	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021
A-T-024s	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	09/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021
A-T-026s	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021
A-T-028s	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021
A-T-031s	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021
A-T-032 OM					05/11/2021		05/11/2021	05/11/2021		05/11/2021
A-T-044	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021
A-T-045	02/11/2021				02/11/2021		02/11/2021		02/11/2021	
A-T-052s	05/11/2021	05/11/2021			05/11/2021					
A-T-055s	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

APPENDIX J
LABORATORY CERTIFICATES FOR GEOTECHNICAL ANALYSIS

STRUCTURAL SOILS LTD

TEST REPORT

Report No. 584684-01 (00) 1774

Date 26-November-2021 Contract Greenway Academy, Horsham

Client RSK
Address 18 Frogmore Rd
Apsley
Hemel Hempstead
Hertfordshire
HP3 9RT
For the Attention of Christopher Duffield

Samples submitted by client	02-November-2021	Client Reference	1921968
Testing Started	10-November-2021	Client Order No.	n/a
Testing Completed	22-November-2021	Instruction Type	Written

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory.

UKAS Accredited Tests

1.01	Moisture Content (oven drying method) BS1377:Part 2:1990:clause 3.2 (superseded)*
1.03	Liquid Limit (one point method) & Plastic Limit BS1377:Part 2:1990,clause 4.4/5.3 (superseded)*
6.03	Consolidated undrained triaxial compression with pore pressure measurement 100mm specimens BS1377:Part 8:1990,clause 7 (superseded)*

Undertaken by a sub-contractor

-	Chemical Analysis

* This clause of BS1377 is no longer the most up to date method due to the publication of ISO17892

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of .
Test were undertaken on samples 'as received' unless otherwise stated.
Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

Structural Soils Ltd 18 Frogmore Rd Hemel Hempstead HP3 9RT Tel.01442 416661 e-mail dimitris.xirouchakis@soils.co.uk

TESTING VERIFICATION CERTIFICATE

UKAS TESTING
1774

The test results included in this report are certified as:-

ISSUE STATUS: **FINAL**

In accordance with the Structural Soils Ltd Laboratory Quality Management System, results sheets and summaries of results issued by the laboratory are checked by an approved signatory. The integrity of the test data and results are ensured by control of the computer system employed by the laboratory as part of the Software Verification Program as detailed in the Laboratory Quality Manual.

This testing verification certificate covers all testing compiled on or before the following datetime: **22/11/2021 13:37:54**.

Testing reported after this date is not covered by this Verification Certificate.

Approved Signatory
Sharon Cairns (Laboratory Manager)

(Head Office)
Bristol Laboratory
Unit 1A, Princess Street
Bedminster
Bristol
BS3 4AG

Castleford Laboratory
The Potteries, Pottery Street
Castleford
West Yorkshire
WF10 1NJ

Hemel Laboratory
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Tonbridge Laboratory
Anerley Court, Half Moon Lane
Hildenborough
Tonbridge
TN11 9HU

	Contract:	Job No:
STRUCTURAL SOILS LTD	**Greenway Academy Horsham**	**584685**

AGS

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | GrfcText L - LAB VERIFICATION REPORT - V02 - A4P | 584684-GREENWAY-ACADEMY-HORSHAM-RSK-1921968.GPJ - v10_01.
Structural Soils Ltd, Branch Office - Hemel Hempstead: 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442 262323, Fax: 01442 262683, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 22/11/21 - 13:43 | SC1 |

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425µm	Description of Sample
BH101	1	B	0.50	21	70	27	43	100	Light brown mottled grey and orange slightly sandy CLAY
BH101	4	D	2.00	14					Light brown mottled grey and orange sandy CLAY
BH101	7	D	3.75	32	71	29	42	92	Light brown slightly gravelly CLAY
BH101	9	D	4.75	30					Light brown slightly gravelly CLAY
BH101	11	D	6.00	20	72	33	39	100	Light brown mottled grey and orange slightly sandy CLAY
BH102	1	B	0.50	26					Light brown mottled grey and orange sandy CLAY
BH102	4	U	1.50	14	42	24	18	98	Light brown mottled orangish brown and light grey slightly sandy CLAY
BH102	5	D	2.00	14	46	27	19	100	Light brown mottled grey slightly sandy CLAY

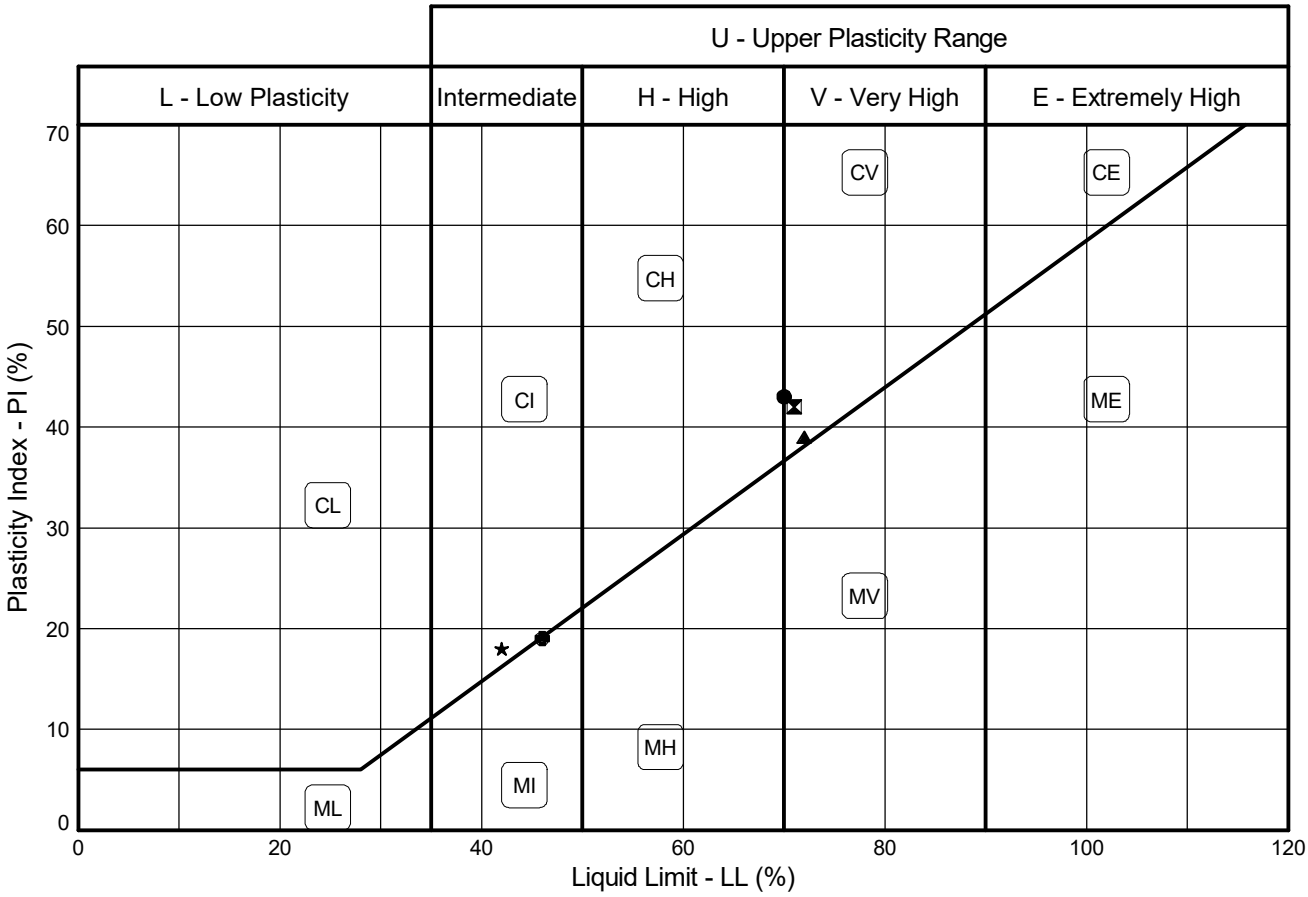
SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425µm	Description of Sample
BH102	7	D	2.75	29	46	27	19	85	Light brown slightly gravelly sandy CLAY
BH102	8	D	3.00	30					Light brown slightly gravelly CLAY

PLASTICITY CHART - PI Vs LL

In accordance with BS5930:2015
Testing in accordance with BS1377-2:1990



Sample Identification				BS Test Method #	Preparation Method +	MC	LL	PL	PI	<425µm	Lab location	Notes
	Exploratory Position ID	Sample	Depth (m)			%	%	%	%	%		
●	BH101	1B	0.50	3.2/4.4/5.3/5.4	4.2.3	21	70	27	43	100	H	
⊠	BH101	7D	3.75	3.2/4.4/5.3/5.4	4.2.4	32	71	29	42	92	H	
▲	BH101	11D	6.00	3.2/4.4/5.3/5.4	4.2.3	20	72	33	39	100	H	
★	BH102	4U	1.50	3.2/4.4/5.3/5.4	4.2.4	14	42	24	18	98	H	
⊙	BH102	5D	2.00	3.2/4.4/5.3/5.4	4.2.3	14	46	27	19	100	H	
✿	BH102	7D	2.75	3.2/4.4/5.3/5.4	4.2.4	29	46	27	19	85	H	

Tested in accordance with the following clauses of BS1377-2:1990.

3.2 - Moisture Content
4.3 - Cone Penetrometer Method
4.4 - One Point Cone Penetrometer Method
4.6 - One Point Casagrande Method
5.3 - Plastic Limit Method
5.4 - Plasticity Index

+ Tested in accordance with the following clauses of BS1377-2:1990.

4.2.3 - Natural State
4.2.4 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By		Date
SC	**SHARON CAIRNS**	**22/11/21**

Contract	Contract Ref:
Greenway Academy Horsham	**584685**

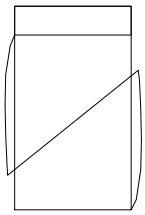
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Structural Soils Ltd, Branch Office - Hemel Hempstead: 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442 262323, Fax: 01442 262683, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 22/11/21 - 13:38 | SC1 |

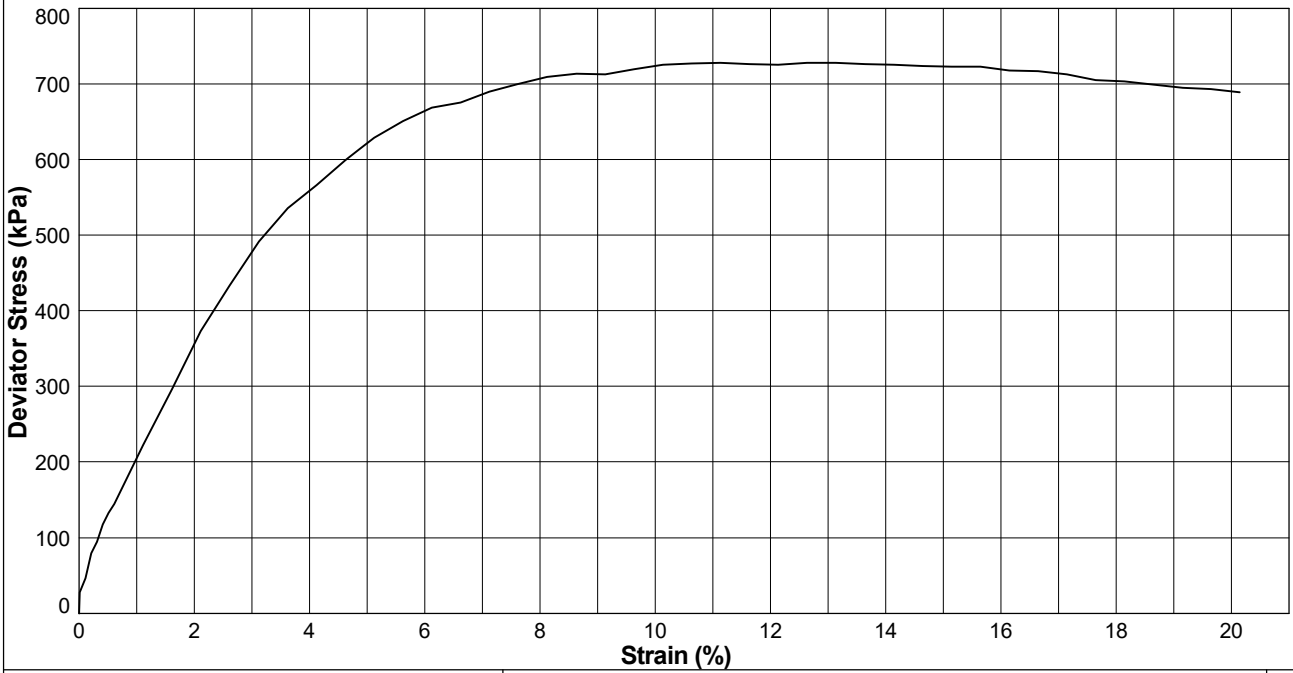
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377 Part 7 Clause 8

Borehole: **BH101** Sample Ref: **2** Sample Type: **U** Depth (m): **1.20**

Description : **Brown mottled orangish brown and light grey slightly sandy CLAY**

STAGE NUMBER			1	2	3
SAMPLE DETAILS	Sample Condition		Undisturbed		
	Orientation of sample		Vertical		
	Diameter	(mm)	103.38		
	Height	(mm)	199.63		
	Moisture Content	(%)	16		
	Bulk Density	(Mg/m^3)	2.12		
	Dry Density	(Mg/m^3)	1.82		
TEST DETAILS	Membrane Type		Rubber		
	Membrane Thickness	(mm)	0.40		
	Rate of Axial Displacement	(%/min)	1.25		
	Cell Pressure	(kPa)	24		
	Membrane Correction	(kPa)	1.05		
	Corrected Deviator Stress	(kPa)	728		
	Undrained Shear Strength	(kPa)	364		
FAILURE DETAILS	Strain at Failure	(%)	12.6		
	Mode of Failure 1 : **Brittle (shear plane)**				



STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By		Date
SC	SHARON CAIRNS	22/11/21

Contract	Contract Ref:
Greenway Academy Horsham	**584685**

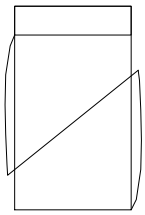
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Structural Soils Ltd, Branch Office - Hemel Hempstead: 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442-262323, Fax: 01442-262683, Web: www.soils.co.uk, Email: ask@soils.co.uk | 22/11/21 - 13:41 | SC1 |

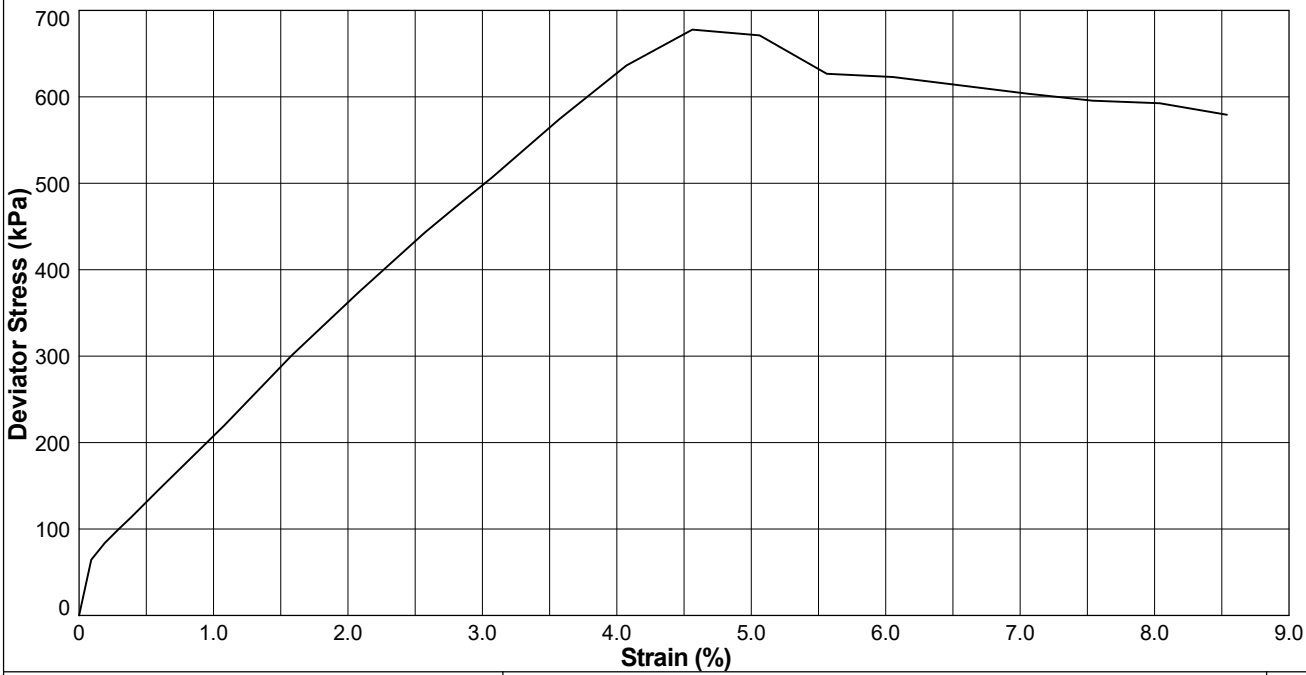
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377 Part 7 Clause 8

Borehole: **BH102** Sample Ref: **2** Sample Type: **U** Depth (m): **1.00**

Description : **Brown mottled orange, red and light grey slightly sandy CLAY**

STAGE NUMBER			1	2	3
SAMPLE DETAILS	Sample Condition		**Undisturbed**		
	Orientation of sample		**Vertical**		
	Diameter	(mm)	**103.26**		
	Height	(mm)	**201.23**		
	Moisture Content	(%)	**21**		
	Bulk Density	(Mg/m^3)	**2.06**		
	Dry Density	(Mg/m^3)	**1.71**		
TEST DETAILS	Membrane Type		**Rubber**		
	Membrane Thickness	(mm)	**0.36**		
	Rate of Axial Displacement	(%/min)	**1.49**		
	Cell Pressure	(kPa)	**20**		
	Membrane Correction	(kPa)	**0.43**		
	Corrected Deviator Stress	(kPa)	**678**		
	Undrained Shear Strength	(kPa)	**339**		
FAILURE DETAILS	Strain at Failure	(%)	**4.6**		
	Mode of Failure 1 : **Brittle (shear plane)**				



STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By		Date
SC	**SHARON CAIRNS**	**22/11/21**

Contract	Contract Ref:
Greenway Academy Horsham	**584685**

AGS

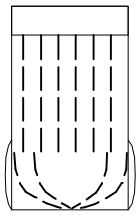
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Structural Soils Ltd, Branch Office - Hemel Hempstead: 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442-262323, Fax: 01442-262683, Web: www.soils.co.uk, Email: ask@soils.co.uk | 22/11/21 - 13:41 | SC1 |

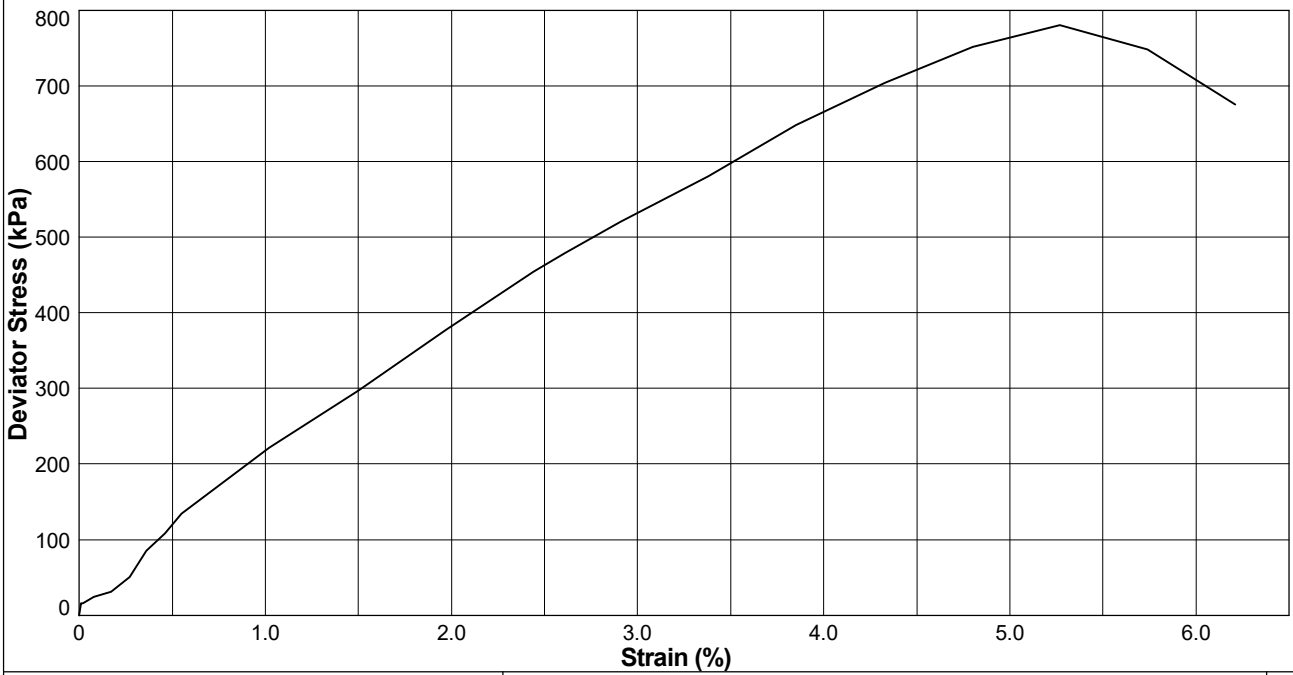
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377 Part 7 Clause 8

Borehole: **BH102** Sample Ref: **4** Sample Type: **U** Depth (m): **1.50**

Description : **Light brown mottled orangish brown and light grey slightly sandy CLAY**

STAGE NUMBER			1	2	3
SAMPLE DETAILS	Sample Condition		Undisturbed		
	Orientation of sample		Vertical		
	Diameter	(mm)	102.82		
	Height	(mm)	211.97		
	Moisture Content	(%)	16		
	Bulk Density	(Mg/m^3)	2.10		
	Dry Density	(Mg/m^3)	1.81		
TEST DETAILS	Membrane Type		Rubber		
	Membrane Thickness	(mm)	0.15		
	Rate of Axial Displacement	(%/min)	1.32		
	Cell Pressure	(kPa)	30		
	Membrane Correction	(kPa)	0.21		
	Corrected Deviator Stress	(kPa)	780		
	Undrained Shear Strength	(kPa)	390		
FAILURE DETAILS	Strain at Failure	(%)	5.3		
	Mode of Failure 1 : **Semi-plastic (bulging, shear & axial splitting)**				



STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By		Date
SC	SHARON CAIRNS	22/11/21

Contract	Contract Ref:
Greenway Academy Horsham	**584685**

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Structural Soils Ltd, Branch Office - Hemel Hempstead: 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442-262683, Fax: 01442-262323, Web: www.soils.co.uk, Email: ask@soils.co.uk | 22/11/21 - 13:41 | SC1 |

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 21/12378
Issue Number: 1 **Date:** 25 November, 2021

Client:
RSK Environment Ltd Hemel
18 Frogmore Road
Hemel Hempstead
Hertfordshire
UK
HP3 9RT

Project Manager: Hemel Lab
Project Name: Greenway Academy, Horsham
Project Ref: 1921968
Order No: N/A
Date Samples Received: 15/11/21
Date Instructions Received: 15/11/21
Date Analysis Completed: 25/11/21

Approved by:



Sophie France
Client Service Manager

Envirolab Job Number: 21/12378

Client Project Name: Greenway Academy, Horsham

Client Project Ref: 1921968

Lab Sample ID	21/12378/1	21/12378/2	21/12378/3	21/12378/4	21/12378/5	21/12378/6		Units	Limit of Detection	Method ref
Client Sample No	1	3	7	1	5	8				
Client Sample ID	BH101	BH101	BH101	BH102	BH102	BH102				
Depth to Top	0.50	1.70	4.00	0.40	2.00	3.00				
Depth To Bottom			4.45	0.60		3.45				
Date Sampled										
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Solid	Soil - D				
Sample Matrix Code	3AE	6AE	6A	6A	7	3A				
% Stones >10mm$_A$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		% w/w	0.1	A-T-044
pH BRE$_D^{M\#}$	7.63	5.80	6.34	7.54	5.95	5.32		pH	0.01	A-T-031s
Chloride BRE, SO4 equiv. (water sol 2:1)$_D$	-	-	-	-	-	<7		mg/l	7	A-T-026s
Nitrate BRE, SO4 equiv. (water sol 2:1)$_D$	-	-	-	-	-	<0.4		mg/l	0.4	A-T-026s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	<10	<10	16	72	16	18		mg/l	10	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	<0.02	<0.02	<0.02	<0.02	0.03	0.05		% w/w	0.02	A-T-028s
Sulphur BRE (total)$_D$	<0.01	<0.01	<0.01	<0.01	0.01	0.02		% w/w	0.01	A-T-024s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

v1

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: RSK Environment Ltd Hemel, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, UK, HP3 9RT

Project: Greenway Academy, Horsham

Clients Project No: 1921968

Project No: 21/12378

Date Received: 15/11/2021 (am)

Cool Box Temperatures (°C): 9.6

Lab Sample ID	21/12378/1	21/12378/2	21/12378/3	21/12378/4	21/12378/5	21/12378/6
Client Sample No	1	3	7	1	5	8
Client Sample ID/Depth	BH101 0.50m	BH101 1.70m	BH101 4.00-4.45m	BH102 0.40-0.60m	BH102 2.00m	BH102 3.00-3.45m
Date Sampled						
Deviation Code						
E (no date)	✓	✓	✓	✓	✓	✓

Key
E (no date) *No sampling date provided (all results affected if not provided)*

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	21/12378/1	21/12378/2	21/12378/3	21/12378/4	21/12378/5	21/12378/6
Client Sample No	1	3	7	1	5	8
Client Sample ID/Depth	BH101 0.50m	BH101 1.70m	BH101 4.00-4.45m	BH102 0.40-0.60m	BH102 2.00m	BH102 3.00-3.45m
Date Sampled						
A-T-024s	19/11/2021	19/11/2021	19/11/2021	19/11/2021	19/11/2021	19/11/2021
A-T-026s	18/11/2021	18/11/2021	18/11/2021	18/11/2021	18/11/2021	25/11/2021
A-T-028s	19/11/2021	19/11/2021	19/11/2021	19/11/2021	19/11/2021	19/11/2021
A-T-031s	18/11/2021	18/11/2021	18/11/2021	18/11/2021	18/11/2021	18/11/2021
A-T-044	19/11/2021	19/11/2021	19/11/2021	19/11/2021	19/11/2021	19/11/2021

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

APPENDIX K
GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH

Generic assessment criteria for human health: secondary school

Background

RSK's generic assessment criteria (GAC) were initially prepared following the publication by the Environment Agency (EA) of soil guideline value (SGV) and toxicological (TOX) reports, and associated publications in 2009[1]. RSK GAC were updated following the publication of GAC by LQM/CIEH in 2009[2]. RSK GAC are periodically revised when updated information on toxicological, land use or receptor parameters is published.

Updates to the RSK GAC: 2015

In 2014, the publication of Category 4 Screening Levels (C4SL)[3,4], as part of the Defra-funded research project SP1010, included modifications to certain exposure assumptions documented within EA Science Report SC050221/SR3 (herein after referred to as SR3)[5] used in the generation of SGVs.

C4SL were initially published for six substances (cadmium, arsenic, benzene, benzo(a)pyrene, chromium VI and lead) for a sandy loam soil type with 6% soil organic matter, based on a low level of toxicological concern (LLTC; see Section 2.3 of research project report SP1010[3]). Further C4SL were published in 2021 for vinyl chloride, tetrachloroethene (PCE) and trichloroethene (TCE). Where a C4SL has been published, the RSK GAC duplicates the C4SL using all input parameters within the SP1010 final project report[3] and associated chemical specific reports[6], and adopts them as GAC for these substances for the published land uses. Due to the use of decimal places rather than significant figures applied to the Contaminated Land Exposure Assessment (CLEA) tool outputs, the GAC presented may be marginally differently to the C4SL values, however any differences between the values are minimal and would not equate to an unacceptable risk. The current RSK GAC have also been revised with updated toxicology published by LQM/CIEH in 2015[7], where a C4SL has not been published.

GAC for a secondary school land use have not been published previously, and RSK has used available reference documents, experience and professional judgement to provide suitable exposure assumptions to characterise this land use.

This GAC appendix therefore presents RSK GAC that may be used in the GQRA stage for a secondary school. **It should be noted that all schools (irrespective of age of pupils) fall within Use Class F1 Learning and non-residential institutions, sub-part F1(a) Provision of education, under The Town and Country Planning (Use Classes) Order 1987 (as amended). A separate Use Class E(f) covers creche, day nursery or day centre (not including a residential use). Therefore consideration should be given to the most sensitive potential school land use within Use Class F1(a), when undertaking a GQRA for a proposed secondary school development. The most sensitive school land use out of a primary and secondary school is considered to be a primary school, for which RSK has published GAC.**

RSK GAC derivation for metals and organic compounds

Model selection

Soil assessment criteria (SAC) were calculated using the CLEA tool v1.071 and supporting EA guidance[5,8,9]. As the SAC are calculated using generic assumptions with respect to a particular scenario, they will be referred to as generic assessment criteria (GAC).

Conceptual model

This scenario considers the risk to a female child from the age of 11 to 16 years, which is the typical age range within a UK secondary school without a sixth form. Whilst the number of attendance days is prescribed by the Department of Education[10], the length of the school day is determined by the school governing body[11]. The consumption of home-grown produce has not been included in this scenario, as the amount of produce grown by a school (if grown) is typically very small and often in raised planters. The consumption of any produce is usually overseen by a teacher or parent and therefore likely to have been thoroughly washed. The pathways considered for the production of SAC in the secondary school are

- direct soil and dust ingestion
- dermal contact with soil and indoor dust
- inhalation of indoor and outdoor dust and vapours.

Figure 1 is a conceptual model illustrating these linkages.

In line with guidance in the EA SGV report for cadmium[1], the RSK GAC for cadmium has been derived based on estimates representative of lifetime exposure (to AC18). Although young children are generally more likely to have higher exposures to soil contaminants, the renal toxicity of cadmium, and the derivation of the TDI_{oral} and TDI_{inh}, are based on considerations of the kidney burden accumulated over 50 years or so. It is therefore reasonable to consider exposure not just in childhood but averaged over a longer period.

The CLEA model only considers the risk of volatile compounds from the soils and not groundwater. Groundwater assessment criteria (GrAC) have not been produced by RSK for this land use scenario, so site-specific assessment criteria should be derived if required.

With respect to volatilisation, the CLEA model assumes a simple linear partitioning of a chemical in the soil between the sorbed, dissolved and vapour phase[9]. The upper boundaries of this partitioning are represented by the maximum aqueous solubility and pure saturated vapour concentration of the chemical. The CLEA model estimates saturated soil concentrations where these limits are reached[9]. The CLEA software uses a traffic light system to identify when individual and/or combined assessment criteria exceed the lower of either the aqueous- or vapour-based soil saturation limits. Model output cells are flagged red where the saturated soil concentration has been exceeded and the contribution of the indoor and outdoor vapour pathway to total exposure is greater than 10%. In this case, further consideration of the following is required[9].

- Free phase contamination may be present.
- Exposure from the vapour pathways will be over-predicted by the model, as in reality the vapour phase concentration will not increase at concentrations above saturation limits

- Where the vapour pathway is greater than 90%, it is unlikely the relevant health criteria value (HCV) will be exceeded at soil concentrations at least a factor of ten higher than the relevant HCV.

Where the vapour pathway is the only exposure route considered and the cell is highlighted red (SAC exceeds saturation limit), the risk based on the assumed conceptual model is likely to be negligible, as the vapour risk is assumed to be tolerable at maximum possible soil concentrations. In such circumstances, vapour exposure should be considered based on the presence of free phase or non-aqueous phase liquid sources and the measured concentrations of volatile organic compounds (VOC) in the vapour phase. Screening could be considered based on setting the SAC as the modelled soil saturation limits. However, as stated within the CLEA handbook[9], this is likely to not be practical in many cases because of the very low saturation limits and, in any case, is highly conservative.

It should also be noted that for mixtures of compounds, free phase may be present where soil (or groundwater) concentrations are well below saturation limits for individual compounds.

Where the vapour pathway is only one of the exposure pathways considered, an additional approach can then be utilised as detailed within Section 4.12 of the CLEA model handbook[9], which explains how to calculate an effective assessment criterion manually.

SR3[5] states that, as a general rule of thumb, it is recognised that estimating vapour phase concentrations from dissolved and sorbed phase contamination by petroleum hydrocarbons are at least a factor of ten higher than those likely to be measured on-site. RSK has therefore applied an empirical correction factor of 10 into the CLEA chemical database for all petroleum hydrocarbons (including BTEX, trimethylbenzenes and total petroleum hydrocarbons (TPH) fraction) and the polycyclic aromatic hydrocarbons (PAH), naphthalene, acenaphthene and acenaphthylene) to reduce this conservatism.

Input selection

The most up-to-date published chemical and toxicological data was obtained from EA Report SC050021/SR7[12], the EA TOX[1] reports, the C4SL SP1010 project report and associated chemical specific reports[3,6] or the 2015 LQM/CIEH report[7].

Following the methodology in the C4SL SP1010 project report and associated reports[3,6], receptor-specific (AC12 to 16) inhalation or oral LLTCs were calculated for arsenic, benzene, chromium VI, benzo(a)pyrene and vinyl chloride. This reflects the average bodyweight and inhalation rate for these age classes.

Toxicological and specific chemical parameters for aromatic hydrocarbon C_8–C_9 (styrene), 1,2,4-trimethylbenzene, barium and methyl tertiary-butyl ether (MTBE) were obtained from the CL:AIRE Soil Generic Assessment Criteria report[13].

For TPH, aromatic hydrocarbons C_5–C_8 were not modelled, as this range comprises benzene and toluene, which are modelled separately. The aromatic C_8–C_9 hydrocarbon fraction comprises ethylbenzene, xylene and styrene. As ethylbenzene and xylene are being modelled separately, the physical, chemical and toxicological data for aromatic C_8–C_9 have been taken from styrene.

Physical parameters

The building type has been based on best practice guidance for the construction of new secondary schools as set out in 'Building Bulletin 98: Briefing Framework for Secondary School Projects'[14], published by the Department for Education and Skills. The site area has been

calculated using the methodology in Building Bulletin 98[14], for a single-storey building with 915 pupils based on the 2013 Department for Education statistical release for schools, pupils and their characteristics in England[14]. This equates to a total net site area of 63,985m^2 and a building footprint of 7981m^2. A total area of 46,228m^2 has been classed as soft landscaping (pitches, habitat areas and soft landscaped areas), with 50% of this assumed to be disturbed ground. Fifty percent is considered highly conservative as most of this area is likely to be covered by grass, which is classed as not available for dust generation in the CLEA model. The building parameters are given in Table 1.

The parameters for a sandy loam soil type were used in line with SR3[5]. This includes a value of 6% for the percentage of soil organic matter (SOM) within the soil. In RSK's experience, this is rather high for many sites. To avoid undertaking site-specific risk assessments for this parameter, RSK has produced SAC for an SOM of 1%, 2.5% and 6%.

The SAC were produced using the input parameters in Tables 1 to 5. The final selected GAC are presented by pathway in Table 6 and the combined GAC in Table 7.

Figure 1: Conceptual model for secondary school scenario

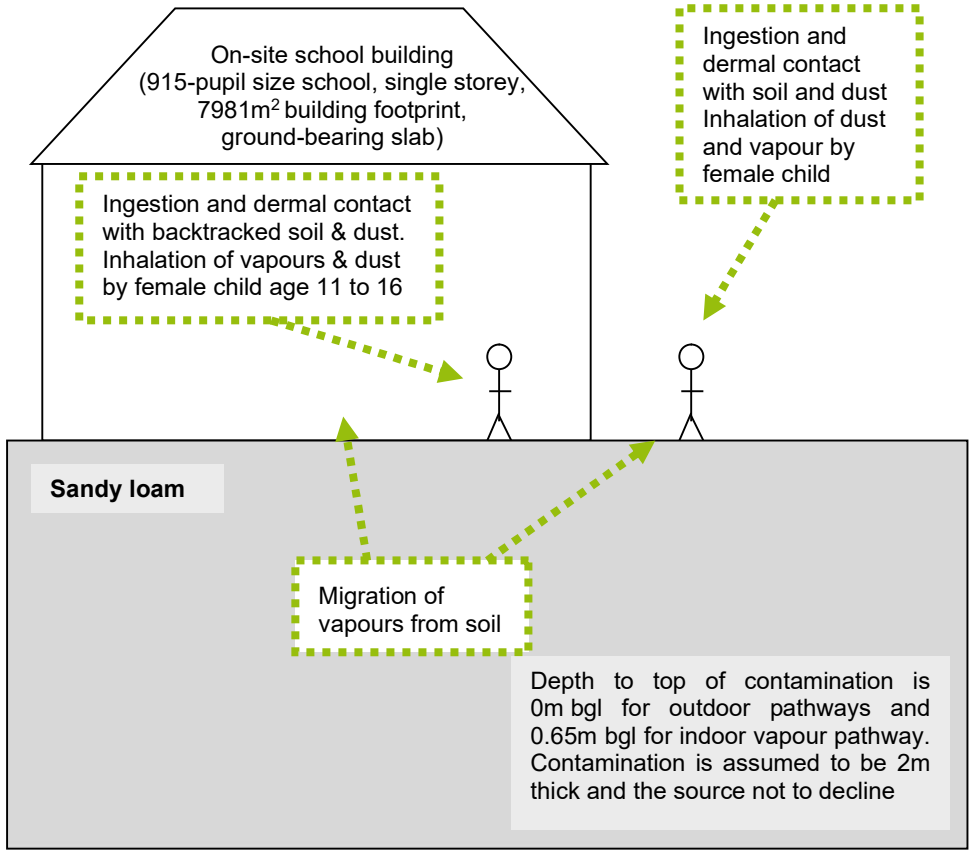


Table 1: Exposure assessment parameters for primary school scenario – inputs for CLEA model

Parameter	Value	Justification
Land use	Secondary school – RSK-derived land use	Chosen land use. It has been assumed that the amount of produce grown and consumed by the pupils is negligible. The assumed secondary school characteristics are presented in Table 2.
Receptor	Female child age 11 to 16	Typical age range of secondary schools without a sixth form attached.
Building	Secondary school	Building type varies significantly depending on age of school and location. Therefore, typical building type scenario was created for a 915-pupil size school, using guidance set out in 'Building Bulletin 98: Briefing Framework for Secondary School Projects'[13]. It has been assumed that the building is single storey with a ground-bearing floor slab.
Soil type	Sandy loam	Most common UK soil type (Section 4.3.1, from Table 3.1, report SC050021/SR3)[5]
Start AC (age class)	12	Range of age classes corresponding to key generic assumption that the critical receptor is a young female child aged 11 to 16. AC12 is the age range 11-12; AC16 is 15–16. For lifetime exposure (cadmium) AC12 to AC18 is considered.
End AC (age class)	16	
SOM (%)	6	Representative of sandy loamy soil according to EA guidance note dated January 2009 entitled 'Changes We Have Made to the CLEA Framework Documents'[16]
	1	To provide SAC for sites where SOM <6% as often observed by RSK
	2.5	
pH	7	Model default

Table 2: Secondary school characteristics

Parameter	Unit	Value	Justification
Number of pupils	No	915	Considered reasonable assumption based on Dept. of Education statistics for the average number of pupils aged 11 to 16 at a state secondary school in England[15]
Number of storeys	No	1	Assumed school is one storey
Building area			
Likely gross building (usable) area	m^2	7981	Calculated using the formula in BB98[14], in Appendix 3
Site area			
Pitches (assumed to be soft cover)	m^2	42025	Calculated using the formula in BB98[14], in Appendix 3
Soft play (informal and social)	m^2	3088	Calculated using the formula in BB98[14], in Appendix 3
Games courts (hard surfaced)	m^2	2430	Calculated using the formula in BB98[14], in Appendix 3
Hard play (informal and social)	m^2	1773	Calculated using the formula in BB98[14], in Appendix 3
Habitat (soft landscaped areas)	m^2	1115	Calculated using the formula in BB98[14], in Appendix 3
Float (any of the above assumed to be soft)	m^2	5575	Calculated using the formula in BB98[14], in Appendix 3
Total net[A] site area	m^2	56005	Calculated using the formula in BB98[14], in Appendix 3
Area of soft cover	m^2	46228	Calculated using the formula in BB98[14], in Appendix 3
Total site area[B]	m^2	63986	Calculated using the formula in BB98[14], in Appendix 3

Note: BB98[14] stipulates best practice for new build secondary schools.

[A] Net site area is the total of five categories of space (sports pitches, games courts (hard surfaces), soft play (informal and social), hard play, habitat areas), as defined in figure D.1 of BB98[14]

[B] Total site area is the sum of the net area plus buildings and access, as calculated using the formula in Appendix 3 of BB98[14]

Table 3: Secondary school – land use data for CLEA model

Parameter	Unit					Age class		
		12	13	14	15	16	17	18
EF (soil and dust ingestion)	day yr^{-1}	190	190	190	190	190	190	190
EF (consumption of home-grown produce)	day yr^{-1}	0	0	0	0	0	0	0
EF (skin contact, indoor)	day yr^{-1}	190	190	190	190	190	190	190
EF (skin contact, outdoor)	day yr^{-1}	190	190	190	190	190	190	190
EF (inhalation of dust and vapour, indoor)	day yr^{-1}	190	190	190	190	190	190	190
EF (inhalation of dust and vapour, outdoor)	day yr^{-1}	190	190	190	190	190	190	190
Justification	Based on 190 days for secondary school education[10]							
Occupancy period (indoor)	hr day^{-1}	6	6	6	6	6	6	6
Occupancy period (outdoor)	hr day^{-1}	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Justification	Based on a typical school day of 7h (08:30 to 15:30) including a 1h lunch break and an average of 12 mins of extracurricular activity per day (1 hour per week), totaling a 7.2h school day. The school day assumes 2hr of exercise per week (voluntary target set by Department for Education[17]), 1hr of which is indoors to account for inclement weather and forms part of the 7h school day; and 1hr of extracurricular (additional to the school day) outdoor activity a week outside of school hours. It is assumed that all of the 1h lunch break is outside, equating to 1.2h of outdoor occupancy per week. The occupancy period does not include for daily use of after-school clubs or activities, as this is not a statutory requirement and not all schools provide these.							
Soil to skin adherence factor (indoor)	mg cm^{-2} day^{-1}	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Soil to skin adherence factor (outdoor)	mg cm^{-2} day^{-1}	0.1	0.3	0.3	0.3.	0.3	0.3	0.3
Justification	Indoor: Table 8.1, SR3[5]; Outdoor: Table 3.5, SP1010[3]. Outdoor adherence factors are based on a limited number of studies and are summarised in the USEPA Exposure Factor Handbook[18] Table 7-4. Of the activities relevant to behaviours at a secondary school the highest adherence was for hands, and for outdoor sports, with a mean adherence factor of 0.11 mg cm^{-2}. Therefore applying the value of 0.1 in Table 3.5, SP1010[3] used for AC1-12. Default values for AC13 to AC16 (older children) and, AC17 and 18 (lifetime exposure) from Table 4.1, SR4[9] have been used.							

Parameter	Unit	Age class						
		12	13	14	15	16	17	18
Soil and dust ingestion rate	g day^{-1}	0.1	0.05	0.05	0.05	0.05	0.05	0.05
Justification	Table 6.2, SR3[5] and Table 4.1 (lifetime), SR4[9].							
Note: For **cadmium**, the exposure assessment for the secondary school land use is based on estimates representative of lifetime exposure to AC18. This is because the TDI_{oral} and TDI_{inh} are based on considerations of the kidney burden accumulated over 50 years. It is therefore reasonable to consider exposure not just in childhood but averaged over a longer time period. See the Environment Agency Science Report SC050021/TOX 3[1] and Science Report SC050021/Cadmium SGV[1].								

Table 4: Secondary school – receptor data for CLEA model

Parameter	Unit	Age class						
		12	13	14	15	16	17	18
Body weight	kg	41.3	47.2	51.2	56.7	59.0	70.0	70.9
Body height	m	1.4	1.5	1.6	1.6	1.6	1.6	1.6
Justification	Table 4.6, SR3[3]. See Table 4.8 SR3[3] for AC12 to 18							
Inhalation rate	m^3 day^{-1}	25.20	25.20	25.20	25.20	25.20	24.54	23.58
Justification	USEPA Exposure Factor Handbook[18] Table 6.2, short-term mean exposure values (males and female combined). Mean inhalation rates calculated for the occupancy period and factored up to assume an hourly rate for a 24hr period in accordance with SR3[5]. Assumed: 0.9h (54 mins) high-intensity activity (i.e. football, running during 24 mins of sport/PE per day and 30 mins of the lunch break);6.3 h light intensity (i.e. time in classroom, eating, light activity during half of the lunch break over 6h 18 mins).							
Max exposed skin fraction (indoor)	m^2 m^{-2}	0.22	0.22	0.22	0.21	0.21	0.33	0.33
Max exposed skin fraction (outdoor)	m^2 m^{-2}	0.14	0.14	0.14	0.14	0.14	0.27	0.27
Justification	Data in Table 4.8, SR3[5]. See Table 4.8 of SR(3)[5] for AC12 to 18.							

Table 5: Secondary school – default soil and building inputs for CLEA model

Parameter	Unit	Value	Justification
Soil properties for sandy loam			
Porosity, total	$cm^3\ cm^{-3}$	0.53	Default soil type is sandy loam, Section 4.3.1, SR3[5] Parameters for sandy loam from Table 4.4, SR3[5]
Porosity, air filled	$cm^3\ cm^{-3}$	0.20	
Porosity, water filled	$cm^3\ cm^{-3}$	0.33	
Residual soil water content	$cm^3\ cm^{-3}$	0.12	
Saturated hydraulic conductivity	$cm\ s^{-1}$	3.56E-03	
van Genuchten shape parameter (m)	-	3.20E-01	
Bulk density	$g\ cm^{-3}$	1.21	
Threshold value of wind speed at 10m	$m\ s^{-1}$	7.20	Default value taken from Section 9.2.2, SR3[5]
Empirical function (F_x) for dust model	-	1.22	Value taken from Section 9.2.2, SR3[5]
Ambient soil temperature	K	283	Annual average soil temperature representative of UK surface soils. Section 4.3.1, SR3[5]
Air dispersion model			
Mean annual wind speed (10m)	$m\ s^{-1}$	5.00	Default value taken from Section 9.2.2, SR3[5]
Air dispersion factor at height of 0.8m	$g\ m^{-2}\ s^{-1}$ per $kg\ m^{-3}$	68	Values for a 2ha site, appropriate to land use in Newcastle (considered the most representative city for the UK as its data is close to the 10th percentile value for mean values of all 13 cites modelled in SR3; Table 9.1, SR3[5]
Air dispersion factor at height of 1.6m	$g\ m^{-2}\ s^{-1}$ per $kg\ m^{-3}$	120	
Fraction of site with hard or vegetative cover	$m^2\ m^{-2}$	0.587	Total site area calculated from BB98[14] less the building footprint[5]. It has been assumed that 50% of the soft cover is vegetative cover such as grass. The remaining 50% of soft cover is assumed to be disturbed in some way, either by gardening or sports/ playtime activities.
Building properties for secondary school with ground-bearing floor slab			
Building footprint	m^2	7981	Calculated from BB 98[14]. See Table 2.
Living space air exchange rate	hr^{-1}	2	The Building Regulations 2000, Approved Document F[19] states that ventilation should be designed in accordance with 'Building Bulletin 101: Ventilation for School Buildings'[20]. The School Premises Regulations 1999[21] apply to existing buildings and state that all occupied areas in a school building shall have controllable ventilation at a minimum rate of three litres of fresh air per second for each of the maximum number of persons the area will accommodate. BB101[18] states that in a special school, the minimum air exchange rate should be 2.5 air changes per hour. CIBSE Guide B2:2001[22], states that for schoolrooms, there should be a

Parameter	Unit	Value	Justification
			minimum of 4–6 air changes per hour. A conservative rate of 2 has been used.
Living space (i.e. classroom) height (above ground)	m	2.4	Minimum height requirement for a school sports hall is 7.6m and an activity studio is 3.5m (BB98[14]). It is assumed that the school is single storey. A minimum classroom height of 2.4m has been assumed in order to be conservative.
Living space height (below ground)	m	0.0	Assumed no basement
Pressure difference (soil to enclosed space)	Pa	5.1	From Table 4.21, SR3[5]. Based on the negative pressure of an office of similar dimensions and construction, most conservative value assumed.
Foundation thickness	m	0.15	Assumed reasonable
Floor crack area	cm^2	25687	From Table 4.21, SR3[5]. Based on an office of similar construction, scaled up to the size of the generic school building (office post 1970 x 13).
Dust loading factor (indoors)	$\mu g\ m^{-3}$	100	Default value for a commercial property taken from Section 9.3, SR3[5]. Oatway & Mobbs 2003 (cited in SR3[5]) suggest a value of 500 $\mu g\ m^{-3}$ for residential and school use, during surface disturbances. Surface disturbances are considered unlikely and Oomen & Lijzen 2004 (cited in SR3[5])) recommend mean fine particulate (PM_{10}) concentrations 100 $\mu g\ m^{-3}$ for very crowded places such as classrooms.
Vapour model			
Default soil gas ingress rate	$cm^3\ s^{-1}$	150	Generic flow rate for commercial property, Section 10.3, SR3[5], based on a worst-case building type and therefore considered suitable for a secondary school building. The value also lies at the top end of soil ingress rate observed by Hers et al[23].
Depth to top of source (beneath building)	cm	65	Section 3.2.6, SR3[5] states source is 50cm below building or 65cm below ground surface
Depth to top of source (no building)	cm	0	Section 10.2, SR3[5] assumes impact from 0m to 1m for outdoor inhalation pathway
Thickness of contaminant layer	cm	200	Model default for indoor air, Section 4.9, SR4[9]
Time average period for surface emissions	years	5	Time period of AC 12-16 year old, Box 3.5, SR3[5] ; time period of AC 12–18 (64 years) for lifetime exposure.
User-defined effective air permeability	cm^2	3.05E-08	Calculated for sandy loam using equations in Appendix 1, SR3[5]

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GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - SECONDARY SCHOOL

Table 6

Human Health Generic Assessment Criteria by Pathway for Secondary School

Compound	Notes	SAC Appropriate to Pathway SOM 1% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 2.5% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 6% (mg/kg)			Soil Saturation Limit (mg/kg)
		Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Metals													
Arsenic	(a,b)	4.23E+02	1.25E+03	NR	NR	4.23E+02	1.25E+03	NR	NR	4.23E+02	1.25E+03	NR	NR
Barium	(b)	1.54E+04	NR	NR	NR	1.54E+04	NR	NR	NR	1.54E+04	NR	NR	NR
Beryllium		2.72E+03	6.07E+00	NR	NR	2.72E+03	6.07E+00	NR	NR	2.72E+03	6.07E+00	NR	NR
Boron		1.54E+05	1.65E+07	NR	NR	1.54E+05	1.65E+07	NR	NR	1.54E+05	1.65E+07	NR	NR
Cadmium	(a)	8.75E+02	7.06E+02	4.06E+02	NR	8.75E+02	7.06E+02	4.06E+02	NR	8.75E+02	7.06E+02	4.06E+02	NR
Chromium (III) - trivalent	(c)	2.31E+05	4.88E+03	NR	NR	2.31E+05	4.88E+03	NR	NR	2.31E+05	4.88E+03	NR	NR
Chromium (VI) - hexavalent	(a,d)	6.61E+02	4.94E+01	NR	NR	6.61E+02	4.94E+01	NR	NR	6.61E+02	4.94E+01	NR	NR
Copper		1.24E+05	5.21E+04	4.16E+04	NR	1.24E+05	5.21E+04	4.16E+04	NR	1.24E+05	5.21E+04	4.16E+04	NR
Lead	(a)	3.59E+03	NR	NR	NR	3.59E+03	NR	NR	NR	3.59E+03	NR	NR	NR
Elemental Mercury (Hg^0)	(d)	NR	2.89E+01	NR	4.31E+00	NR	4.70E+01	NR	1.07E+01	NR	6.33E+01	NR	2.58E+01
Inorganic Mercury (Hg^{2+})		8.19E+02	1.15E+04	7.65E+02	NR	8.19E+02	1.15E+04	7.65E+02	NR	8.19E+02	1.15E+04	7.65E+02	NR
Methyl Mercury (Hg^{4+})		2.04E+02	8.71E+02	1.65E+02	7.33E+01	2.04E+02	1.23E+03	1.75E+02	1.42E+02	2.04E+02	1.80E+03	1.83E+02	3.04E+02
Nickel	(d)	2.12E+03	5.76E+02	NR	NR	2.12E+03	5.76E+02	NR	NR	2.12E+03	5.76E+02	NR	NR
Selenium	(b)	8.44E+03	NR	NR	NR	8.44E+03	NR	NR	NR	8.44E+03	NR	NR	NR
Vanadium		1.49E+04	5.26E+03	NR	NR	1.49E+04	5.26E+03	NR	NR	1.49E+04	5.26E+03	NR	NR
Zinc	(b)	4.66E+05	1.15E+08	NR	NR	4.66E+05	1.15E+08	NR	NR	4.66E+05	1.15E+08	NR	NR
Cyanide (free)		4.50E+02	4.40E+04	4.48E+02	NR	4.50E+02	4.40E+04	4.48E+02	NR	4.50E+02	4.40E+04	4.48E+02	NR
Volatile Organic Compounds													
Benzene	(a)	6.62E+02	1.40E+02	1.15E+02	1.22E+03	6.62E+02	2.45E+02	1.79E+02	2.26E+03	6.62E+02	4.64E+02	2.73E+02	4.71E+03
Toluene		2.58E+05	1.62E+05	9.97E+04	8.69E+02	2.58E+05	3.23E+05	1.44E+05	1.92E+03	2.58E+05	6.37E+05	1.84E+05	4.36E+03
Ethylbenzene		1.16E+05	1.34E+04	1.20E+04	5.18E+02	1.16E+05	2.75E+04	2.22E+04	1.22E+03	1.16E+05	5.42E+04	3.70E+04	2.84E+03
Xylene - m		2.09E+05	1.36E+04	1.28E+04	6.25E+02	2.09E+05	2.77E+04	2.45E+04	1.47E+03	2.09E+05	5.39E+04	4.29E+04	3.46E+03
Xylene - o		2.09E+05	1.44E+04	1.35E+04	4.78E+02	2.09E+05	2.92E+04	2.56E+04	1.12E+03	2.09E+05	5.65E+04	4.45E+04	2.62E+03
Xylene - p		2.09E+05	1.32E+04	1.24E+04	5.76E+02	2.09E+05	2.68E+04	2.37E+04	1.35E+03	2.09E+05	5.21E+04	4.17E+04	3.17E+03
Total xylene		2.09E+05	1.32E+04	1.24E+04	6.25E+02	2.09E+05	2.68E+04	2.37E+04	1.47E+03	2.09E+05	5.21E+04	4.17E+04	3.46E+03
Methyl tertiary-Butyl ether (MTBE)		3.48E+05	2.36E+04	2.21E+04	2.04E+04	3.48E+05	3.79E+04	3.42E+04	3.31E+04	3.48E+05	7.05E+04	5.86E+04	6.27E+04
Trichloroethene (TCE)		2.20E+00	8.22E+00	NR	1.54E+03	4.54E+00	1.71E+01	NR	3.22E+03	9.80E+00	3.74E+01	NR	7.14E+03
Tetrachloroethene (PCE)		1.62E+04	7.32E+01	7.29E+01	4.24E+02	1.62E+04	1.63E+02	1.61E+02	9.51E+02	1.62E+04	3.68E+02	3.60E+02	2.19E+03
1,1,1-Trichloroethane		6.97E+05	2.08E+03	2.08E+03	1.43E+03	6.97E+05	4.23E+03	4.21E+03	2.92E+03	6.97E+05	9.20E+03	9.08E+03	6.39E+03
1,1,1,2 Tetrachloroethane		6.70E+03	3.13E+02	2.99E+02	2.60E+03	6.70E+03	7.08E+02	6.40E+02	6.02E+03	6.70E+03	1.58E+03	1.28E+03	1.40E+04
1,1,2,2-Tetrachloroethane		6.70E+03	7.97E+02	7.12E+02	2.67E+03	6.70E+03	1.58E+03	1.28E+03	5.46E+03	6.70E+03	3.28E+03	2.20E+03	1.20E+04
Carbon Tetrachloride		4.64E+03	8.55E+00	8.54E+00	1.52E+03	4.64E+03	1.86E+01	1.85E+01	3.32E+03	4.64E+03	4.18E+01	4.14E+01	7.54E+03
1,2-Dichloroethane		1.39E+02	2.21E+00	2.18E+00	3.41E+03	1.39E+02	3.17E+00	3.10E+00	4.91E+03	1.39E+02	5.37E+00	5.17E+00	8.43E+03
Vinyl Chloride (chloroethene)		2.28E+01	4.27E+00	3.59E+00	1.36E+03	2.28E+01	5.51E+00	4.44E+00	1.76E+03	2.28E+01	8.41E+00	6.14E+00	2.96E+03
1,2,4-Trimethylbenzene		NR	4.26E+02	NR	4.74E+02	NR	6.19E+02	NR	1.16E+03	NR	7.86E+02	NR	2.76E+03
1,3,5-Trimethylbenzene	(e)	NR	NR	NR	2.30E+02	NR	NR	NR	5.52E+02	NR	NR	NR	1.30E+03
Semi-Volatile Organic Compounds													
Acenaphthene		6.48E+04	9.25E+05	6.05E+04	5.70E+01	6.48E+04	1.43E+06	6.20E+04	1.41E+02	6.48E+04	2.10E+06	6.28E+04	3.36E+02
Acenaphthylene		6.48E+04	8.91E+05	6.04E+04	8.61E+01	6.48E+04	1.37E+06	6.19E+04	2.12E+02	6.48E+04	2.02E+06	6.28E+04	5.06E+02
Anthracene		3.24E+05	8.66E+06	3.12E+05	1.17E+00	3.24E+05	1.32E+07	3.16E+05	2.91E+00	3.24E+05	1.87E+07	3.18E+05	6.96E+00
Benzo(a)anthracene		1.67E+02	1.41E+02	7.65E+01	1.71E+00	1.67E+02	1.74E+02	8.53E+01	4.28E+00	1.67E+02	2.02E+02	9.16E+01	1.03E+01
Benzo(a)pyrene	(a)	4.49E+01	5.37E+01	NR	9.11E-01	4.50E+01	6.39E+01	NR	2.28E+00	4.50E+01	7.22E+01	NR	5.46E+02
Benzo(b)fluoranthene		4.21E+01	3.96E+01	2.04E+01	1.22E+00	4.21E+01	4.76E+01	2.24E+01	3.04E+00	4.21E+01	5.43E+01	2.37E+01	7.29E+00
Benzo(g,h,i)perylene		3.72E+03	4.47E+03	2.03E+03	1.54E-02	3.72E+03	5.01E+03	2.13E+03	3.85E-02	3.72E+03	5.41E+03	2.20E+03	9.23E-02
Benzo(k)fluoranthene		1.11E+03	1.12E+03	5.59E+02	6.87E-01	1.11E+03	1.33E+03	6.05E+02	1.72E+00	1.11E+03	1.49E+03	6.37E+02	4.12E+00
Chrysene		3.35E+02	2.63E+02	1.47E+02	4.40E-01	3.35E+02	3.29E+02	1.66E+02	1.10E+00	3.35E+02	3.88E+02	1.80E+02	2.64E+00
Dibenzo(a,h)anthracene		3.35E+00	3.57E+00	1.73E+00	3.93E-03	3.35E+00	4.15E+00	1.85E+00	9.84E-03	3.35E+00	4.61E+00	1.94E+00	2.36E-02
Fluoranthene		1.35E+04	7.08E+05	1.32E+04	1.89E+01	1.35E+04	9.64E+05	1.33E+04	4.73E+01	1.35E+04	1.23E+06	1.33E+04	1.13E+02

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - SECONDARY SCHOOL

Table 6

Human Health Generic Assessment Criteria by Pathway for Secondary School

Compound	Notes	SAC Appropriate to Pathway SOM 1% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 2.5% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 6% (mg/kg)			Soil Saturation Limit (mg/kg)
		Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Fluorene		4.32E+04	5.87E+05	4.02E+04	3.09E+01	4.32E+04	9.96E+05	4.14E+04	7.65E+01	4.32E+04	1.55E+06	4.20E+04	1.83E+02
Indeno(1,2,3-cd)pyrene		4.78E+02	4.33E+02	2.27E+02	6.13E-02	4.78E+02	5.25E+02	2.50E+02	1.53E-01	4.78E+02	6.03E+02	2.67E+02	3.68E-01
Naphthalene		2.15E+04	1.99E+03	1.82E+03	7.64E+01	2.15E+04	3.49E+03	3.00E+03	1.83E+02	2.15E+04	5.79E+03	4.56E+03	4.32E+02
Phenanthrene		1.35E+04	3.77E+05	1.30E+04	3.60E+01	1.35E+04	5.68E+05	1.32E+04	8.96E+01	1.35E+04	7.97E+05	1.32E+04	2.14E+02
Pyrene		3.24E+04	1.64E+06	3.18E+04	2.20E+00	3.24E+04	2.24E+06	3.19E+04	5.49E+00	3.24E+04	2.87E+06	3.20E+04	1.32E+01
Phenol		7.67E+05	1.04E+04	1.03E+04	2.42E+04	7.67E+05	1.10E+04	1.09E+04	3.81E+04	7.67E+05	1.18E+04	1.16E+04	7.03E+04
Total Petroleum Hydrocarbons													
Aliphatic hydrocarbons EC_5-EC_6		2.90E+06	1.09E+04	1.09E+04	3.04E+02	2.90E+06	1.97E+04	1.97E+04	5.58E+02	2.90E+06	3.94E+04	3.93E+04	1.15E+03
Aliphatic hydrocarbons >EC_6-EC_8		2.90E+06	2.59E+04	2.59E+04	1.44E+02	2.90E+06	5.56E+04	5.54E+04	3.22E+02	2.90E+06	1.20E+05	1.19E+05	7.36E+02
Aliphatic hydrocarbons >EC_8-EC_{10}		5.81E+04	6.16E+03	5.99E+03	7.77E+01	5.81E+04	1.38E+04	1.29E+04	1.90E+02	5.81E+04	2.92E+04	2.47E+04	4.51E+02
Aliphatic hydrocarbons >EC_{10}-EC_{12}		5.81E+04	2.56E+04	2.22E+04	4.75E+01	5.81E+04	5.44E+04	3.74E+04	1.18E+02	5.81E+04	1.07E+05	4.82E+04	2.83E+02
Aliphatic hydrocarbons >EC_{12}-EC_{16}		5.81E+04	1.37E+05	5.07E+04	2.37E+01	5.81E+04	2.59E+05	5.45E+04	5.91E+01	5.81E+04	4.53E+05	5.61E+04	1.42E+02
Aliphatic hydrocarbons >EC_{16}-EC_{35}	(b)	9.68E+05	NR	NR	8.48E+00	1.04E+06	NR	NR	2.12E+01	1.08E+06	NR	NR	5.09E+01
Aliphatic hydrocarbons >EC_{35}-EC_{44}	(b)	9.68E+05	NR	NR	8.48E+00	1.04E+06	NR	NR	2.12E+01	1.08E+06	NR	NR	5.09E+01
Aromatic hydrocarbons >EC_8-EC_{10}		2.32E+04	8.35E+03	7.47E+03	6.13E+02	2.32E+04	1.70E+04	1.30E+04	1.50E+03	2.32E+04	3.23E+04	1.78E+04	3.58E+03
Aromatic hydrocarbons >EC_{10}-EC_{12}		2.32E+04	3.09E+04	1.75E+04	3.64E+02	2.32E+04	5.74E+04	2.04E+04	8.99E+02	2.32E+04	9.98E+04	2.17E+04	2.15E+03
Aromatic hydrocarbons >EC_{12}-EC_{16}		2.32E+04	1.45E+05	2.22E+04	1.69E+02	2.32E+04	2.41E+05	2.26E+04	4.19E+02	2.32E+04	3.81E+05	2.29E+04	1.00E+03
Aromatic hydrocarbons >EC_{16}-EC_{21}	(b)	1.67E+04	NR	NR	5.37E+01	1.69E+04	NR	NR	1.34E+02	1.71E+04	NR	NR	3.21E+02
Aromatic hydrocarbons >EC_{21}-EC_{35}	(b)	1.72E+04	NR	NR	4.83E+00	1.72E+04	NR	NR	1.21E+01	1.73E+04	NR	NR	2.90E+01
Aromatic hydrocarbons >EC_{35}-EC_{44}	(b)	1.72E+04	NR	NR	4.83E+00	1.72E+04	NR	NR	1.21E+01	1.73E+04	NR	NR	2.90E+01

Notes:

EC - equivalent carbon. SAC - soil assessment criteria.

The CLEA model output is colour coded depending upon whether the soil saturation limit has been exceeded.

Calculated SAC exceeds soil saturation limit and may significantly effect the interpretation of any exceedances since the contribution of the indoor and outdoor vapour pathway to total exposure is >10%.

Calculated SAC exceeds soil saturation limit but will not effect the SAC significantly since the contribution of the indoor and outdoor vapour pathway to total exposure is <10%.

Calculated SAC does not exceed the soil saturation limit.

For consistency where the theoretical solubility limit within RBCA has been exceeded in production of the GrAC, these cellls have also been hatched red.

The SAC for organic compounds are dependant upon soil organic matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58. 1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.

SAC for TPH fractions, PAHs napthalene, acenaphthene and acenaphthylene, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway (Section 10.1.1, SR3)

(a) SAC for arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead are derived using the C4SL toxicology data.

(b) SAC for barium and selenium should not include the inhalation pathway as no expert group HCV has been derived; aliphatic and aromatic hydrocarbons >EC16 should not include inhalation pathway due to their non-volatile nature and inhalation exposure being minimal (oral, dermal and inhalation exposure is compared to the oral HCV); arsenic should only be based on oral contribution (rather than combined) owing to the relative small contribution from inhalation in accordance with the SGV report. The Oral SAC should be adopted for zinc and benzo(a)pyrene.

(c) SAC for CrIII should be based on the lower of the oral and inhalation SAC (see LQM/CIEH 2015 Section 6.8)

(d) SAC for elemental mercury, chromium VI and nickel should be based on the inhalation pathway only.

(e) SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4 trimethylbenzene may be used.

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - SECONDARY SCHOOL

Table 7
Human Health Generic Assessment Criteria for Secondary School

Compound	SAC for Soil SOM 1% (mg/kg)	SAC for Soil SOM 2.5% (mg/kg)	SAC for Soil SOM 6% (mg/kg)
Metals			
Arsenic	423	423	423
Barium	15,400	15,400	15,400
Beryllium	6.1	6.1	6.1
Boron	154,000	154,000	154,000
Cadmium	406	406	406
Chromium (III) - trivalent	4,880	4,880	4,880
Chromium (VI) - hexavalent	49	49	49
Copper	41,600	41,600	41,600
Lead	3,590	3,590	3,590
Elemental Mercury (Hg^0)	28.9 (4.3)	47.0 (10.7)	63.3 (25.8)
Inorganic Mercury (Hg^{2+})	760	760	760
Methyl Mercury (Hg^{4+})	165 (73)	175 (142)	183
Nickel	580	580	580
Selenium	8,440	8,440	8,440
Vanadium	5,300	5,300	5,300
Zinc	465,700	465,700	465,700
Cyanide (free)	450	450	450
Volatile Organic Compounds			
Benzene	115	179	273
Toluene	100,000 (869)	144,000 (1,920)	184,000 (4,360)
Ethylbenzene	12,000 (518)	22,000 (1,220)	37,000 (2,840)
Xylene - m	12,800 (625)	24,500 (1,470)	42,900 (3,460)
Xylene - o	13,500 (478)	25,600 (1,120)	44,500 (2,620)
Xylene - p	12,400 (576)	23,700 (1,350)	41,700 (3,170)
Total xylene	12,400 (625)	23,700 (1,470)	41,700 (3,460)
Methyl tertiary-Butyl ether (MTBE)	22,100 (20,400)	34,200 (33,075)	58,600
Trichloroethene (TCE)	2.20	4.54	9.80
Tetrachloroethene (PCE)	73	161	360
1,1,1-Trichloroethane	2,080 (1,430)	4,210 (2,920)	9,080 (6,390)
1,1,1,2 Tetrachloroethane	300	640	1,280
1,1,2,2-Tetrachloroethane	710	1,280	2,200
Carbon Tetrachloride	8.54	18.54	41.43
1,2-Dichloroethane	2.18	3.10	5.17
Vinyl Chloride (chloroethene)	3.59	4.44	6.14
1,2,4-Trimethylbenzene	426	619	786
1,3,5-Trimethylbenzene	NR	NR	NR
Semi-Volatile Organic Compounds			
Acenaphthene	60,500	62,000	62,800
Acenaphthylene	60,400	61,900	62,800
Anthracene	312,000	316,000	318,000
Benzo(a)anthracene	77	85	92
Benzo(a)pyrene	44.9	45.0	45.0
Benzo(b)fluoranthene	20	22	24
Benzo(g,h,i)perylene	2,030	2,130	2,200
Benzo(k)fluoranthene	560	610	640
Chrysene	147	166	180
Dibenzo(a,h)anthracene	1.73	1.85	1.94
Fluoranthene	13,200	13,300	13,300
Fluorene	40,000	41,000	42,000
Indeno(1,2,3-cd)pyrene	230	250	270
Naphthalene	1,820 (76)	3,000 (183)	4,560 (432)
Phenanthrene	13,000	13,200	13,200
Pyrene	32,000	32,000	32,000
Phenol	440*	690*	1,300*
Total Petroleum Hydrocarbons			
Aliphatic hydrocarbons EC_5-EC_6	10,900 (304)	19,700 (558)	39,300 (1,151)
Aliphatic hydrocarbons >EC_6-EC_8	26,000 (144)	55,000 (322)	119,000 (736)
Aliphatic hydrocarbons >EC_8-EC_{10}	6,000 (78)	12,900 (190)	24,700 (451)
Aliphatic hydrocarbons >EC_{10}-EC_{12}	22,200 (48)	37,400 (118)	48,200 (283)
Aliphatic hydrocarbons >EC_{12}-EC_{16}	51,000 (24)	54,000 (59)	56,000 (142)
Aliphatic hydrocarbons >EC_{16}-EC_{35}	968,000	1,000,000**	1,000,000**
Aliphatic hydrocarbons >EC_{35}-EC_{44}	968,000	1,000,000**	1,000,000**
Aromatic hydrocarbons >EC_8-EC_{10}	7,500 (613)	13,000 (1,500)	17,800 (3,580)
Aromatic hydrocarbons >EC_{10}-EC_{12}	17,500 (364)	20,400 (899)	21,700 (2,150)
Aromatic hydrocarbons >EC_{12}-EC_{16}	22,200	22,600	22,900
Aromatic hydrocarbons >EC_{16}-EC_{21}	16,700	16,900	17,100
Aromatic hydrocarbons >EC_{21}-EC_{35}	17,200	17,200	17,300
Aromatic hydrocarbons >EC_{35}-EC_{44}	17,200	17,200	17,300
Minerals			
Asbestos	Stage 1 test – No asbestos detected with ID; Stage 2 test - <0.001% dry weight (exceedance of either equates to an exceedance of the GAC)[1]		

Notes:

'-' Generic assessment criteria not calculated owing to low volatility of substance and therefore no pathway, or an absence of toxicological data.

NR - SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4 trimethylbenzene may be used

EC - equivalent carbon. GrAC - groundwater assessment criteria. SAC - soil assessment criteria.

* The GAC for Phenol is based on a threshold which is protective of direct contact (SC050021/Phenol SGV report)

** Denoted SAC calculated exceeds 100% contaminant, hence 100% (1,000,000mg/kg) has been taken as SAC

The SAC for organic compounds are dependent on Soil Organic Matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58.
1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.

SAC for TPH fractions, PAHs napthalene, acenaphthene and acenaphthylene, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway, section 10.1.1, SR3.

(VALUE IN BRACKETS) The SAC has been set as the model calculated SAC with the saturation limit shown in brackets.

RSK has adopted an approach for petroleum hydrocarbons in accordance with LQM/CIEH whereby the concentration modelled for each petroleum hydrocarbon fraction has been tabulated as the SAC with the corresponding solubility or vapour saturation limits given in brackets.

APPENDIX L
GENERIC ASSESSMENT CRITERIA FOR PHYTOTOXIC EFFECTS

APPENDIX N
GENERIC ASSESSMENT CRITERIA FOR PHYTOTOXIC EFFECTS

Several compounds can inhibit plant growth; hence it is important to have generic assessment criteria (GAC) to promote healthy plant growth. In the absence of other published GAC, the GAC have been obtained from legislation (UK and European) and guidance related to the use of sewage sludge on agricultural fields.

The Council of European Communities Sewage Sludge Directive (86/278/EEC) dated 1986, has been transposed into UK law by Statutory Instrument No. 1263, The Sludge (use in Agriculture) Regulations 1989 (Public Health England, Wales and Scotland), as ammended in 1990 and The Sludge (use in Agriculture) Regulations (Northern Ireland) SR No, 245, 1990. In addition the Department of Environment (DoE) produced a Code of Practice (CoP) (Updated 2nd Edition) in 2006 which provided guidance on the application of sewage sludge on agricultural land (however the status of this document is unclear as it is on the archive section of the Defra website).

The directive seeks to encourage the use of sewage sludge in agriculture and to regulate its use in such a way as to "***prevent harmful effects on soil, vegetation, animals and man".*** To this end, it prohibits the use of untreated sludge on agricultural land unless it is injected or incorporated into the soil. Treated sludge is defined as having undergone "biological, chemical or heat treatment, long-term storage or any other appropriate process so as significantly to reduce its fermentability and the health hazards resulting from its use". To provide protection against potential health risks from residual pathogens, sludge must not be applied to soil in which fruit and vegetable crops are growing, or less than ten months before fruit and vegetable crops are to be harvested. Grazing animals must not be allowed access to grassland or forage land less than three weeks after the application of sludge.

The specified limits of concentrations of selected elements in soil are presented in Table 4 of the updated 2nd Edition of the DoE Code of Practice and are designed to protect plant growth. It is noted that these values are more stringent than the values set in current UK regulations. However since they were ammended following recommendations from the Independent Scientific Committee in 1993. (MAFF/DOE 1993). The GAC are presented in Table 1.

Table 1: Generic assessment criteria

Determinant	Generic assessment criteria (mg/kg)			
	pH 5.0 < 5.5	pH 5.5 < 6.0	pH 6.0 < 7.0	pH >7.0
Zinc	200	200	200	300
Copper	80	100	135	200
Nickel	50	60	75	110
Lead	300	300	300	300
Cadmium	3	3	3	3
Mercury	1	1	1	1
Note: Only compounds with assessment criteria documented within the Directive 86/278/EEC have been included, although criteria for 5 additional compounds have been presented within the 2006 CoP.				

APPENDIX M
GENERIC ASSESSMENT CRITERIA POTABLE WATER SUPPLY PIPES

A range of pipe materials is available and careful selection, design and installation is required to ensure that water supply pipes are satisfactorily installed and meet the requirements of the Water Supply (Water Fittings) Regulations 1999 in England and Wales, the Byelaws 2000 in Scotland and the Northern Ireland Water Regulations. The regulations include a requirement to use only suitable materials when laying water pipes and laying water pipes without protection is not permitted at contaminated sites. The water supply company has a statutory duty to enforce the regulations.

Contaminants in the ground can pose a risk to human health by permeating potable water supply pipes. To fulfil their statutory obligation, UK water supply companies require robust evidence from developers to demonstrate either that the ground in which new plastic supply pipes will be laid is free from specific contaminants, or that the proposed remedial strategy will mitigate any existing risk. If these requirements cannot be demonstrated to the satisfaction of the relevant water company, it becomes necessary to specify an alternative pipe material on the whole development or in specific zones.

In 2010, UK Water Industry Research (UKWIR) published *Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites* (Report Ref. No. 10/WM/03/21). This report reviewed previously published industry guidelines and threshold concentrations adopted by individual water supply companies.

The focus of the UKWIR research project was to develop clear and concise procedures, which provide consistency in the pipe selection decision process. It was intended to provide guidance that can be used to ensure compliance with current regulations and to prevent water supply pipe failing prematurely due to the presence of contamination.

The report concluded that in most circumstances only organic contaminants pose a potential risk to plastic pipe materials and Table 3.1 of the report provides threshold concentrations for polyethylene (PE) and polyvinyl chloride (PVC) pipes for the organic contaminants of concern. The report also makes recommendations for the procedures to be adopted in the design of site investigations and sampling strategies, and the assessment of data, to ensure that the ground through which water supply pipes will be laid is adequately characterised.

Risks to water supply pipes have therefore been assessed against the threshold concentrations for PE and PVC pipe specified in Table 3.1 of Report 10/WM/03/21, which have been adopted as the GAC for this linkage and are reproduced in Table A3 below.

Since water supply pipes are typically laid at a minimum depth of 0.75 m below finished ground levels, sample results from depths between 0.5 m and 1.5 m below finished level are generally considered suitable for assessing risks to water supply. Samples outside these depths can be used, providing the stratum is the same as that in which water supply pipes are likely to be located. The report specifies that sampling should characterise the ground conditions to a minimum of 0.5 m below the proposed depth of the pipe.

It should be noted that the assessment provided in this report is a guide and the method of assessment and recommendations should be checked with the relevant water supply company.

Table Q1: Generic assessment criteria for water supply pipes

		Pipe material	
		GAC (mg/kg)	
	Parameter group	**PE**	**PVC**
1	Extended VOC suite by purge and trap or head space and GC-MS with TIC (Not including compounds within group 1a)	0.5	0.125
1a	• BTEX + MTBE	0.1	0.03
2	SVOCs TIC by purge and trap or head space and GC-MS with TIC (aliphatic and aromatic C_5–C_{10}) (Not including compounds within group 2e and 2f)	2	1.4
2e	• Phenols	2	0.4
2f	• Cresols and chlorinated phenols	2	0.04
3	Mineral oil C_{11}–C_{20}	10	Suitable
4	Mineral oil C_{21}–C_{40}	500	Suitable
5	Corrosive (conductivity, redox and pH)	Suitable	Suitable
Specific suite identified as relevant following site investigation			
2a	Ethers	0.5	1
2b	Nitrobenzene	0.5	0.4
2c	Ketones	0.5	0.02
2d	Aldehydes	0.5	0.02
6	Amines	Not suitable	Suitable
Notes: where indicated as 'suitable', the material is considered resistant to permeation or degradation and no threshold concentration has been specified by UKWIR.			

APPENDIX N
WM3 ASSESSMENT

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Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!".
If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

Haswaste, developed by Dr. Iain Haslock.

Ref. 1		FP101	BH101	BH101	BH102	WS101	WS101	WS102	WS103	WS104
Ref. 2		0.25	0.40	0.80	0.40	0.25	0.50	0.40	0.00	0.00
Date		27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21
% Moisture	%									
pH (soil)		7.86	6.88	6.67	6.64	6.40	6.98	5.91	5.97	5.79
pH (leachate)										
Arsenic	mg/kg	1	21	25	3	6	9	6	7	5
Cadmium	mg/kg	0.9	0.5	0.5	0.6	0.5	0.5	0.7	0.6	0.5
Copper	mg/kg	27	14	17	13	12	13	17	16	15
CrVI or Chromium	mg/kg	49	28	25	23	19	26	24	21	21
Lead	mg/kg	20	17	16	30	35	15	31	56	52
Mercury	mg/kg	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Nickel	mg/kg	27	11	12	12	9	14	19	12	11
Selenium	mg/kg	1	1	1	1	1	1	1	1	1
Zinc	mg/kg	69	39	35	51	49	41	60	55	95
Barium	mg/kg									
Beryllium	mg/kg									
Vanadium	mg/kg									
Cobalt	mg/kg									
Manganese	mg/kg									
Molybdenum	mg/kg									
Antimony	mg/kg									
Aluminium	mg/kg									
Bismuth	mg/kg									
CrIII	mg/kg									
Iron	mg/kg									
Strontium	mg/kg									
Tellurium	mg/kg									
Thallium	mg/kg									
Titanium	mg/kg									
Tungsten	mg/kg									
Ammoniacal N	mg/kg									
ws Boron	mg/kg									
PAH (Input Total PAH **OR** individual PAH results)										
Acenaphthene	mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Acenaphthylene	mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Anthracene	mg/kg	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Benzo(a)anthracene	mg/kg	0.04	0.04	0.04	0.04	0.04	0.04	0.15	0.07	0.04
Benzo(a)pyrene	mg/kg	0.04	0.04	0.04	0.04	0.13	0.04	0.14	0.08	0.04
Benzo(b)fluoranthene	mg/kg	0.05	0.05	0.05	0.05	0.15	0.05	0.17	0.10	0.05
Benzo(ghi)perylene	mg/kg	0.05	0.05	0.05	0.05	0.07	0.05	0.05	0.05	0.05
Benzo(k)fluoranthene	mg/kg	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Chrysene	mg/kg	0.06	0.06	0.06	0.06	0.13	0.06	0.14	0.10	0.06
Dibenzo(ah)anthracene	mg/kg	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Fluoranthene	mg/kg	0.08	0.08	0.08	0.08	0.17	0.08	0.21	0.12	0.08
Fluorene	mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Indeno(123cd)pyrene	mg/kg	0.03	0.03	0.03	0.03	0.08	0.03	0.07	0.06	0.03
Naphthalene	mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Phenanthrene	mg/kg	0.03	0.03	0.03	0.03	0.05	0.03	0.08	0.04	0.03
Pyrene	mg/kg	0.07	0.07	0.07	0.07	0.15	0.07	0.18	0.11	0.07
Coronene	mg/kg									
Total PAHs (16 or 17)	mg/kg									
TPH										
Petrol	mg/kg									
Diesel	mg/kg									
Lube Oil	mg/kg									
Crude Oil	mg/kg									
White Spirit / Kerosene	mg/kg									
Creosote	mg/kg									
Unknown TPH with ID	mg/kg									
Unknown TPHCWG	mg/kg	1.0	1.0	1.0	2.0	7.0	1.0	2.0	11.0	1.0
Total Sulphide	mg/kg									
Complex Cyanide	mg/kg									
Free (or Total) Cyanide	mg/kg									
Thiocyanate	mg/kg									
Elemental/Free Sulphur	mg/kg									
Phenols Input Total Phenols HPLC **OR** individual Phenol results.										
Phenol	mg/kg									
Cresols	mg/kg									
Xylenols	mg/kg									
Resourcinol	mg/kg									
Phenols Total by HPLC	mg/kg									
BTEX Input Total BTEX **OR** individual BTEX results.										
Benzene	mg/kg									
Toluene	mg/kg									
Ethylbenzene	mg/kg									
Xylenes	mg/kg									
Total BTEX	mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PCBs (POPs)										
PCBs Total (eg EC7/WHO12)	mg/kg									
PBBs (POPs)										
Hexabromobiphenyl (Total or PBB153; 2,2',4,4',5,5'- if only available)	mg/kg									

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Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!".
If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

Haswaste, developed by Dr. Iain Haslock.

Ref. 1		FP101	BH101	BH101	BH102	WS101	WS101	WS102	WS103	WS104
Ref. 2		0.25	0.40	0.80	0.40	0.25	0.50	0.40	0.00	0.00
Date		27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21
POPs Dioxins and Furans Input Total Dioxins and Furans **OR** individual Dioxin and Furan results.										
2,3,7,8-TeCDD	mg/kg									
1,2,3,7,8-PeCDD	mg/kg									
1,2,3,4,7,8-HxCDD	mg/kg									
1,2,3,6,7,8-HxCDD	mg/kg									
1,2,3,7,8,9-HxCDD	mg/kg									
1,2,3,4,6,7,8-HpCDD	mg/kg									
OCDD	mg/kg									
2,3,7,8-TeCDF	mg/kg									
1,2,3,7,8-PeCDF	mg/kg									
2,3,4,7,8-PeCDF	mg/kg									
1,2,3,4,7,8-HxCDF	mg/kg									
1,2,3,6,7,8-HxCDF	mg/kg									
2,3,4,6,7,8-HxCDF	mg/kg									
1,2,3,7,8,9-HxCDF	mg/kg									
1,2,3,4,6,7,8-HpCDF	mg/kg									
1,2,3,4,7,8,9-HpCDF	mg/kg									
OCDF	mg/kg									
Total Dioxins and Furans	mg/kg									
Some Pesticides (POPs unless otherwise stated)										
Aldrin	mg/kg									
α Hexachlorocyclohexane (alpha-HCH) *(leave empty if total HCH results used)*	mg/kg									
β Hexachlorocyclohexane (beta-HCH) *(leave empty if total HCH results used)*	mg/kg									
α Cis-Chlordane (alpha) ***OR*** *Total Chlordane*	mg/kg									
δ Hexachlorocyclohexane (delta-HCH) *(leave empty if total HCH results used)*	mg/kg									
Dieldrin	mg/kg									
Endrin	mg/kg									
χ Hexachlorocyclohexane (gamma-HCH) (lindane) ***OR*** *Total HCH*	mg/kg									
Heptachlor	mg/kg									
Hexachlorobenzene	mg/kg									
o,p'-DDT *(leave empty if total DDT results used)*	mg/kg									
p,p'-DDT ***OR*** *Total DDT*	mg/kg									
χ Trans-Chlordane (gamma) *(leave empty if total Chlordane results used)*	mg/kg									
Chlordecone (kepone)	mg/kg									
Pentachlorobenzene	mg/kg									
Mirex	mg/kg									
Toxaphene (camphechlor)	mg/kg									
Tin										
Tin *(leave empty if Organotin and Tin excl Organotin results used)*	mg/kg									
Organotin										
Dibutyltin; DiBT	mg/kg									
Tributyltin; TriBT	mg/kg									
Triphenyltin; TriPT	mg/kg									
Tetrabutyltin; TeBT	mg/kg									
Tin excluding Organotin										
Tin excl Organotin	mg/kg									

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Haswaste, developed by Dr. Iain Haslock.

Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!".
If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

Ref. 1	FP101	BH101	BH101	BH102	WS101	WS101	WS102	WS103	WS104
Ref. 2	0.25	0.40	0.80	0.40	0.25	0.50	0.40	0.00	0.00
Date	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21
Asbestos in Soil	Thresholds								
Asbestos detected in Soil (enter Y or N)	Y	n	n	n	n	n	n	n	n	n

If Asbestos in Soil above is "Y", the soil is Hazardous Waste HP5 and HP7

Asbestos % Composition in Soil (Matrix Loose Fibres or Microscopic Identifiable Pieces only)	see "Carc HP7 % Asbestos in Soil (Fibres)" below	%							
Carcinogenic HP7 % Asbestos in Soil (fibres or micro pieces) *Please be advised, if the calculation cell is "0.00000" DOES NOT MEAN asbestos testing has been undertaken and the result is zero.*	≥0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

If Asbestos in Soil above is "Y", but Asbestos % above is "<0.1%", the soil is Non Hazardous Waste. You can only use Asbestos % results where loose fibres or micro pieces are only present. You cannot use Asbestos % results when visual identifiable pieces are present.

Asbestos Identifiable Pieces visible with the naked eye detected in the Soil (enter Y or N)	Y								

If visual identifiable pieces of asbestos are present, you cannot use Asbestos % results and the whole soil sample is Hazardous Waste HP5 and HP7 Construction material containing Asbestos 17 06 05.
Therefore, if Asbestos in Soil above is "Y", the Asbestos % above is "<0.1%", but the Asbestos Identifiable Pieces visible with the naked eye is "Y", the soil is Hazardous Waste.

Identifiable Pieces are Cement, Fragments, Board, Rope etc. ie anything ACM that is not Loose Fibres.
All visual asbestos pieces need to be removed leaving only fibres (or micro pieces) with an Asbestos % Composition in Soil result of <0.1% for the soil to become non-hazardous waste.

Hazardous Property	Thresholds	Cut Off Value	If cells below turn yellow and the text turns red, the samples should be classified as Hazardous Waste.								
Corrosive HP8	≥5%	<1%	0.00954	0.00815	0.00810	0.00481	0.00444	0.00618	0.00540	0.00496	0.00469
Irritant HP4	≥10%	<1%	0.00318	0.00435	0.00522	0.00187	0.00215	0.00266	0.00271	0.00273	0.00236
Irritant HP4	≥20%	<1%	0.00852	0.00382	0.00436	0.00391	0.00320	0.00431	0.00579	0.00425	0.00393
Specifc Target Organ Toxicity HP5	≥1%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Specifc Target Organ Toxicity HP5	≥20%		0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00001	0.00000	0.00000
Specifc Target Organ Toxicity HP5	≥1%		0.00941	0.00538	0.00480	0.00442	0.00365	0.00499	0.00461	0.00403	0.00403
Specifc Target Organ Toxicity HP5	≥10%		0.00200	0.00170	0.00160	0.00300	0.00350	0.00150	0.00310	0.00560	0.00520
Aspiration Toxicity HP5	≥10%		0.00010	0.00010	0.00010	0.00020	0.00070	0.00010	0.00020	0.00110	0.00010
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.25%	<0.1%	0.00015	0.00279	0.00332	0.00041	0.00081	0.00121	0.00081	0.00094	0.00068
Acute Toxicity HP6	≥5%	<0.1%	0.00955	0.00552	0.00494	0.00456	0.00379	0.00513	0.00475	0.00417	0.00417
Acute Toxicity HP6	≥25%	<1%	0.01061	0.00557	0.00601	0.00697	0.00675	0.00586	0.00896	0.00991	0.00918
Acute Toxicity HP6	≥0.25%	<0.1%	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
Acute Toxicity HP6	≥2.5%	<0.1%	0.00941	0.00538	0.00480	0.00442	0.00365	0.00499	0.00461	0.00403	0.00403
Acute Toxicity HP6	≥15%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥55%	<1%	0.00009	0.00005	0.00005	0.00006	0.00005	0.00005	0.00007	0.00006	0.00005
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.5%	<0.1%	0.00952	0.00544	0.00487	0.00449	0.00372	0.00506	0.00470	0.00411	0.00410
Acute Toxicity HP6	≥3.5%	<0.1%	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014
Acute Toxicity HP6	≥22.5%	<1%	0.01051	0.00551	0.00595	0.00689	0.00668	0.00580	0.00886	0.00983	0.00912
Carcinogenic HP7	≥0.1%		0.00941	0.00538	0.00480	0.00442	0.00365	0.00499	0.00461	0.00560	0.00520
Carcinogenic HP7	≥0.1%		0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000
Carcinogenic HP7	≥1%		0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00001	0.00001	0.00000
Carcinogenic HP7 Unknown TPH with ID	≥1,000mg/kg		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carcinogenic HP7 b(a)p marker test (Unknown TPH with ID only) Cell only applicable if TPH >1,000mg/kg	≥0.01%		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
pH Corrosive HP8 pH (soil or leachate)	H8 ≥11.5		7.86	6.88	6.67	6.64	6.40	6.98	5.91	5.97	5.79
pH Corrosive HP8 pH (soil or leachate)	H8 ≤2		7.86	6.88	6.67	6.64	6.40	6.98	5.91	5.97	5.79
Toxic for Reproduction HP10	≥0.3%		0.00545	0.00222	0.00242	0.00300	0.00350	0.00283	0.00384	0.00560	0.00520
Toxic for Reproduction HP10	≥3%		0.00941	0.00538	0.00480	0.00442	0.00365	0.00499	0.00461	0.00403	0.00403
Mutagenic HP11	≥0.1%		0.00941	0.00538	0.00480	0.00442	0.00365	0.00499	0.00461	0.00403	0.00403
Mutagenic HP11 Unknown TPH with ID	≥1,000mg/kg		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mutagenic HP11 b(a)p marker test (Unknown TPH with ID only) Cell only applicable if TPH >1,000mg/kg	≥0.01%		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Mutagenic HP11	≥1%		0.00545	0.00222	0.00242	0.00242	0.00182	0.00283	0.00384	0.00242	0.00222
Produces Toxic Gases HP12 Sulphide	≥1,400mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Cyanide	≥1,200mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Thiocyanate	≥2,600mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP13 Sensitising	≥10%		0.00941	0.00538	0.00480	0.00442	0.00365	0.00499	0.00461	0.00403	0.00403

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If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

Haswaste, developed by Dr. Iain Haslock.

Ref. 1			FP101	BH101	BH101	BH102	WS101	WS101	WS102	WS103	WS104
Ref. 2			0.25	0.40	0.80	0.40	0.25	0.50	0.40	0.00	0.00
Date			27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21
Ecotoxic HP14 amended v6	≥25%	<0.1%	0.02898	0.01880	0.01869	0.01836	0.01755	0.01737	0.02212	0.02197	0.02595
Ecotoxic HP14 amended v6	≥25%	<0.1% (except Be, V, Te, Tl, Petrol, Diesel, Crude Oil, Kerosene, White Spirit, Crosote, TPH, TPHCWG, Phenol, Cresols, Xylenols, T-Phenols, CompCN, Thiocyanate, Toluene, Ethylbenzene, Xylene + BTEX 1%).	0.02908	0.01890	0.01879	0.01856	0.01826	0.01747	0.02232	0.02307	0.02605
Ecotoxic HP14 amended v6	≥25%	<0.1% (except Be, V, Te, Tl, Petrol, Diesel, Crude Oil, Kerosene, White Spirit, Crosote, TPH, TPHCWG, Phenol, Cresols, Xylenols, T-Phenols, CompCN, Thiocyanate, Toluene, Ethylbenzene, Xylene + BTEX 1%).	2.89880	1.88050	1.86980	1.83780	1.76240	1.73800	2.21370	2.20760	2.59620
Persistent Organic Pollutant (PCB, PBB or POP Pesticides)	>0.005%		0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Persistent Organic Pollutant (Total Dioxins+Furans)	>0.0000015%		0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000
Persistent Organic Pollutant (Individual Dioxins+Furans)	>0.0000015%		0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000

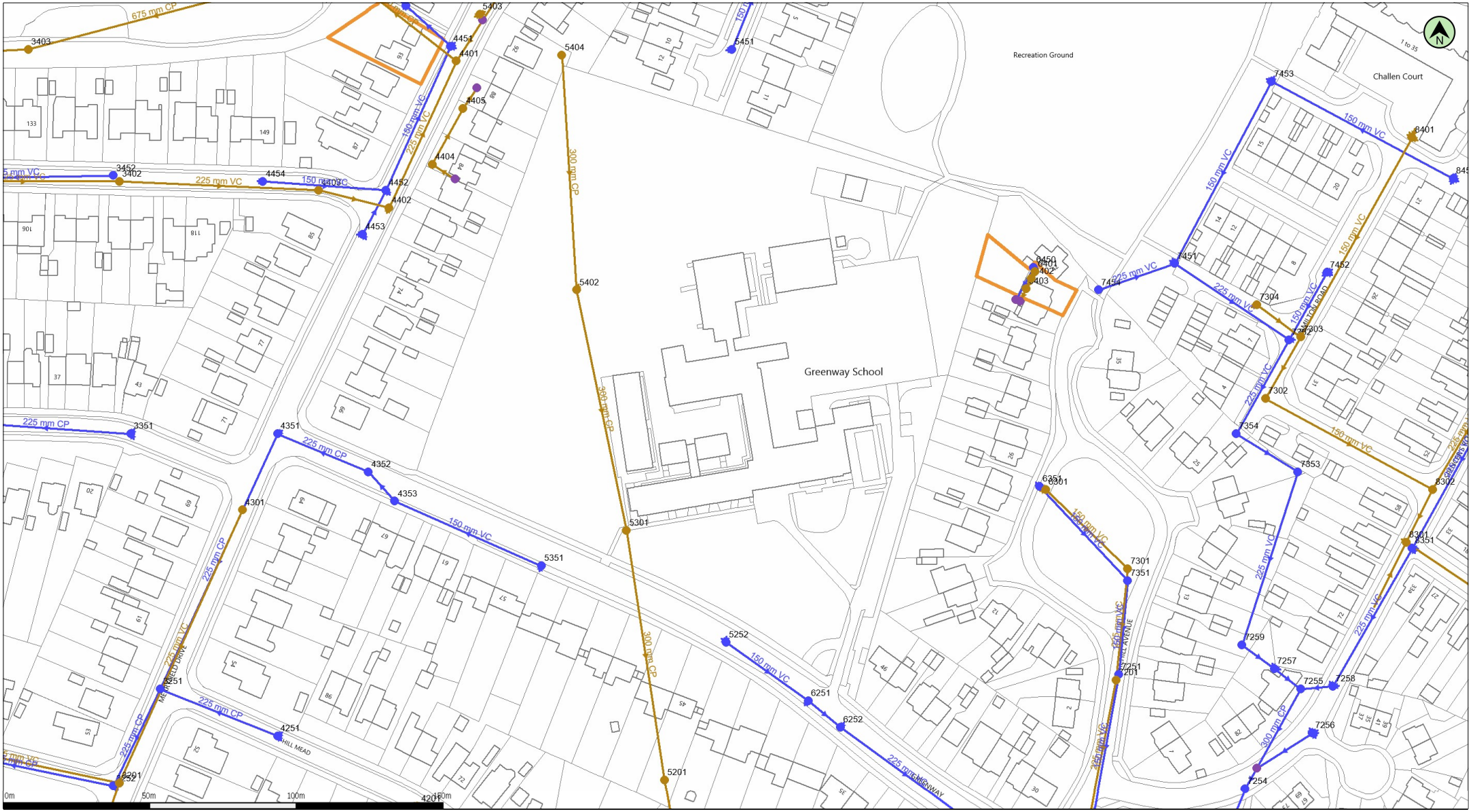


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Appendix 5

Southern Water Records

3.1 SRP1029 Southern Water - Wastewater



(c) Crown copyright and database rights 2021 Ordnance Survey 100031673 | Date: 16/06/21 | Scale: 1:1250 | Map Centre: 516589,131363 | Data updated: 17/05/21 | Our Ref: 579879 - 5 | Wastewater Plan A3

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2021 Ordnance Survey 100031673 .This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

Foul Gravity Sewer
Combined Gravity Sewer
Culverted Water Course or Treated Effluent
Surface Water Gravity Sewer
Rising Main, Vacuum or Syphon
Combined Outfall
Surface Water Outfall
Foul Outfall
Surface Water Inlet
Combined Pumping Station
Surface Water Pumping Station
Foul Pumping Station
Water Treatment Works
Section 104 Area
Building Over Agreement Area
Foul Manhole
Combined Manhole
Surface Water Manhole
Side Entry Manhole, Decarcation Chamber, Dummy Manhole or Surface Water Soakaway

melsom@rsk.co.uk

2190563 Greenway

WATER for LIFE from Southern Water.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
3201	F	40.02	38.20	
3402	F	39.36	34.86	
3403	F	37.22	33.24	
4201	F	42.05	39.45	
4301	F	40.49	39.26	
4401	F	38.17	33.86	
4402	F	39.63	34.55	
4403	F	39.58	34.67	
4404	F	0.00	0.00	
4405	F	0.00	0.00	
5201	F	42.72	33.09	
5301	F	43.84	33.39	10.45
5402	F	41.46	33.68	7.78
5403	F	38.16	34.24	
5404	F	0.00	0.00	
6301	F	42.95	40.92	
6401	F	0.00	0.00	
6402	F	0.00	0.00	
6403	F	0.00	0.00	
7201	F	41.16	38.99	
7301	F	41.87	39.58	
7302	F	42.74	41.41	
7303	F	43.24	41.67	
7304	F	43.13	41.84	
8301	F	41.70	40.52	
8302	F	41.89	40.71	
8401	F	44.38	42.34	
3251	S	40.03	38.36	
3252	S	40.02	37.90	
3351	S	40.44	38.68	
3452	S	39.31	37.83	
4251	S	40.28	38.80	
4351	S	40.84	39.20	
4352	S	41.49	40.13	
4353	S	41.86	40.67	1.19
4451	S	38.08	36.37	
4452	S	39.53	37.70	
4453	S	39.97	38.09	
4454	S	39.58	38.18	
4455	S	37.93	35.26	
5252	S	42.86	41.04	1.82
5351	S	43.34	42.07	1.27
5451	S	41.05	40.30	
6251	S	42.19	40.55	1.64
6252	S	41.98	39.92	
6351	S	42.96	41.17	
6450	S	0.00	0.00	
7251	S	41.20	39.29	
7254	S	40.49	38.60	
7255	S	40.81	39.26	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
7256	S	40.36	39.68	
7257	S	40.75	39.42	
7258	S	40.72	40.00	
7259	S	41.05	39.71	
7351	S	41.86	39.84	
7352	S	43.14	40.86	
7353	S	42.14	40.47	
7354	S	0.00	0.00	
7451	S	42.89	41.09	
7452	S	43.72	41.18	
7453	S	43.53	41.74	
7454	S	0.00	0.00	
8351	S	41.63	40.57	
8451	S	43.75	42.30	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert



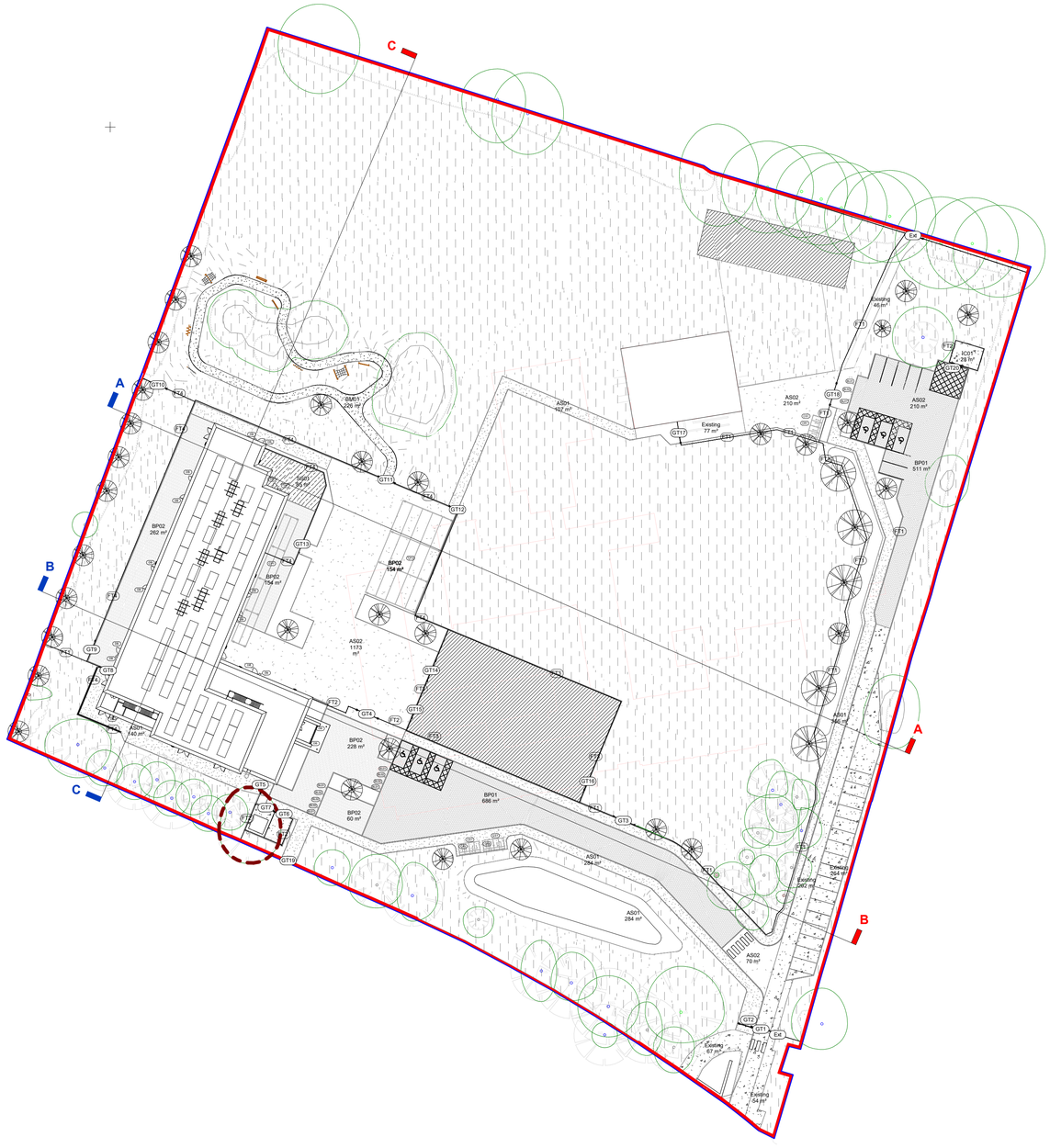
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Appendix 6

Development Masterplan

SRP1029-LLB-00-EX-D-L-0018

Appendix



LEGEND

AS01 — Permeable Asphalt Concrete Paving
Grade: Pedestrian
Colour: Grey
NBS: Q22.115

AS02 — Asphalt Concrete Paving
Grade: Vehicular
Colour: Grey
NBS: Q22.110

AS03 — Proprietary Porous Asphalt Surface
Product: Contractors Choice
Wearing Course:20mm
Colour: Black
NBS: Q22.127

IC01 — In-Situ Concrete Surfacing
Product: Contractors Choice
Colour: Grey
Finish: Brush and Band
NBS: Q21.115

BP01 — Permeable Concrete Block Paving
Product: Tobermore Hydropave Fusion
Size: 208/173 x 173 x 80mm
Colour: Graphite, Mid Grey & Silver
NBS: Q24.115B

BP02 — Permeable Concrete Block Paving
Product: Tobermore Hydropave 240
Size: 240x120x80mm
Colour: Charcoal
NBS: Q24.115A

SS01 — EPDM Rubber Crumb Surfacing
Product: GCL Permabond Wet Pour Rubber
Grade: 1-4mm
Depth: 40mm
Colour: Assorted
NBS: Q23.225

BL01 — Street Furniture - Steel Bollard
Product: Broxap Heavy Duty Economy Bollard
Size: 168mm Dia. x 1300mm
Fixing: Root Fixed
Colour: PPC Anthracite Grey RAL 7016
Options: White Reflective Band
NBS: Q50.196

BL02 — Street Furniture - Steel Bollard
Product: Broxap Heavy Duty Economy Bollard
Size: 168mm Dia. x 1300mm
Fixing: Removable
Colour: PPC Anthracite Grey RAL 7016
Options: White Reflective Band
NBS: Q50.196

CR — Street Furniture - Cycle Rack
Product: Broxap Senior Sheffield Cycle Rack
Size: 5 Hoops
Finish: Galvanised Steel
Fixing: Surface base plates
NBS: Q50.210

CS1 — Street Furniture - Cycle Shelter
Product: Broxap Sheffield Cycle Shelter
Size: 1800 x 2400 x 2150mm
Finish: Galvanized
Covering: 5 mm PETg UV ClearView
NBS: B91.340

D8 — Street Furniture - Door Barrier
Product: Broxap Door Barrier
Size: 450 x 1320mm
Finish: PPC Anthracite Grey RAL 7016
Fixing: Root Fixed Buffers
NBS: Q50.170

CP1 — External Canopy - People Shelter
Product: Broxap Newcastle Monopitch Canopy
Size: 19500 x 10500 x 3000mm
Finish: Mild Steel, RPC Anthracite Grey
Roof Covering: 16mm Polycarbonate panels
Accessories: PostPads, uPVC guttering & downpipes
NBS: B91.330 - Type A

CP2 — External Canopy - People Shelter
Product: Broxap Newcastle Monopitch Canopy
Size: 19500 x 10500 x 3000mm
Finish: Mild Steel, ppc Anthracite Grey
Roof Covering: 16mm Polycarbonate panels
Accessories: PostPads, uPVC guttering & downpipes
NBS: B91.330 - Type B

FT1 — Fence Type 1- Metal Mesh Panel Fencing
Product: Protek 868
Mesh Size: 200 x 45 x 5mm
Height: 2400mm
Finish: PPC Green RAL 6005
NBS: Q40.125 - Type A

FT2 — Fence Type 2- Metal Mesh & Timber Panel Fencing
Product: Protek 2000 Privacy
Mesh Size: 200 x 45 x 5mm
Timber: 40 x57mm treated softwood slats
Height: 2400mm
Finish: PPC Green RAL 6005
NBS: Q40.430

FT3 — Fence Type 3- Metal Mesh Panel Sports Fencing
Product: Protek 868 Rebound
Mesh Size: 200 x 45 x 5mm
Height: 3020mm
Finish: PPC Green RAL 6005
NBS: Q40.125 - Type B

FT4 — Fence Type 4- Steel Vertical Bar Fencing
Product: Paysafe RCSPA Fencing - Flat Top
Rails: 40 x 8mm Flat Bar
Bars: 12mm dia. solid bar, with 89mm gaps
Height: 1200mm
Finish: PCC Green RAL 6005
NBS: Q40.340

GT1 — Gate Type 1 - Metal Weld Mesh Gate
Product: Protek 1000 V-Mesh
Size: (Double) 3600mm Clear Opening x 2400mm High
Finish: PPCGreen RAL 6005
Access: Automated with Intercom.
Other: Fire Tender manual override
NBS: Q40.570 - Type A

GT2 — Gate Type 2 - Metal Weld Mesh Gate
Product: Protek 1000 V-Mesh
Size: (Double) 2400mm Clear Opening x 2400mm High
Finish: PCC Green RAL 6005
Access: Automated with Intercom and Mag Lock.
NBS: Q40.570 - Type B

GT3 — Gate Type 3 - Metal Weld Mesh Gate
Product: Protek 1000 V-Mesh
Size: (Double) 4000mm Clear Opening x 2400mm High
Finish: PPC Green RAL 6005
Access: Manual,Sliding latch, padlock and drop bolts
NBS: Q40.570 - Type C

GT4 — Gate Type 4 - Metal Weld Mesh and Timber Gate
Product: Protek 3000 Privacy
Size: (Double) 4000mm Clear Opening x 2400mm High
Finish: PPC Green RAL 6005
Access: Manual,Sliding latch, padlock and drop bolts
NBS: Q40.570 - Type D

GT5 — Gate Type 5 - Metal Weld Mesh Sports Gate
Product: Protek 1000 V-Mesh
Size: (Single) 1800mm Clear Opening x 2400mm High
Finish: PPC Green RAL 6005
Access: Manual,Sliding latch, padlock and drop bolts
NBS: Q40.570 - Type E

GT6 — Gate Type 6 - Metal Weld Mesh Sports Gate
Product: Protek 1000 V-Mesh
Size: (Double) 3600mm Clear Opening x 2400mm High
Finish: PPC Green RAL 6005
Access: Manual,Sliding latch, padlock and drop bolts
NBS: Q40.570 - Type F

GT7 — Gate Type 7 - Steel Vertical Bar Gate
Product: Protek 1000 V-Mesh
Size: (Single) 1800mm Clear Opening x 2400mm High
Finish: PPC Green RAL 6005
Access: Manual,Sliding latch, padlock and drop bolts
NBS: Q40.570 - Type G

GT8 — Gate Type 8 - Metal Weld Mesh Gate
Product: Protek 1000 V-Mesh
Size: (Single) 1800mm Clear Opening x 2400mm High
Finish: PPC Green RAL 6005
Access: Manual,Sliding latch, padlock and drop bolts
Other: Mag Lock with auto release on Fire Alarm
NBS: Q40.570 - Type H

GT9 — Gate Type 9 - Steel Vertical Bar Gate
Product: Fastline - RoSPA Playsafe Gate
Size: (Single) 1600mm Clear Opening x 1200mm High
Finish: PCC Green RAL 6005
Access: Manual, sliding latch, self closing
NBS: Q40.570 - Type I

GT10 — Gate Type 10 - Steel Vertical Bar Gate
Product: Fastline - RoSPA Playsafe Gate
Size: (Single) 1600mm Clear Opening x 1200mm High
Finish: PCC Green RAL 6005
Access: Manual, sliding latch, self closing
NBS: Q40.570 - Type J

GT11 — Gate Type 11 - Steel Vertical Bar Gate
Product: Fastline - RoSPA Playsafe Gate
Size: (Double) 3200mm Clear Opening x 1200mm High
Finish: PCC Green RAL 6005
Access: Manual, sliding latch, self closing
NBS: Q40.570 - Type K

GT12 — Gate Type 12 - Steel Vertical Bar Gate
Product: Fastline - RoSPA Playsafe Gate
Size: (Double) 2400mm Clear Opening x 1200mm High
Finish: PCC Green RAL 6005
Access: Manual, sliding latch, self closing
NBS: Q40.570 - Type L

GT13 — Gate Type 13 -Steel Vertical Bar Gate
Product: Fastline - RoSPA Playsafe Gate
Size: (Single) 1600mm Clear Opening x 1200mm High
Finish: PCC Green RAL 6005
Access: Manual, sliding latch, self closing
NBS: Q40.570 - Type M

GT14 — Gate Type 14 - Metal Weld Sports Mesh Gate
Product: Protek 868 Rebound
Size: (Double) 4000mm Clear Opening x 3000mm High
Finish: PPC Green RAL 6005
Access: Manual, sliding latch, padlock and drop bolts
NBS: Q40.570 - Type N

GT15 — Gate Type 15 - Metal Weld Sports Mesh Gate
Product: Protek 868 Rebound
Size: (Double) 4000mm Clear Opening x 3000mm High
Finish: PPC Green RAL 6005
Access: Manual, sliding latch, and padlock
NBS: Q40.570 - Type O

GT16 — Gate Type 16 - Metal Weld Sports Mesh Gate
Product: Protek 868 Rebound
Size: (Single) 1400mm Clear Opening x 3000mm High
Finish: PPC Green RAL 6005
Access: Manual, sliding latch, and padlock
NBS: Q40.570 - Type P

GT17 — Gate Type 17 - Metal Weld Mesh Gate
Product: Protek 1000 V-Mesh
Size: (Single) 1800mm Clear Opening x 2400mm High
Finish: PPC Green RAL 6005
Access: Manual,Sliding latch, padlock and drop bolts
NBS: Q40.570 - Type Q

GT18 — Gate Type 18 - Metal Weld Mesh Gate
Product: Protek 1000 V-Mesh
Size: (Double) 4000mm Clear Opening x 2400mm High
Finish: PPC Green RAL 6005
Access: Manual,Sliding latch, padlock and drop bolts
NBS: Q40.570 - Type R

GT19 — Gate Type 19 - Metal Weld Mesh Gate
Product: Protek 1000 V-Mesh
Size: (Double) 2400mm Clear Opening x 2400mm High
Finish: PPC Green RAL 6005
Access: Automated with intercom and Mag Lock
NBS: Q40.570 - Type S

GT20 — Gate Type 20 - Metal Weld Mesh Gate
Product: Protek 1000 V-Mesh
Size: (Single) 1800mm Clear Opening x 2400mm High
Finish: PPC Green RAL 6005
Access: Manual,Sliding latch, padlock and drop bolts
NBS: Q40.570 - Type T

N

0 25 50 m

Purpose:
RIBA Stage 3: Spatial Coordination

Rev:	Notes	Drw:	Date:
P01	Initial issue	AC	15/11/2025

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Client:
Morgan Sindall

Project:
Greenway Junior School

Title:
Landscape General Arrangement Plan

Scale:		Drawn:	Date:
As indicated	@A1	AC	01/12/25
Project Number:		**Drawing Number:**	
SRP1029		SRP1029-LLB-00-EX-D-L-0018 - P01	



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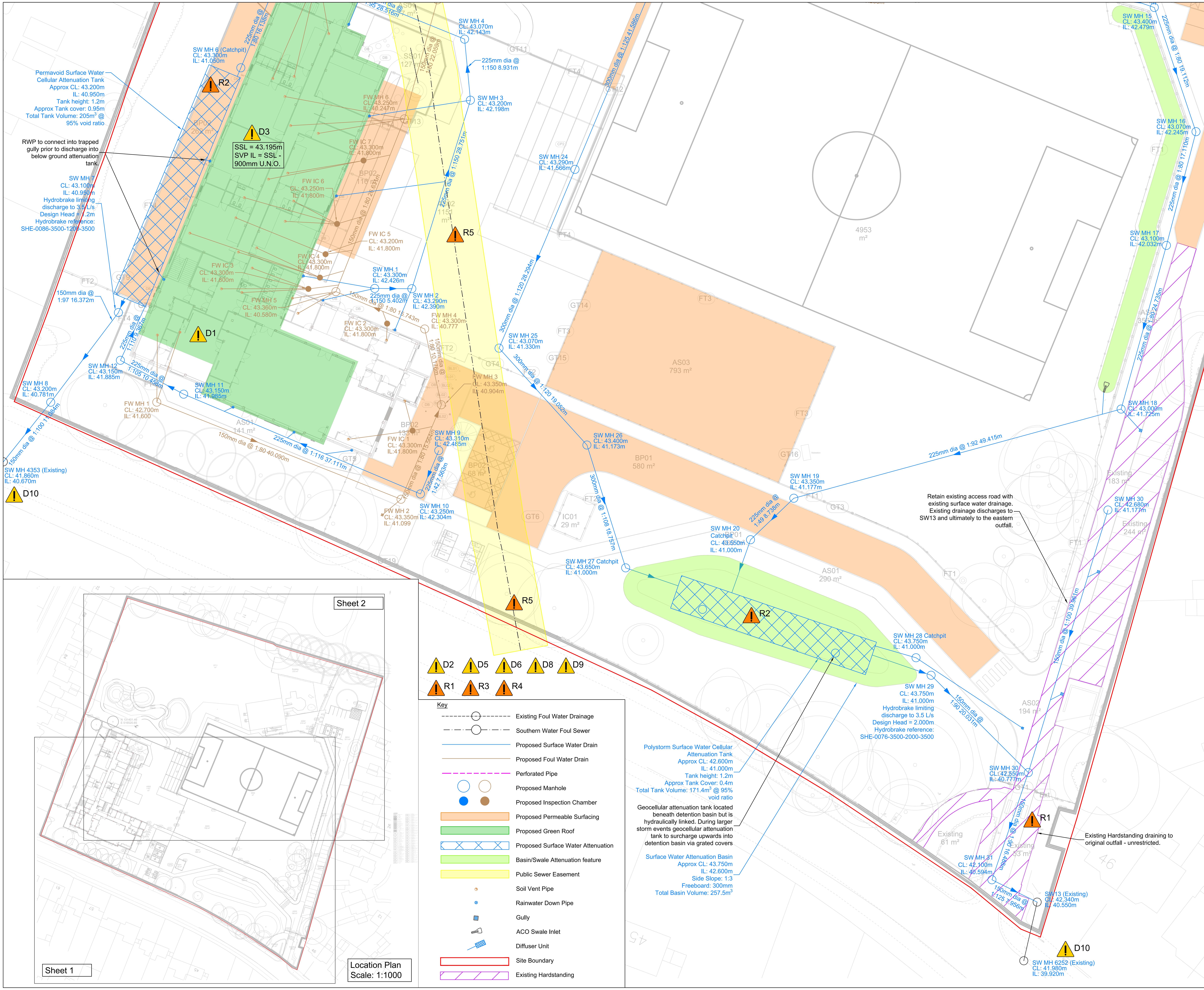
Appendix 7

Drainage Strategy

SRP1029-CRH-00-EX-D-C-5500
SRP1029-CRH-00-EX-D-C-5500

Appendix

C:\Users\andrewhall\Downloads\SRP1029-CRH-00-EX-D-C-5500-5501-P02_Drainage Layout WIP S73.dwg



Notes

1. Do not scale from this drawing on print or electronically. Work from figured dimensions only.
2. No deviation from the details on this drawing is allowed without CampbellReith's prior permission in writing.
3. Read this drawing with all Architect's, Service Engineer's and CampbellReith's relevant details, specifications and drawings.
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5. Drawing revision:
   P: Preliminary Evolving drawings for approvals, tenders, billings etc.
   C: Contractual Drawings authorized and approved for stage completion.
6. Drawing status:
   Work in progress
   S0 - Initial status
   Shared (Non-contractual)
   S1 - Suitable for coordination, **S2** - Suitable for information, **S3** - Suitable for review and comment, **S4** - Suitable for stage approval.
   Published (For contractors purposes)
   A1, **An** etc - Authorised and accepted ('n' relates to work stages)
   B1, **Bn** etc - Partial sign-off (with comments)
   CR - As constructed record document (Final Construction ONLY. Any deviations to that which is on site is not the liability of CampbellReith)
7. Work Stages:
   2 - Concept, **3** - Definition, **4** - Design, **5** - Build & commission, **6** - Handover
8. Only drawings with **revision Cn and status A5 to be used for Construction**.
9. Proposed Landscape Masterplan based on SRP1029-LLB-00-EX-D-L-0016_Landscape General Arrangement Plan_S3 - For Review & Comment_P02_0 received from LLOYDBORE LANDSCAPE ECOLOGY ARBORICULTURE 25/06/2026 in CAD format.
10. Proposed Architectural layout based on SRP1029-ECE-XX-00-D-A-0100 received 13/03/13 from ECE ARCHITECTS in CAD format.
11. All existing topographical survey information shown or referred to is based upon topographical survey (ref. SRP1029-SVS-XX-XX-D-Y-0001) prepared by SUBVISION SURVEYS in Mar 2026 - no warranty as to the accuracy of the information is given or implied.
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16. Surface water drainage system has been designed to prevent at surface flooding for all events up to and including the 1:30 year plus 40% CC event and to prevent off site flooding for all events up to and including 1:100 year plus 45% CC event.
17. External rainwater pipes are to be roddable above ground. All SVPs to have rodding plates at ground floor level.
18. U.N.O. SVP and floor gully connections have IL of 42.295m and all RWP connection IL's are 42.595m.
19. At least one soil pipe at the head of each run shall vent to the atmosphere.
20. All SVPs have been positioned manually. Any setting out should be undertaken using Architects and MEP drawings.
21. Refer to Design Risk Register ref. SRP1029-CRH-XX-XX-T-C-0003 for reference. D1
22. Refer to Designers Risk Assessment ref. SRP1029-CRH-XX-XX-T-C-0002 for reference. R1

Rev	Description	Date	By
P03	Interim Submission	26/06/26	AH
P02	For Information Exchange 3	17/04/26	YL
P01	For Information Exchange 3	07/04/26	AH

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Bristol	0117 916 1066 ☐	☐ Birmingham	01675 467 484

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Job Title: Greenway School

Client: Morgan Sindall Construction

Drainage Strategy (Sheet 1 of 2)

Drawn by	Date made	Scale @ A1	Checked by	Suitability	CR Project
AH	26/06/26	1:250	LM	-	14500

Project No	Orig.	Funct.	Spatial	Form	Disc.	Number	Rev
SRP1029	CRH	00	XX	D	C	5500	P03

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Key

- Existing Foul Water Drainage
- Southern Water Foul Sewer
- Proposed Surface Water Drain
- Proposed Foul Water Drain
- Perforated Pipe
- Proposed Manhole
- Proposed Inspection Chamber
- Proposed Permeable Surfacing
- Proposed Green Roof
- Proposed Surface Water Attenuation
- Basin/Swale Attenuation feature
- Public Sewer Easement
- Soil Vent Pipe
- Rainwater Down Pipe
- Gully
- ACO Swale Inlet
- Diffuser Unit
- Site Boundary
- Existing Hardstanding

D2 D5 D6 D8 D9
R1 R3 R4

EX FW 29
CL: 41.490m
IL: 34.250m
EX FW 28
CL: 41.560m
IL: 39.850m
EX FW 27
CL: 41.570m
IL: 39.870m
FW MH 5402
CL: 41.460m
IL: 33.690m
Existing Southern Water Foul Sewer
EX FW 34
CL: 41.510m
IL: 41.030m
D4
SW MH 23
CL: 42.900m
IL: 41.898m
300mm dia @ 1:100 23.165m
SW MH 22
CL: 43.200m
IL: 42.127m
Existing FW drainage from Nursery building to connect into new FW sewer constructed following demolition of existing buildings
AS01
150m² 150mm dia @ 1:60 32.991m
D4
FW MH 9
CL: 43.200m
IL: 41.578m
150mm dia @ 1:60 9.285m
EX/PRP FW 18
CL: 43.360m
IL: 41.733m
150mm dia @ 1:54 20.742m
AS02
FW MH 10
CL: 43.300m
IL: 42.117m
SW MH 14
CL: 43.450m
IL: 42.546m
225mm dia @ 1:80 5.024m
SW MH 15
CL: 43.400m
IL: 42.479m
225mm dia @ 1:80 19.112m
SW MH 16
CL: 43.070m
IL: 42.245m
225mm dia @ 1:80 17.110m
SW MH 17
CL: 43.100m
IL: 42.032m
225mm dia @ 1:80 24.135m
SW MH 18
CL: 43.000m
IL: 41.832m
150mm dia @ 1:50 30.625m
SW MH 13
CL: 44.000m
IL: 43.250m
SW MH 21
CL: 43.800m
IL: 43.050m
150mm dia @ 1:50 30.625m
150mm dia @ 1:56 23.340m
150mm dia @ 1:50 36.635m
Gully has 750mm of cover
IC01
28 m²
BP01
511 m²
Existing
272 m²
Existing
46 m²
4953 m²
AS03
793 m²
FW MH 5402
CL: 41.460m
IL: 33.690m
Existing Southern Water Foul Sewer
FW MH 8
CL: 43.300m
IL: 39.912m
150mm dia @ 1:80 4.750m
FW MH 7
CL: 43.250m
IL: 39.971m
SW MH 4
CL: 43.070m
IL: 42.143m
225mm dia @ 1:150 8.931m
SW MH 3
CL: 43.200m
IL: 42.198m
150mm dia @ 1:150 22.059m
225mm dia @ 1:150 28.751m
SW MH 24
CL: 43.290m
IL: 41.566m
300mm dia @ 1:125 41.588m
300mm dia @ 1:120 28.234m
SW MH 25
CL: 43.070m
IL: 41.330m
300mm dia @ 1:120 19.052m
FW MH 3
CL: 43.350m
IL: 40.904m
SW MH 5
CL: 43.000m
IL: 41.843m
FW IC 8
CL: 43.300m
IL: 41.800m
150mm dia @ 1:10 17.820m
225mm dia @ 1:95 28.516m
225mm dia @ 1:80 15.138m
FW MH 6 (Catchpit)
CL: 43.300m
IL: 41.050m
R2
FW MH 6
CL: 43.250m
IL: 40.247m
D3
SSL = 43.195m
SVP IL = SSL - 900mm U.N.O.
FW IC 7
CL: 43.300m
IL: 41.800m
FW IC 6
CL: 43.250m
IL: 41.800m
150mm dia @ 1:80 26.653m
FW IC 5
CL: 43.200m
IL: 41.800m
R5
FW IC 4
CL: 43.300m
IL: 41.800m
FW IC 3
CL: 43.300m
IL: 41.800m
SW MH 1
CL: 43.300m
IL: 42.426m
225mm dia @ 1:50 5.402m
SW MH 2
CL: 43.290m
IL: 42.390m
150mm dia @ 1:80 15.743m
FW MH 4
CL: 43.300m
IL: 40.777
FW IC 2
CL: 43.300m
IL: 41.800m
FW MH 5
CL: 43.360m
IL: 40.560m
D1
FW MH 11
CL: 43.150m
IL: 41.085m
150mm dia @ 1:80 10.170m
SS01
127 m²
SS02
115 m²
BP02
116 m²
GT10 GT4 GT11 GT12 GT13 GT14 GT15 GT16 GT17 GT18 GT20 GT21
FT1 FT2 FT3 FT4
CR1 CR2
DB1 DB2 DB3 DB4 DB5 DB6 DB7 DB8
BLD1 BLD2 BLD3 BLD4 BLD5 BLD6 BLD7 BLD8

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8. Only drawings with **revision Cn and status A5 to be used for Construction**.
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22. Refer to Designers Risk Assessment ref. SRP1029-CRH-XX-XX-T-C-0002 for reference.

D1
R1

Rev	Description	Date	By
P03	Interim Submission	26/06/26	AH
P02	For Information Exchange 3	17/04/26	YL
P01	For Information Exchange 3	07/04/26	AH

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Job Title: Greenway School

Client: Morgan Sindall Construction

Drainage Strategy (Sheet 2 of 2)

Drawn by	Date made	Scale @ A1	Checked by	Suitability	CR Project
AH	26/06/26	1:250	LM	-	14500

Project No	Orig.	Funct.	Spatial	Form	Disc.	Number	Rev
SRP1029	CRH	00	XX	D	C	5501	P03

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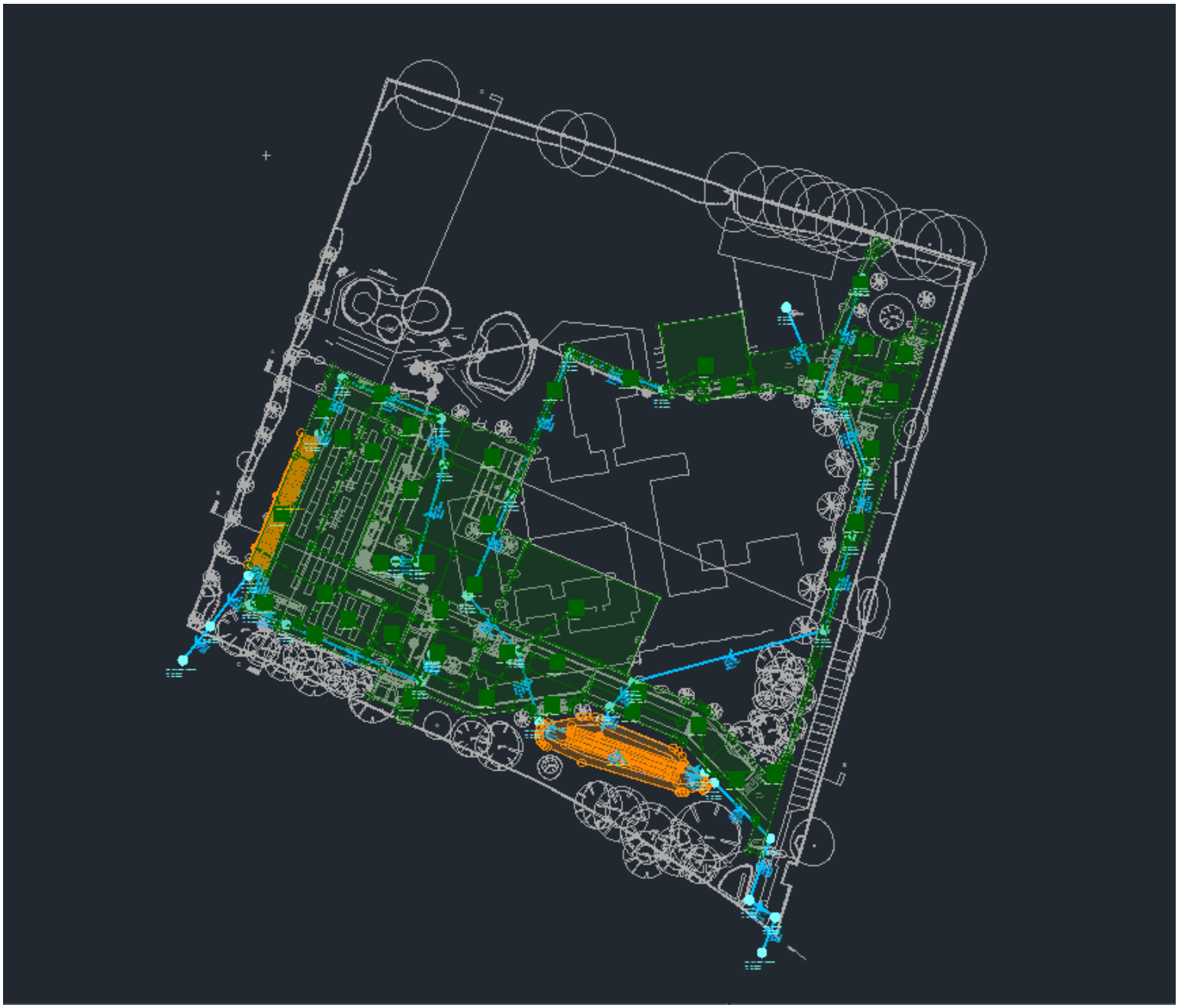


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Appendix 8

Calculations

14500-CRH-XX-XX-CA-C-0004
InfoDrainage Calculation Output





Greenroof 1

Type : Catchment Area

Area (ha)	0.034

Dynamic Sizing

Runoff Method	Green Roof
Summer Volumetric Runoff Coefficient	1.000
Winter Volumetric Runoff Coefficient	1.000
Depression Storage (mm)	100
Evapotranspiration (mm/day)	3.0
Decay Coefficiency	0.050
Time Delay (mins)	120



Greenroof 3

Type : Catchment Area

Area (ha)	0.03

Dynamic Sizing

Runoff Method	Green Roof
Summer Volumetric Runoff Coefficient	1.000
Winter Volumetric Runoff Coefficient	1.000
Depression Storage (mm)	100
Evapotranspiration (mm/day)	3.0
Decay Coefficiency	0.050
Time Delay (mins)	120



Hardstanding 19

Type : Catchment Area

Area (ha)	0.006

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Hardstanding 17

Type : Catchment Area

Area (ha)	0.008

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Hardstanding 18

Type : Catchment Area

Area (ha)	0.005

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Hardstanding 3

Type : Catchment Area

Area (ha)	0.007

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Hardstanding 4

Type : Catchment Area

Area (ha)	0.018

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Hardstanding 6 Type : Catchment Area

Area (ha)	0.027

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Hardstanding 8 Type : Catchment Area

Area (ha)	0.027

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Hardstanding 5 Type : Catchment Area

Area (ha)	0.021

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Hardstanding 7 Type : Catchment Area

Area (ha)	0.044

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Hardstanding 9

Type : Catchment Area

Area (ha)	0.011

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Hardstanding 10

Type : Catchment Area

Area (ha)	0.019

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Hardstanding 11

Type : Catchment Area

Area (ha)	0.017

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Roof 5

Type : Catchment Area

Area (ha)	0.008

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Hardstanding 14 Type : Catchment Area

Area (ha)	0.007

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Hardstanding 15 Type : Catchment Area

Area (ha)	0.005

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Hardstanding 2 Type : Catchment Area

Area (ha)	0.011

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Hardstanding 13 Type : Catchment Area

Area (ha)	0.02

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Acess Road 1

Type : Catchment Area

Area (ha)	0.016

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Acess Road 2

Type : Catchment Area

Area (ha)	0.012

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Acess Road 3

Type : Catchment Area

Area (ha)	0.013

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Acess Road 4

Type : Catchment Area

Area (ha)	0.013

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Acess Road 5

Type : Catchment Area

Area (ha)	0.014

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Acess Road 6

Type : Catchment Area

Area (ha)	0.011

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Acess Road 7

Type : Catchment Area

Area (ha)	0.013

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Acess Road 8

Type : Catchment Area

Area (ha)	0.013

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Acess Road 9

Type : Catchment Area

Area (ha)	0.015

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Acess Road 10

Type : Catchment Area

Area (ha)	0.007

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Acess Road 11

Type : Catchment Area

Area (ha)	0.01

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Acess Road 12

Type : Catchment Area

Area (ha)	0.02

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Acess Road 15

Type : Catchment Area

Area (ha)	0.009

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Acess Road 13

Type : Catchment Area

Area (ha)	0.007

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Acess Road 14

Type : Catchment Area

Area (ha)	0.011

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Acess Road 16

Type : Catchment Area

Area (ha)	0.01

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Acess Road 17

Type : Catchment Area

Area (ha)	0.026

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Hardstanding 1

Type : Catchment Area

Area (ha)	0.015

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Greenroof 2

Type : Catchment Area

Area (ha)	0.038

Dynamic Sizing

Runoff Method	Green Roof
Summer Volumetric Runoff Coefficient	1.000
Winter Volumetric Runoff Coefficient	1.000
Depression Storage (mm)	100
Evapotranspiration (mm/day)	3.0
Decay Coefficiency	0.050
Time Delay (mins)	120



Greenroof 4

Type : Catchment Area

Area (ha)	0.019

Dynamic Sizing

Runoff Method	Green Roof
Summer Volumetric Runoff Coefficient	1.000
Winter Volumetric Runoff Coefficient	1.000
Depression Storage (mm)	100
Evapotranspiration (mm/day)	3.0
Decay Coefficiency	0.050
Time Delay (mins)	120



Hardstanding 12

Type : Catchment Area

Area (ha)	0.022

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Nursery

Type : Catchment Area

Area (ha)	0.033

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



MUGA

Type : Catchment Area

Area (ha)	0.075

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Hardstanding 16

Type : Catchment Area

Area (ha)	0.005

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Greenway Primary School:	Date: 15/04/2026			CampbellReith consulting engineers
	Designed by: YL/HJ/AH	Checked by: LM	Approved By: LM	
Report Details: Type: Junctions Storm Phase: Phase	CampbellReith:			

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Sump Depth (m)	Chamber Shape
SW MH 13	Manhole	516653.499	131428.955	44.000	0.750	43.250	0.000	Circular
SW MH 21	Manhole	516634.097	131421.659	43.800	0.750	43.050	0.000	Circular
SW MH 14	Manhole	516643.435	131399.353	43.450	0.904	42.546	0.000	Circular
SW MH 15	Manhole	516648.494	131397.678	43.400	0.921	42.479	0.000	Circular
SW MH 16	Manhole	516654.609	131379.972	43.070	0.825	42.245	0.000	Circular
SW MH 17	Manhole	516650.680	131363.360	43.100	1.068	42.032	0.000	Circular
SW MH 18	Manhole	516643.833	131339.756	43.000	1.275	41.725	0.000	Circular
SW MH 19	Manhole	516595.208	131326.440	43.350	2.173	41.177	0.000	Circular
SW MH 20 Catchpit	Manhole	516589.237	131320.106	43.550	2.550	41.000	0.000	Circular
SW MH 28 Catchpit	Manhole	516613.617	131303.451	43.000	2.000	41.000	0.000	Circular
SW MH 29	Manhole	516615.816	131300.899	43.750	2.750	41.000	0.000	Circular
SW MH 30	Manhole	516629.976	131286.731	42.550	1.773	40.777	0.000	Circular
SW13 (Existing)	Manhole	516631.305	131266.713	42.230	1.700	40.530	0.000	Circular
SW MH 6252 (Existing)	Manhole	516627.926	131257.684	41.980	2.060	39.920	0.000	Circular
SW MH 22	Manhole	516602.704	131400.663	43.070	0.929	42.141	0.000	Circular
SW MH 23	Manhole	516579.169	131410.072	43.070	1.182	41.888	0.000	Circular
SW MH 24	Manhole	516564.280	131374.458	43.290	1.724	41.566	0.000	Circular
SW MH 25	Manhole	516553.136	131348.451	43.070	1.740	41.330	0.000	Circular
SW MH 26	Manhole	516565.678	131334.428	43.400	2.227	41.173	0.000	Circular
SW MH 27 Catchpit	Manhole	516571.325	131316.541	43.650	2.650	41.000	0.000	Circular
SW MH 2	Manhole	516540.173	131357.193	43.290	0.900	42.390	0.000	Circular
SW MH 4	Manhole	516546.267	131393.437	43.070	0.929	42.141	0.000	Circular
SW MH 5	Manhole	516521.183	131403.637	43.000	1.157	41.843	0.000	Circular
SW MH 7	Manhole	516497.436	131353.727	43.100	2.150	40.950	0.000	Circular
SW MH 8	Manhole	516487.570	131340.662	43.200	2.419	40.781	0.000	Circular
SW MH 4253 (Existing)	Manhole	516480.665	131331.991	41.860	1.190	40.670	0.000	Circular
SW MH 12	Manhole	516497.729	131345.995	43.150	1.265	41.885	0.000	Circular
SW MH 11	Manhole	516506.949	131341.060	43.150	1.165	41.985	0.000	Circular
SW MH 10	Manhole	516541.151	131326.657	43.250	0.946	42.304	0.000	Circular
SW MH 9	Manhole	516544.098	131333.622	43.310	0.825	42.485	0.000	Circular
SW MH 6 Catchpit	Manhole	516515.261	131389.372	43.300	2.250	41.050	0.600	Circular
SW MH 1	Manhole	516534.771	131357.235	43.300	0.874	42.426	0.000	Circular
SW MH 3	Manhole	516547.032	131381.934	43.200	0.982	42.218	0.000	Circular
SW MH 31	Manhole	516624.679	131271.117	42.100	1.506	40.594	0.000	Circular

Name	Diameter (m)	Lock
SW MH 13	1.200	None
SW MH 21	1.200	None
SW MH 14	1.200	None
SW MH 15	1.200	None
SW MH 16	1.200	None
SW MH 17	1.200	None
SW MH 18	1.200	None
SW MH 19	1.200	None
SW MH 20 Catchpit	1.200	None
SW MH 28 Catchpit	1.200	None
SW MH 29	1.200	None
SW MH 30	1.200	None
SW13 (Existing)	1.200	None
SW MH 6252 (Existing)	1.200	None
SW MH 22	1.200	None
SW MH 23	1.200	None
SW MH 24	1.200	None
SW MH 25	1.200	None
SW MH 26	1.200	None
SW MH 27 Catchpit	1.200	None
SW MH 2	1.200	None
SW MH 4	1.200	None
SW MH 5	1.200	None
SW MH 7	1.200	None
SW MH 8	1.200	None
SW MH 4253 (Existing)	1.200	None
SW MH 12	1.200	None
SW MH 11	1.200	None
SW MH 10	1.200	None
SW MH 9	1.200	None
SW MH 6 Catchpit	1.200	None
SW MH 1	1.200	None
SW MH 3	1.200	None
SW MH 31	1.200	None

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
SW MH 13	Inlet	Hardstanding 19	(None)	No Restriction
SW MH 14	Inlet	Pipe 13 Pipe 21 Hardstanding 16	(None)	No Restriction
	Inlet (1)	Acess Road 17	(None)	No Restriction
SW MH 15	Inlet	Pipe 14 Acess Road 16 Acess Road 13 Acess Road 15	(None)	No Restriction
	Inlet (2)	Acess Road 14	(None)	No Restriction
SW MH 16	Inlet	Pipe 15	(None)	No Restriction
	Inlet (1)	Acess Road 12	(None)	No Restriction
SW MH 17	Inlet	Pipe 16	(None)	No Restriction
	Inlet (1)	Acess Road 11	(None)	No Restriction
SW MH 18	Inlet	Pipe 17	(None)	No Restriction
	Inlet (1)	Acess Road 10	(None)	No Restriction
SW MH 19	Inlet	Pipe 18	(None)	No Restriction
	Inlet (1)	Acess Road 5	(None)	No Restriction
SW MH 20 Catchpit	Inlet	Pipe 19	(None)	No Restriction
	Inlet (1)	Acess Road 6	(None)	No Restriction

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Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
SW MH 28 Catchpit	Inlet	Acess Road 8 Acess Road 9	(None)	No Restriction
	Inlet (1)	Acess Road 7	(None)	No Restriction
SW MH 29	Inlet	Pipe 29A	(None)	No Restriction
SW MH 30	Inlet	Pipe 30	(None)	No Restriction
SW13 (Existing)	Inlet	Pipe 32 (1)	(None)	No Restriction
SW MH 6252 (Existing)	Inlet	Pipe 33	(None)	No Restriction
SW MH 22	Inlet	Nursery	(None)	No Restriction
SW MH 23	Inlet	Pipe 22	(None)	No Restriction
	Inlet (1)	Hardstanding 17	(None)	No Restriction
SW MH 24	Inlet	Pipe 23	(None)	No Restriction
	Inlet (1)	Hardstanding 5 Hardstanding 7 Hardstanding 18	(None)	No Restriction
SW MH 25	Inlet	Pipe 24 Hardstanding 10	(None)	No Restriction
SW MH 26	Inlet	Pipe 25 Acess Road 3	(None)	No Restriction
	Inlet (1)	Acess Road 1 Acess Road 2	(None)	No Restriction
	Inlet (2)	MUGA	(None)	No Restriction
SW MH 27 Catchpit	Inlet	Pipe 26	(None)	No Restriction
	Inlet (1)	Acess Road 4	(None)	No Restriction
SW MH 2	Inlet	Hardstanding 9	(None)	No Restriction
	Inlet (1)	Hardstanding 8	(None)	No Restriction
	Inlet (2)	Pipe 1	(None)	No Restriction
	Inlet (3)	Greenroof 2	(None)	No Restriction
SW MH 4	Inlet	Pipe 3	(None)	No Restriction
	Inlet (1)	Hardstanding 4	(None)	No Restriction
SW MH 5	Inlet	Pipe 4	(None)	No Restriction
	Inlet (1)	Hardstanding 3	(None)	No Restriction
SW MH 7	Inlet	Pipe 6A	(None)	No Restriction
SW MH 8	Inlet	Pipe 7	(None)	No Restriction
SW MH 4253 (Existing)	Inlet	Pipe 8	(None)	No Restriction
SW MH 12	Inlet	Pipe 11	(None)	No Restriction
	Inlet (1)	Hardstanding 15	(None)	No Restriction
SW MH 11	Inlet	Pipe 10	(None)	No Restriction
	Inlet (1)	Hardstanding 14	(None)	No Restriction
SW MH 10	Inlet	Pipe 9 Hardstanding 12	(None)	No Restriction
	Inlet (1)	Roof 5 Greenroof 4	(None)	No Restriction
	Inlet (2)	Hardstanding 13	(None)	No Restriction
SW MH 9	Inlet	Hardstanding 11	(None)	No Restriction
SW MH 6 Catchpit	Inlet	Pipe 5	(None)	No Restriction
	Inlet (1)	Hardstanding 2	(None)	No Restriction
	Inlet (2)	Greenroof 1	(None)	No Restriction
SW MH 3	Inlet	Pipe 2	(None)	No Restriction
	Inlet (1)	Hardstanding 6	(None)	No Restriction
SW MH 31	Inlet	Pipe 32	(None)	No Restriction

Outlets

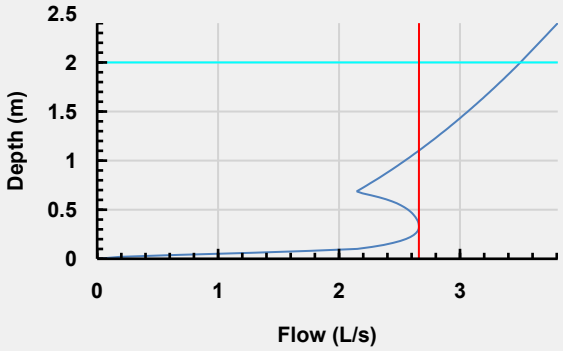
Junction	Outlet Name	Outgoing Connection	Outlet Type
SW MH 13	Outlet	Pipe 13	Free Discharge
SW MH 21	Outlet	Pipe 21	Free Discharge
SW MH 14	Outlet	Pipe 14	Free Discharge
SW MH 15	Outlet	Pipe 15	Free Discharge
SW MH 16	Outlet	Pipe 16	Free Discharge

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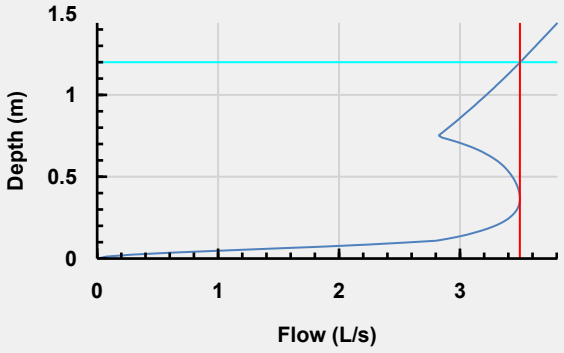
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Junction	Outlet Name	Outgoing Connection	Outlet Type
SW MH 17	Outlet	Pipe 17	Free Discharge
SW MH 18	Outlet	Pipe 18	Free Discharge
SW MH 19	Outlet	Pipe 19	Free Discharge
SW MH 20 Catchpit	Outlet	Pipe 20	Free Discharge
SW MH 28 Catchpit	Outlet	Pipe 29	Free Discharge
SW MH 29	Outlet	Pipe 30	Hydro-Brake®

Invert Level (m)	41.000
Design Depth (m)	2.000
Design Flow (L/s)	3.5
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☑
Unit Reference	SHE-0076-3500-2000-3500



SW MH 30	Outlet	Pipe 32	Free Discharge
SW13 (Existing)	Outlet	Pipe 33	Free Discharge
SW MH 22	Outlet	Pipe 22	Free Discharge
SW MH 23	Outlet	Pipe 23	Free Discharge
SW MH 24	Outlet	Pipe 24	Free Discharge
SW MH 25	Outlet	Pipe 25	Free Discharge
SW MH 26	Outlet	Pipe 26	Free Discharge
SW MH 27 Catchpit	Outlet	Pipe 27	Free Discharge
SW MH 2	Outlet	Pipe 2	Free Discharge
SW MH 4	Outlet	Pipe 4	Free Discharge
SW MH 5	Outlet	Pipe 5	Free Discharge
	Outlet	Pipe 7	Hydro-Brake®

Junction	Outlet Name	Outgoing Connection	Outlet Type
SW MH 7	Invert Level (m)	40.950	
	Design Depth (m)	1.200	
	Design Flow (L/s)	3.5	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☑	
	Unit Reference	SHE-0086-3500-1200-3500	
			
SW MH 8	Outlet	Pipe 8	Free Discharge
SW MH 12	Outlet	Pipe 12	Free Discharge
SW MH 11	Outlet	Pipe 11	Free Discharge
SW MH 10	Outlet	Pipe 10	Free Discharge
SW MH 9	Outlet	Pipe 9	Free Discharge
SW MH 6 Catchpit	Outlet	Pipe 6	Free Discharge
SW MH 1	Outlet	Pipe 1	Free Discharge
SW MH 3	Outlet	Pipe 3	Free Discharge
SW MH 31	Outlet	Pipe 32 (1)	Free Discharge



Pond

Type : Pond

Dimensions

Exceedance Level (m)	43.750
Depth (m)	1.150
Base Level (m)	42.600
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	2.495
Total Volume (m³)	257.496

Depth (m)	Area (m²)	Volume (m³)
0.000	240.000	0.000
1.150	423.415	376.507

Outlets

Outlet

Outgoing Connection	Pipe (Tank)
Outlet Type	Free Discharge

Advanced

Perimeter	Circular
Length (m)	44.802
Friction Scheme	Manning's n
n	0.5



Cellular Storage East

Type : Cellular Storage

Dimensions

Exceedance Level (m)	42.600
Depth (m)	1.200
Base Level (m)	41.000
Number of Crates Long	30
Number of Crates Wide	10
Number of Crates High	3
Porosity (%)	95
Crate Length (m)	1
Crate Width (m)	0.5
Crate Height (m)	0.4
Total Volume (m³)	171.400

Inlets

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe (Tank)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe 27
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (7)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe 20
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (8)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe 29
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe 29A
Outlet Type	Free Discharge



Cellular Storage West

Type : Cellular Storage

Dimensions

Exceedance Level (m)	43.100
Depth (m)	1.200
Base Level (m)	40.950
Number of Crates Long	51
Number of Crates Wide	14
Number of Crates High	8
Porosity (%)	95
Crate Length (m)	0.708
Crate Width (m)	0.354
Crate Height (m)	0.15
Total Volume (m³)	204.954

Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe 12
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe 6
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Point Inflow
Incoming Item(s)	Greenroof 3
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Point Inflow
Incoming Item(s)	Hardstanding 1
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe 6A
Outlet Type	Free Discharge

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Name	From	To	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)
Pipe 13	SW MH 13	SW MH 14	31.266	Pipe	49.707		0.6	150
Pipe 14	SW MH 14	SW MH 15	5.329	Pipe	79.539		0.6	225
Pipe 15	SW MH 15	SW MH 16	18.732	Pipe	80.052		0.6	225
Pipe 16	SW MH 16	SW MH 17	17.070	Pipe	80.142		0.6	225
Pipe 17	SW MH 17	SW MH 18	24.577	Pipe	80.055		0.6	225
Pipe 18	SW MH 18	SW MH 19	50.415	Pipe	91.999		0.6	225
Pipe 19	SW MH 19	SW MH 20 Catchpit	8.705	Pipe	49.179		0.6	225
Pipe 21	SW MH 21	SW MH 14	24.182	Pipe	56.368		0.6	150
Pipe 30	SW MH 29	SW MH 30	20.031	Pipe	89.825		0.6	150
Pipe 33	SW13 (Existing)	SW MH 6252 (Existing)	9.641	Pipe	15.804		0.6	150
Pipe 22	SW MH 22	SW MH 23	25.346	Pipe	100.000		0.6	300
Pipe 23	SW MH 23	SW MH 24	38.601	Pipe	120.000		0.6	300
Pipe 24	SW MH 24	SW MH 25	28.294	Pipe	119.959		0.6	300
Pipe 25	SW MH 25	SW MH 26	18.813	Pipe	119.831		0.6	300
Pipe 26	SW MH 26	SW MH 27 Catchpit	18.757	Pipe	108.423		0.6	300
Pipe 9	SW MH 9	SW MH 10	7.563	Pipe	41.783		0.6	225
Pipe 10	SW MH 10	SW MH 11	37.111	Pipe	116.335		0.6	225
Pipe 11	SW MH 11	SW MH 12	10.458	Pipe	104.577		0.6	225
Pipe 7	SW MH 7	SW MH 8	16.372	Pipe	96.874		0.6	225
Pipe 8	SW MH 8	SW MH 4253 (Existing)	11.084	Pipe	99.860		0.6	225
Pipe 4	SW MH 4	SW MH 5	27.079	Pipe	90.868		0.6	225
Pipe 5	SW MH 5	SW MH 6 Catchpit	15.445	Pipe	80.028		0.6	225
Pipe 27	SW MH 27 Catchpit	Cellular Storage East	8.111	Pipe	0.000		0.6	300
Pipe 20	SW MH 20 Catchpit	Cellular Storage East	7.616	Pipe	0.000		0.6	225
Pipe 29	SW MH 28 Catchpit	Cellular Storage East	6.183	Pipe	0.000		0.6	225
Pipe 29A	Cellular Storage East	SW MH 29	9.206	Pipe	0.000		0.6	225
Pipe 6A	Cellular Storage West	SW MH 7	2.299	Pipe	0.000		0.6	225
Pipe (Tank)	Pond	Cellular Storage East	1.632	Pipe	2.331		0.6	300
Pipe 12	SW MH 12	Cellular Storage West	9.367	Pipe	110.203		0.6	225
Pipe 1	SW MH 1	SW MH 2	5.402	Pipe	150.060		0.6	225
Pipe 2	SW MH 2	SW MH 3	25.674	Pipe	149.268		0.6	225
Pipe 3	SW MH 3	SW MH 4	11.528	Pipe	149.720		0.6	225
Pipe 6	SW MH 6 Catchpit	Cellular Storage West	1.534	Pipe	82.603		0.6	225
Pipe 32	SW MH 30	SW MH 31	16.488	Pipe	90.000		0.6	150
Pipe 32 (1)	SW MH 31	SW13 (Existing)	7.956	Pipe	124.704		0.6	150

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Report Details: Type: Connections Storm Phase: Phase	CampbellReith:		

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Name	Height (mm)	Upstream Cover Level (m)	Upstream Invert Level (m)	Downstream Cover Level (m)	Downstream Invert Level (m)	Part Family	Lock	Min. Cover Depth (m)
Pipe 13		44.000	43.250	43.450	42.621		Levels	0.000
Pipe 14		43.450	42.546	43.400	42.479		None	0.000
Pipe 15		43.400	42.479	43.070	42.245		None	0.000
Pipe 16		43.070	42.245	43.100	42.032		None	0.000
Pipe 17		43.100	42.032	43.000	41.725		None	0.000
Pipe 18		43.000	41.725	43.350	41.177		None	0.000
Pipe 19		43.350	41.177	43.550	41.000		None	0.000
Pipe 21		43.800	43.050	43.450	42.621		Levels	0.000
Pipe 30		43.750	41.000	42.550	40.777		None	0.000
Pipe 33		42.230	40.530	41.980	39.920		None	0.000
Pipe 22		43.070	42.141	43.070	41.888		None	0.000
Pipe 23		43.070	41.888	43.290	41.566		None	0.000
Pipe 24		43.290	41.566	43.070	41.330		None	0.000
Pipe 25		43.070	41.330	43.400	41.173		None	0.000
Pipe 26		43.400	41.173	43.650	41.000		None	0.000
Pipe 9		43.310	42.485	43.250	42.304		None	0.000
Pipe 10		43.250	42.304	43.150	41.985		None	0.000
Pipe 11		43.150	41.985	43.150	41.885		None	0.000
Pipe 7		43.100	40.950	43.200	40.781		None	0.000
Pipe 8		43.200	40.781	41.860	40.670		None	0.000
Pipe 4		43.070	42.141	43.000	41.843		None	0.000
Pipe 5		43.000	41.843	43.300	41.650		None	0.000
Pipe 27		43.650	41.000	0.000	41.000		None	0.000
Pipe 20		43.550	41.000	42.600	41.000		None	0.000
Pipe 29		43.000	41.000	42.600	41.000		Levels	0.000
Pipe 29A		42.600	41.000	43.750	41.000		None	0.000
Pipe 6A		43.100	40.950	43.100	40.950		None	0.000
Pipe (Tank)		43.750	42.600	42.600	41.900		Levels	0.000
Pipe 12		43.150	41.885	43.100	41.800		Levels	0.000
Pipe 1		43.300	42.426	43.290	42.390		None	0.000
Pipe 2		43.290	42.390	43.200	42.218		None	0.000
Pipe 3		43.200	42.218	43.070	42.141		None	0.000
Pipe 6		43.300	41.650	43.100	41.631		Levels	0.000
Pipe 32		42.550	40.777	42.100	40.594		None	0.000
Pipe 32 (1)		42.100	40.594	42.230	40.530		None	0.000

Greenway Primary School:	Date: 15/04/2026		
	Designed by: YL/HJ/AH	Checked by: LM	Approved By: LM
Report Details: Type: Connections Storm Phase: Phase	CampbellReith:		

Name	Flow Restriction (L/s)	Culvert Type	Culvert Entrance
Pipe 13		(None)	(None)
Pipe 14		(None)	(None)
Pipe 15		(None)	(None)
Pipe 16		(None)	(None)
Pipe 17		(None)	(None)
Pipe 18		(None)	(None)
Pipe 19		(None)	(None)
Pipe 21		(None)	(None)
Pipe 30	3.8	(None)	(None)
Pipe 33		(None)	(None)
Pipe 22		(None)	(None)
Pipe 23		(None)	(None)
Pipe 24		(None)	(None)
Pipe 25		(None)	(None)
Pipe 26		(None)	(None)
Pipe 9		(None)	(None)
Pipe 10		(None)	(None)
Pipe 11		(None)	(None)
Pipe 7	3.8	(None)	(None)
Pipe 8		(None)	(None)
Pipe 4		(None)	(None)
Pipe 5		(None)	(None)
Pipe 27		(None)	(None)
Pipe 20		(None)	(None)
Pipe 29		(None)	(None)
Pipe 29A		(None)	(None)
Pipe 6A		(None)	(None)
Pipe (Tank)		(None)	(None)
Pipe 12		(None)	(None)
Pipe 1		(None)	(None)
Pipe 2		(None)	(None)
Pipe 3		(None)	(None)
Pipe 6		(None)	(None)
Pipe 32		(None)	(None)
Pipe 32 (1)		(None)	(None)

Greenway Primary School:	Date: 15/04/2026			CampbellReith consulting engineers
	Designed by: YL/HJ/AH	Checked by: LM	Approved By: LM	
Report Details: Type: Manhole Schedule Storm Phase: Phase	CampbellReith:			

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW MH 13	44.000 43.250	Diameter / Length: 1.200					Manhole
E:516653.499 N:131428.955	0.750		{a} Pipe 13	Pipe	43.250	Diam/Width:150	Not Applicable
SW MH 21	43.800 43.050	Diameter / Length: 1.200					Manhole
E:516634.097 N:131421.659	0.750		{a} Pipe 21	Pipe	43.050	Diam/Width:150	Not Applicable
SW MH 14	43.450 42.546	Diameter / Length: 1.200	{1} Pipe 13 {2} Pipe 21	Pipe Pipe	42.621 42.621	Diam/Width:150 Diam/Width:150	Manhole
E:516643.435 N:131399.353	0.904		{a} Pipe 14	Pipe	42.546	Diam/Width:225	Not Applicable
SW MH 15	43.400 42.479	Diameter / Length: 1.200	{1} Pipe 14	Pipe	42.479	Diam/Width:225	Manhole
E:516648.494 N:131397.678	0.921		{a} Pipe 15	Pipe	42.479	Diam/Width:225	Not Applicable
SW MH 16	43.070 42.245	Diameter / Length: 1.200	{1} Pipe 15	Pipe	42.245	Diam/Width:225	Manhole
E:516654.609 N:131379.972	0.825		{a} Pipe 16	Pipe	42.245	Diam/Width:225	Not Applicable

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW MH 17	43.100 42.032	Diameter / Length: 1.200	{1} Pipe 16	Pipe	42.032	Diam/Width:225	Manhole
E:516650.680 N:131363.360	1.068		{a} Pipe 17	Pipe	42.032	Diam/Width:225	Not Applicable
SW MH 18	43.000 41.725	Diameter / Length: 1.200	{1} Pipe 17	Pipe	41.725	Diam/Width:225	Manhole
E:516643.833 N:131339.756	1.275		{a} Pipe 18	Pipe	41.725	Diam/Width:225	Not Applicable
SW MH 19	43.350 41.177	Diameter / Length: 1.200	{1} Pipe 18	Pipe	41.177	Diam/Width:225	Manhole
E:516595.208 N:131326.440	2.173		{a} Pipe 19	Pipe	41.177	Diam/Width:225	Not Applicable
SW MH 20 Catchpit	43.550 41.000	Diameter / Length: 1.200	{1} Pipe 19	Pipe	41.000	Diam/Width:225	Manhole
E:516589.237 N:131320.106	2.550		{a} Pipe 20	Pipe	41.000	Diam/Width:225	Not Applicable
SW MH 28 Catchpit	43.000 41.000	Diameter / Length: 1.200					Manhole
E:516613.617 N:131303.451	2.000		{a} Pipe 29	Pipe	41.000	Diam/Width:225	Not Applicable

Greenway Primary School:	Date: 15/04/2026			CampbellReith consulting engineers
	Designed by: YL/HJ/AH	Checked by: LM	Approved By: LM	
Report Details: Type: Manhole Schedule Storm Phase: Phase	CampbellReith:			

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW MH 29	43.750 41.000	Diameter / Length: 1.200	{1} Pipe 29A	Pipe	41.000	Diam/Width:225	Manhole
E:516615.816 N:131300.899	2.750		{a} Pipe 30	Pipe	41.000	Diam/Width:150	Not Applicable
SW MH 30	42.550 40.777	Diameter / Length: 1.200	{1} Pipe 30	Pipe	40.777	Diam/Width:150	Manhole
E:516629.976 N:131286.731	1.773		{a} Pipe 32	Pipe	40.777	Diam/Width:150	Not Applicable
SW13 (Existing)	42.230 40.530	Diameter / Length: 1.200	{1} Pipe 32 (1)	Pipe	40.530	Diam/Width:150	Manhole
E:516631.305 N:131266.713	1.700		{a} Pipe 33	Pipe	40.530	Diam/Width:150	Not Applicable
SW MH 6252 (Existing)	41.980 39.920	Diameter / Length: 1.200	{1} Pipe 33	Pipe	39.920	Diam/Width:150	Manhole
E:516627.926 N:131257.684	2.060						Not Applicable
SW MH 22	43.070 42.141	Diameter / Length: 1.200					Manhole
E:516602.704 N:131400.663	0.929		{a} Pipe 22	Pipe	42.141	Diam/Width:300	Not Applicable

Greenway Primary School:	Date: 15/04/2026			CampbellReith consulting engineers
	Designed by: YL/HJ/AH	Checked by: LM	Approved By: LM	
Report Details: Type: Manhole Schedule Storm Phase: Phase	CampbellReith:			

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW MH 23	43.070 41.888	Diameter / Length: 1.200	{1} Pipe 22	Pipe	41.888	Diam/Width:300	Manhole
E:516579.169 N:131410.072	1.182		{a} Pipe 23	Pipe	41.888	Diam/Width:300	Not Applicable
SW MH 24	43.290 41.566	Diameter / Length: 1.200	{1} Pipe 23	Pipe	41.566	Diam/Width:300	Manhole
E:516564.280 N:131374.458	1.724		{a} Pipe 24	Pipe	41.566	Diam/Width:300	Not Applicable
SW MH 25	43.070 41.330	Diameter / Length: 1.200	{1} Pipe 24	Pipe	41.330	Diam/Width:300	Manhole
E:516553.136 N:131348.451	1.740		{a} Pipe 25	Pipe	41.330	Diam/Width:300	Not Applicable
SW MH 26	43.400 41.173	Diameter / Length: 1.200	{1} Pipe 25	Pipe	41.173	Diam/Width:300	Manhole
E:516565.678 N:131334.428	2.227		{a} Pipe 26	Pipe	41.173	Diam/Width:300	Not Applicable
SW MH 27 Catchpit	43.650 41.000	Diameter / Length: 1.200	{1} Pipe 26	Pipe	41.000	Diam/Width:300	Manhole
E:516571.325 N:131316.541	2.650		{a} Pipe 27	Pipe	41.000	Diam/Width:300	Not Applicable

Greenway Primary School:	Date: 15/04/2026			CampbellReith consulting engineers
	Designed by: YL/HJ/AH	Checked by: LM	Approved By: LM	
Report Details: Type: Manhole Schedule Storm Phase: Phase	CampbellReith:			

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW MH 2	43.290 42.390	Diameter / Length: 1.200	{1} Pipe 1	Pipe	42.390	Diam/Width:225	Manhole
E:516540.173 N:131357.193	0.900		{a} Pipe 2	Pipe	42.390	Diam/Width:225	Not Applicable
SW MH 4	43.070 42.141	Diameter / Length: 1.200	{1} Pipe 3	Pipe	42.141	Diam/Width:225	Manhole
E:516546.267 N:131393.437	0.929		{a} Pipe 4	Pipe	42.141	Diam/Width:225	Not Applicable
SW MH 5	43.000 41.843	Diameter / Length: 1.200	{1} Pipe 4	Pipe	41.843	Diam/Width:225	Manhole
E:516521.183 N:131403.637	1.157		{a} Pipe 5	Pipe	41.843	Diam/Width:225	Not Applicable
SW MH 7	43.100 40.950	Diameter / Length: 1.200	{1} Pipe 6A	Pipe	40.950	Diam/Width:225	Manhole
E:516497.436 N:131353.727	2.150		{a} Pipe 7	Pipe	40.950	Diam/Width:225	Not Applicable
SW MH 8	43.200 40.781	Diameter / Length: 1.200	{1} Pipe 7	Pipe	40.781	Diam/Width:225	Manhole
E:516487.570 N:131340.662	2.419		{a} Pipe 8	Pipe	40.781	Diam/Width:225	Not Applicable

Greenway Primary School:	Date: 15/04/2026			CampbellReith consulting engineers
	Designed by: YL/HJ/AH	Checked by: LM	Approved By: LM	
Report Details: Type: Manhole Schedule Storm Phase: Phase	CampbellReith:			

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW MH 4253 (Existing)	41.860 40.670	Diameter / Length: 1.200	{1} Pipe 8	Pipe	40.670	Diam/Width:225	Manhole
E:516480.665 N:131331.991	1.190						
							Not Applicable
SW MH 12	43.150 41.885	Diameter / Length: 1.200	{1} Pipe 11	Pipe	41.885	Diam/Width:225	Manhole
E:516497.729 N:131345.995	1.265						
			{a} Pipe 12	Pipe	41.885	Diam/Width:225	Not Applicable
SW MH 11	43.150 41.985	Diameter / Length: 1.200	{1} Pipe 10	Pipe	41.985	Diam/Width:225	Manhole
E:516506.949 N:131341.060	1.165						
			{a} Pipe 11	Pipe	41.985	Diam/Width:225	Not Applicable
SW MH 10	43.250 42.304	Diameter / Length: 1.200	{1} Pipe 9	Pipe	42.304	Diam/Width:225	Manhole
E:516541.151 N:131326.657	0.946						
			{a} Pipe 10	Pipe	42.304	Diam/Width:225	Not Applicable
SW MH 9	43.310 42.485	Diameter / Length: 1.200					Manhole
E:516544.098 N:131333.622	0.825						
			{a} Pipe 9	Pipe	42.485	Diam/Width:225	Not Applicable

Greenway Primary School:	Date: 15/04/2026			CampbellReith consulting engineers
	Designed by: YL/HJ/AH	Checked by: LM	Approved By: LM	
Report Details: Type: Manhole Schedule Storm Phase: Phase	CampbellReith:			

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW MH 6 Catchpit	43.300 41.050	Diameter / Length: 1.200	{1} Pipe 5	Pipe	41.650	Diam/Width:225	Manhole
E:516515.261 N:131389.372	2.250		{a} Pipe 6	Pipe	41.650	Diam/Width:225	Not Applicable
SW MH 1	43.300 42.426	Diameter / Length: 1.200					Manhole
E:516534.771 N:131357.235	0.874		{a} Pipe 1	Pipe	42.426	Diam/Width:225	Not Applicable
SW MH 3	43.200 42.218	Diameter / Length: 1.200	{1} Pipe 2	Pipe	42.218	Diam/Width:225	Manhole
E:516547.032 N:131381.934	0.982		{a} Pipe 3	Pipe	42.218	Diam/Width:225	Not Applicable
SW MH 31	42.100 40.594	Diameter / Length: 1.200	{1} Pipe 32	Pipe	40.594	Diam/Width:150	Manhole
E:516624.679 N:131271.117	1.506		{a} Pipe 32 (1)	Pipe	40.594	Diam/Width:150	Not Applicable

Greenway Primary School:	Date: 15/04/2026			CampbellReith consulting engineers
	Designed by: YL/HJ/AH	Checked by: LM	Approved By: LM	
Report Details: Type: Inflow Summary Storm Phase: Phase	CampbellReith:			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Acess Road 1	SW MH 26		Time of Concentration	0.016	100	0	100	0.016
Acess Road 2	SW MH 26		Time of Concentration	0.012	100	0	100	0.012
Acess Road 3	SW MH 26		Time of Concentration	0.013	100	0	100	0.013
Acess Road 4	SW MH 27 Catchpit		Time of Concentration	0.013	100	0	100	0.013
Acess Road 5	SW MH 19		Time of Concentration	0.014	100	0	100	0.014
Acess Road 6	SW MH 20 Catchpit		Time of Concentration	0.011	100	0	100	0.011
Acess Road 7	SW MH 28 Catchpit		Time of Concentration	0.013	100	0	100	0.013
Acess Road 8	SW MH 28 Catchpit		Time of Concentration	0.013	100	0	100	0.013
Acess Road 9	SW MH 28 Catchpit		Time of Concentration	0.015	100	0	100	0.015
Acess Road 10	SW MH 18		Time of Concentration	0.007	100	0	100	0.007
Acess Road 11	SW MH 17		Time of Concentration	0.010	100	0	100	0.010
Acess Road 12	SW MH 16		Time of Concentration	0.020	100	0	100	0.020
Acess Road 13	SW MH 15		Time of Concentration	0.007	100	0	100	0.007
Acess Road 14	SW MH 15		Time of Concentration	0.011	100	0	100	0.011
Acess Road 15	SW MH 15		Time of Concentration	0.009	100	0	100	0.009
Acess Road 16	SW MH 15		Time of Concentration	0.010	100	0	100	0.010
Acess Road 17	SW MH 14		Time of Concentration	0.026	100	0	100	0.026
Greenroof 1	SW MH 6 Catchpit		Green Roof	0.034		0		0.034
Greenroof 2	SW MH 2		Green Roof	0.038		0		0.038
Greenroof 3	Cellular Storage West		Green Roof	0.030		0		0.030
Greenroof 4	SW MH 10		Green Roof	0.019		0		0.019
Hardstanding 1	Cellular Storage West		Time of Concentration	0.015	100	0	100	0.015
Hardstanding 2	SW MH 6 Catchpit		Time of Concentration	0.011	100	0	100	0.011
Hardstanding 3	SW MH 5		Time of Concentration	0.007	100	0	100	0.007
Hardstanding 4	SW MH 4		Time of Concentration	0.018	100	0	100	0.018
Hardstanding 5	SW MH 24		Time of Concentration	0.021	100	0	100	0.021
Hardstanding 6	SW MH 3		Time of Concentration	0.027	100	0	100	0.027
Hardstanding 7	SW MH 24		Time of Concentration	0.044	100	0	100	0.044
Hardstanding 8	SW MH 2		Time of Concentration	0.027	100	0	100	0.027
Hardstanding 9	SW MH 2		Time of Concentration	0.011	100	0	100	0.011
Hardstanding 10	SW MH 25		Time of Concentration	0.019	100	0	100	0.019
Hardstanding 11	SW MH 9		Time of Concentration	0.017	100	0	100	0.017
Hardstanding 12	SW MH 10		Time of Concentration	0.022	100	0	100	0.022
Hardstanding 13	SW MH 10		Time of Concentration	0.020	100	0	100	0.020

Hardstanding 14	SW MH 11		Time of Concentration	0.007	100	0	100	0.007
Hardstanding 15	SW MH 12		Time of Concentration	0.005	100	0	100	0.005
Hardstanding 16	SW MH 14		Time of Concentration	0.005	100	0	100	0.005
Hardstanding 17	SW MH 23		Time of Concentration	0.008	100	0	100	0.008
Hardstanding 18	SW MH 24		Time of Concentration	0.005	100	0	100	0.005
Hardstanding 19	SW MH 13		Time of Concentration	0.006	100	0	100	0.006
MUGA	SW MH 26		Time of Concentration	0.075	100	0	100	0.075
Nursery	SW MH 22		Time of Concentration	0.033	100	0	100	0.033
Roof 5	SW MH 10		Time of Concentration	0.008	100	0	100	0.008
TOTAL		**0.0**		**0.753**				**0.753**

Greenway Primary School:	Date: 15/04/2026		
	Designed by: YL/HJ/AH	Checked by: LM	Approved By: LM
Report Title: Rainfall Analysis Criteria	CampbellReith:		

CampbellReith consulting engineers

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Prefill Manhole Sumps	☐
Perform No Discharge Analysis	☐

Rainfall

FSR 15 MIN

Type: FSR

Region	England And Wales
M5-60 (mm)	20.0
Ratio R	0.350
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
1.0	0.000
30.0	40.000
100.0	45.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30

FSR ALL

Type: FSR

Region	England And Wales
M5-60 (mm)	20.0
Ratio R	0.362
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
1.0	0.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520
7200	14400
8640	17280
10080	20160

FEH22

Type: FEH

Site Location	GB 516050 131150 TQ 16050 31150
Rainfall Version	2022
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
2.0	0.000
30.0	40.000
100.0	45.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	2160
480	960
600	1200
720	2880
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520
7200	14400
8640	17280
10080	20160

FEH19/13

Type: FEH

Site Location	GB 516050 131150 TQ 16050 31150
Rainfall Version	1999
C (1km)	-0.026
D1 (1km)	0.340
D2 (1km)	0.335
D3 (1km)	0.374
E (1km)	0.316
F (1km)	2.450
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
1.0	0.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520
7200	14400
8640	17280
10080	20160

FEH22: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Greenroof 1	FEH22: 2 years: +0 %: 15 mins: Summer	0.03	0.0	0.000
Greenroof 3	FEH22: 2 years: +0 %: 15 mins: Summer	0.03	0.0	0.000
Hardstanding 19	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	1.3	0.560
Hardstanding 17	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	1.6	0.688
Hardstanding 18	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	1.1	0.482
Hardstanding 3	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	1.5	0.667
Hardstanding 4	FEH22: 2 years: +0 %: 15 mins: Summer	0.02	3.7	1.592
Hardstanding 6	FEH22: 2 years: +0 %: 15 mins: Summer	0.03	5.7	2.451
Hardstanding 8	FEH22: 2 years: +0 %: 15 mins: Summer	0.03	5.6	2.436
Hardstanding 5	FEH22: 2 years: +0 %: 15 mins: Summer	0.02	4.3	1.847
Hardstanding 7	FEH22: 2 years: +0 %: 15 mins: Summer	0.04	9.0	3.909
Hardstanding 9	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	2.3	1.012
Hardstanding 10	FEH22: 2 years: +0 %: 15 mins: Summer	0.02	4.0	1.730
Hardstanding 11	FEH22: 2 years: +0 %: 15 mins: Summer	0.02	3.4	1.494
Roof 5	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	1.6	0.697

Hardstanding 14	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	1.4	0.623
Hardstanding 15	FEH22: 2 years: +0 %: 15 mins: Summer	0.00	1.0	0.440
Hardstanding 2	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	2.3	0.979
Hardstanding 13	FEH22: 2 years: +0 %: 15 mins: Summer	0.02	4.2	1.829
Acess Road 1	FEH22: 2 years: +0 %: 15 mins: Summer	0.02	3.4	1.464
Acess Road 2	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	2.6	1.107
Acess Road 3	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	2.8	1.200
Acess Road 4	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	2.7	1.173
Acess Road 5	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	2.9	1.266
Acess Road 6	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	2.3	0.994
Acess Road 7	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	2.6	1.143
Acess Road 8	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	2.7	1.155
Acess Road 9	FEH22: 2 years: +0 %: 15 mins: Summer	0.02	3.2	1.380
Acess Road 10	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	1.4	0.602
Acess Road 11	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	2.0	0.889
Acess Road 12	FEH22: 2 years: +0 %: 15 mins: Summer	0.02	4.1	1.790
Acess Road 15	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	1.8	0.799

Acess Road 13	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	1.4	0.626
Acess Road 14	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	2.2	0.940
Acess Road 16	FEH22: 2 years: +0 %: 15 mins: Summer	0.01	2.1	0.895
Acess Road 17	FEH22: 2 years: +0 %: 15 mins: Summer	0.03	5.5	2.371
Hardstanding 1	FEH22: 2 years: +0 %: 15 mins: Summer	0.02	3.2	1.368
Greenroof 2	FEH22: 2 years: +0 %: 15 mins: Summer	0.04	0.0	0.000
Greenroof 4	FEH22: 2 years: +0 %: 15 mins: Summer	0.02	0.0	0.000
Hardstanding 12	FEH22: 2 years: +0 %: 15 mins: Summer	0.02	4.5	1.934
Nursery	FEH22: 2 years: +0 %: 15 mins: Summer	0.03	6.7	2.921
MUGA	FEH22: 2 years: +0 %: 15 mins: Summer	0.07	15.5	6.699
Hardstanding 16	FEH22: 2 years: +0 %: 15 mins: Summer	0.00	1.0	0.443

FEH22: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Greenroof 1	FEH22: 30 years: +40 %: 10080 mins: Summer	0.03	0.3	21.876
Greenroof 3	FEH22: 30 years: +40 %: 10080 mins: Summer	0.03	0.3	19.428
Hardstanding 19	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	4.0	1.720
Hardstanding 17	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	4.9	2.128
Hardstanding 18	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	3.4	1.483
Hardstanding 3	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	4.8	2.068
Hardstanding 4	FEH22: 30 years: +40 %: 15 mins: Summer	0.02	11.3	4.906
Hardstanding 6	FEH22: 30 years: +40 %: 15 mins: Summer	0.03	17.5	7.561
Hardstanding 8	FEH22: 30 years: +40 %: 15 mins: Summer	0.03	17.4	7.525
Hardstanding 5	FEH22: 30 years: +40 %: 15 mins: Summer	0.02	13.1	5.691
Hardstanding 7	FEH22: 30 years: +40 %: 15 mins: Summer	0.04	27.8	12.054
Hardstanding 9	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	7.2	3.120
Hardstanding 10	FEH22: 30 years: +40 %: 15 mins: Summer	0.02	12.3	5.341
Hardstanding 11	FEH22: 30 years: +40 %: 15 mins: Summer	0.02	10.6	4.603
Roof 5	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	4.9	2.143

Hardstanding 14	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	4.4	1.924
Hardstanding 15	FEH22: 30 years: +40 %: 15 mins: Summer	0.00	3.1	1.352
Hardstanding 2	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	7.0	3.021
Hardstanding 13	FEH22: 30 years: +40 %: 15 mins: Summer	0.02	13.0	5.649
Acess Road 1	FEH22: 30 years: +40 %: 15 mins: Summer	0.02	10.4	4.519
Acess Road 2	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	7.9	3.414
Acess Road 3	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	8.5	3.701
Acess Road 4	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	8.4	3.623
Acess Road 5	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	9.0	3.905
Acess Road 6	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	7.1	3.075
Acess Road 7	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	8.1	3.524
Acess Road 8	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	8.2	3.569
Acess Road 9	FEH22: 30 years: +40 %: 15 mins: Summer	0.02	9.8	4.253
Acess Road 10	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	4.3	1.852
Acess Road 11	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	6.3	2.736
Acess Road 12	FEH22: 30 years: +40 %: 15 mins: Summer	0.02	12.7	5.517
Acess Road 15	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	5.7	2.472

Acess Road 13	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	4.5	1.936
Acess Road 14	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	6.7	2.904
Acess Road 16	FEH22: 30 years: +40 %: 15 mins: Summer	0.01	6.4	2.754
Acess Road 17	FEH22: 30 years: +40 %: 15 mins: Summer	0.03	16.9	7.310
Hardstanding 1	FEH22: 30 years: +40 %: 15 mins: Summer	0.02	9.8	4.226
Greenroof 2	FEH22: 30 years: +40 %: 10080 mins: Summer	0.04	0.3	24.768
Greenroof 4	FEH22: 30 years: +40 %: 10080 mins: Summer	0.02	0.2	12.522
Hardstanding 12	FEH22: 30 years: +40 %: 15 mins: Summer	0.02	13.8	5.973
Nursery	FEH22: 30 years: +40 %: 15 mins: Summer	0.03	20.8	9.015
MUGA	FEH22: 30 years: +40 %: 15 mins: Summer	0.07	47.7	20.664
Hardstanding 16	FEH22: 30 years: +40 %: 15 mins: Summer	0.00	3.1	1.361

FEH22: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Greenroof 1	FEH22: 100 years: +45 %: 2160 mins: Summer	0.03	0.8	14.634
Greenroof 3	FEH22: 100 years: +45 %: 2160 mins: Summer	0.03	0.8	13.020
Hardstanding 19	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	5.2	2.262
Hardstanding 17	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	6.4	2.793
Hardstanding 18	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	4.5	1.950
Hardstanding 3	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	6.2	2.715
Hardstanding 4	FEH22: 100 years: +45 %: 15 mins: Summer	0.02	14.8	6.434
Hardstanding 6	FEH22: 100 years: +45 %: 15 mins: Summer	0.03	22.8	9.917
Hardstanding 8	FEH22: 100 years: +45 %: 15 mins: Summer	0.03	22.7	9.872
Hardstanding 5	FEH22: 100 years: +45 %: 15 mins: Summer	0.02	17.2	7.460
Hardstanding 7	FEH22: 100 years: +45 %: 15 mins: Summer	0.04	36.4	15.814
Hardstanding 9	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	9.4	4.095
Hardstanding 10	FEH22: 100 years: +45 %: 15 mins: Summer	0.02	16.1	7.004
Hardstanding 11	FEH22: 100 years: +45 %: 15 mins: Summer	0.02	13.9	6.035
Roof 5	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	6.5	2.811

Hardstanding 14	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	5.8	2.523
Hardstanding 15	FEH22: 100 years: +45 %: 15 mins: Summer	0.00	4.1	1.776
Hardstanding 2	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	9.1	3.963
Hardstanding 13	FEH22: 100 years: +45 %: 15 mins: Summer	0.02	17.0	7.409
Acess Road 1	FEH22: 100 years: +45 %: 15 mins: Summer	0.02	13.6	5.927
Acess Road 2	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	10.3	4.482
Acess Road 3	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	11.2	4.857
Acess Road 4	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	10.9	4.749
Acess Road 5	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	11.8	5.129
Acess Road 6	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	9.3	4.035
Acess Road 7	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	10.6	4.623
Acess Road 8	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	10.8	4.683
Acess Road 9	FEH22: 100 years: +45 %: 15 mins: Summer	0.02	12.8	5.579
Acess Road 10	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	5.6	2.436
Acess Road 11	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	8.3	3.591
Acess Road 12	FEH22: 100 years: +45 %: 15 mins: Summer	0.02	16.7	7.238
Acess Road 15	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	7.5	3.240

Acess Road 13	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	5.8	2.541
Acess Road 14	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	8.8	3.807
Acess Road 16	FEH22: 100 years: +45 %: 15 mins: Summer	0.01	8.3	3.615
Acess Road 17	FEH22: 100 years: +45 %: 15 mins: Summer	0.03	22.1	9.587
Hardstanding 1	FEH22: 100 years: +45 %: 15 mins: Summer	0.02	12.7	5.540
Greenroof 2	FEH22: 100 years: +45 %: 2160 mins: Summer	0.04	1.0	16.530
Greenroof 4	FEH22: 100 years: +45 %: 2160 mins: Summer	0.02	0.5	8.349
Hardstanding 12	FEH22: 100 years: +45 %: 15 mins: Summer	0.02	18.0	7.841
Nursery	FEH22: 100 years: +45 %: 15 mins: Summer	0.03	27.2	11.828
MUGA	FEH22: 100 years: +45 %: 15 mins: Summer	0.07	62.4	27.105
Hardstanding 16	FEH22: 100 years: +45 %: 15 mins: Summer	0.00	4.1	1.782

FEH22: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Junction	Total Discharge Volume (m³)	Status
FEH22: 2 years: +0 %: 15 mins: Summer	44.000	43.250	43.272	0.022	1.3	0.025	0.000	1.1	SW MH 13	0.557	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.800	43.050	43.050	0.000	0.0	0.000	0.000	0.0	SW MH 21	0.000	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.450	42.546	42.608	0.062	7.6	0.071	0.000	7.5	SW MH 14	3.369	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.400	42.479	42.559	0.080	15.0	0.090	0.000	14.5	SW MH 15	6.625	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.070	42.245	42.336	0.091	18.7	0.103	0.000	17.9	SW MH 16	8.407	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.100	42.032	42.125	0.093	20.0	0.105	0.000	19.1	SW MH 17	9.286	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.000	41.725	41.820	0.095	20.4	0.107	0.000	18.8	SW MH 18	9.879	OK
FEH22: 2 years: +0 %: 480 mins: Summer	43.350	41.177	41.551	0.374	5.3	0.423	0.000	4.6	SW MH 19	39.088	Surcharged
FEH22: 2 years: +0 %: 480 mins: Summer	43.550	41.000	41.551	0.551	5.1	0.623	0.000	5.0	SW MH 20 Catchpit	42.354	Surcharged
FEH22: 2 years: +0 %: 480 mins: Summer	43.000	41.000	41.551	0.551	1.7	0.623	0.000	1.6	SW MH 28 Catchpit	12.679	Surcharged
FEH22: 2 years: +0 %: 480 mins: Summer	43.750	41.000	41.551	0.551	2.8	0.623	0.000	2.7	SW MH 29	122.774	Surcharged
FEH22: 2 years: +0 %: 180 mins: Summer	42.550	40.777	40.815	0.038	2.7	0.043	0.000	2.7	SW MH 30	47.117	OK
FEH22: 2 years: +0 %: 180 mins: Winter	42.230	40.530	40.555	0.025	2.7	0.029	0.000	2.7	SW13 (Existing)	47.398	OK
FEH22: 2 years: +0 %: 180 mins: Winter	41.980	39.920	39.945	0.025	2.7	0.000	0.000	2.7	SW MH 6252 (Existing)	47.398	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.070	42.141	42.191	0.050	6.7	0.056	0.000	6.5	SW MH 22	2.924	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.070	41.888	41.942	0.054	8.1	0.061	0.000	7.4	SW MH 23	3.595	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.290	41.566	41.660	0.095	21.8	0.107	0.000	20.2	SW MH 24	9.823	OK
FEH22: 2 years: +0 %: 480 mins: Summer	43.070	41.330	41.551	0.221	5.5	0.250	0.000	5.5	SW MH 25	40.497	OK
FEH22: 2 years: +0 %: 480 mins: Summer	43.400	41.173	41.551	0.378	10.4	0.428	0.000	9.8	SW MH 26	77.083	Surcharged
FEH22: 2 years: +0 %: 480 mins: Summer	43.650	41.000	41.551	0.551	10.4	0.623	0.000	10.2	SW MH 27 Catchpit	80.840	Surcharged

FEH22: 2 years: +0 %: 15 mins: Summer	43.290	42.390	42.453	0.063	8.0	0.072	0.000	7.4	SW MH 2	3.488	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.070	42.141	42.225	0.084	16.0	0.096	0.000	15.2	SW MH 4	7.471	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.000	41.843	41.928	0.085	16.8	0.096	0.000	15.8	SW MH 5	8.069	OK
FEH22: 2 years: +0 %: 360 mins: Summer	43.100	40.950	41.134	0.184	3.1	0.209	0.000	3.1	SW MH 7	54.876	OK
FEH22: 2 years: +0 %: 360 mins: Summer	43.200	40.781	40.819	0.038	3.1	0.043	0.000	3.1	SW MH 8	54.871	OK
FEH22: 2 years: +0 %: 360 mins: Summer	41.860	40.670	40.707	0.037	3.1	0.000	0.000	3.1	SW MH 4253 (Existing)	54.871	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.150	41.885	41.973	0.088	14.4	0.100	0.000	13.8	SW MH 12	6.986	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.150	41.985	42.071	0.086	14.4	0.097	0.000	13.4	SW MH 11	6.559	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.250	42.304	42.386	0.082	13.7	0.093	0.000	12.9	SW MH 10	5.953	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.310	42.485	42.516	0.031	3.4	0.035	0.000	3.4	SW MH 9	1.493	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.300	41.050	41.753	0.703	18.1	0.795	0.000	17.8	SW MH 6 Catchpit	8.337	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.300	42.426	42.453	0.027	0.1	0.031	0.000	0.0	SW MH 1	0.041	OK
FEH22: 2 years: +0 %: 15 mins: Summer	43.200	42.218	42.307	0.089	13.1	0.101	0.000	12.3	SW MH 3	5.886	OK
FEH22: 2 years: +0 %: 240 mins: Summer	42.100	40.594	40.638	0.044	2.7	0.049	0.000	2.7	SW MH 31	63.234	OK

FEH22: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Junction	Total Discharge Volume (m³)	Status
FEH22: 30 years: +40 %: 15 mins: Summer	44.000	43.250	43.289	0.039	4.0	0.045	0.000	3.8	SW MH 13	1.708	OK
FEH22: 30 years: +40 %: 15 mins: Summer	43.800	43.050	43.050	0.000	0.0	0.000	0.000	0.0	SW MH 21	0.000	OK
FEH22: 30 years: +40 %: 480 mins: Winter	43.450	42.546	42.763	0.217	2.6	0.245	0.000	3.1	SW MH 14	29.467	OK
FEH22: 30 years: +40 %: 480 mins: Winter	43.400	42.479	42.763	0.284	5.1	0.321	0.000	5.7	SW MH 15	58.069	Surcharged
FEH22: 30 years: +40 %: 480 mins: Winter	43.070	42.245	42.763	0.518	6.7	0.586	0.000	6.7	SW MH 16	73.840	Surcharged
FEH22: 30 years: +40 %: 480 mins: Winter	43.100	42.032	42.763	0.731	7.2	0.826	0.000	7.2	SW MH 17	81.629	Surcharged
FEH22: 30 years: +40 %: 480 mins: Winter	43.000	41.725	42.763	1.038	7.6	1.174	0.000	7.6	SW MH 18	85.551	Flood Risk
FEH22: 30 years: +40 %: 480 mins: Winter	43.350	41.177	42.762	1.585	8.3	1.793	0.000	8.0	SW MH 19	94.067	Surcharged
FEH22: 30 years: +40 %: 480 mins: Winter	43.550	41.000	42.762	1.762	8.6	1.993	0.000	8.4	SW MH 20 Catchpit	101.144	Surcharged
FEH22: 30 years: +40 %: 480 mins: Winter	43.000	41.000	42.762	1.762	2.8	1.993	0.000	2.6	SW MH 28 Catchpit	30.739	Flood Risk
FEH22: 30 years: +40 %: 480 mins: Winter	43.750	41.000	42.762	1.762	4.4	1.993	0.000	3.3	SW MH 29	157.974	Surcharged
FEH22: 30 years: +40 %: 480 mins: Winter	42.550	40.777	40.820	0.043	3.3	0.048	0.000	3.3	SW MH 30	157.820	OK
FEH22: 30 years: +40 %: 480 mins: Winter	42.230	40.530	40.558	0.028	3.3	0.032	0.000	3.3	SW13 (Existing)	157.674	OK
FEH22: 30 years: +40 %: 480 mins: Winter	41.980	39.920	39.947	0.027	3.3	0.000	0.000	3.3	SW MH 6252 (Existing)	157.674	OK
FEH22: 30 years: +40 %: 480 mins: Winter	43.070	42.141	42.763	0.622	2.2	0.703	0.000	2.2	SW MH 22	26.165	Surcharged
FEH22: 30 years: +40 %: 480 mins: Winter	43.070	41.888	42.762	0.875	2.8	0.989	0.000	2.8	SW MH 23	31.655	Surcharged
FEH22: 30 years: +40 %: 480 mins: Winter	43.290	41.566	42.762	1.197	7.5	1.353	0.000	6.7	SW MH 24	82.786	Surcharged
FEH22: 30 years: +40 %: 480 mins: Winter	43.070	41.330	42.763	1.433	8.0	1.620	0.000	7.8	SW MH 25	94.592	Surcharged
FEH22: 30 years: +40 %: 480 mins: Winter	43.400	41.173	42.762	1.589	15.8	1.798	0.000	15.6	SW MH 26	182.953	Surcharged
FEH22: 30 years: +40 %: 480 mins: Winter	43.650	41.000	42.762	1.762	16.5	1.993	0.000	16.3	SW MH 27 Catchpit	190.281	Surcharged

FEH22: 30 years: +40 %: 15 mins: Summer	43.290	42.390	42.509	0.119	24.6	0.134	0.000	23.3	SW MH 2	10.778	OK
FEH22: 30 years: +40 %: 15 mins: Summer	43.070	42.141	42.322	0.181	49.5	0.205	0.000	47.4	SW MH 4	23.069	OK
FEH22: 30 years: +40 %: 15 mins: Summer	43.000	41.843	42.035	0.192	52.2	0.217	0.000	49.4	SW MH 5	25.065	OK
FEH22: 30 years: +40 %: 240 mins: Summer	43.100	40.950	41.511	0.561	3.7	0.635	0.000	3.5	SW MH 7	82.945	Surcharged
FEH22: 30 years: +40 %: 60 mins: Winter	43.200	40.781	40.822	0.041	3.5	0.046	0.000	3.5	SW MH 8	19.891	OK
FEH22: 30 years: +40 %: 60 mins: Winter	41.860	40.670	40.709	0.039	3.5	0.000	0.000	3.5	SW MH 4253 (Existing)	19.891	OK
FEH22: 30 years: +40 %: 15 mins: Summer	43.150	41.885	42.072	0.187	45.0	0.212	0.000	43.3	SW MH 12	21.607	OK
FEH22: 30 years: +40 %: 15 mins: Summer	43.150	41.985	42.176	0.191	44.8	0.216	0.000	41.9	SW MH 11	20.270	OK
FEH22: 30 years: +40 %: 15 mins: Summer	43.250	42.304	42.473	0.169	42.3	0.191	0.000	40.4	SW MH 10	18.363	OK
FEH22: 30 years: +40 %: 15 mins: Summer	43.310	42.485	42.538	0.053	10.6	0.060	0.000	10.5	SW MH 9	4.603	OK
FEH22: 30 years: +40 %: 15 mins: Summer	43.300	41.050	41.873	0.823	56.4	0.931	0.000	54.3	SW MH 6 Catchpit	27.391	OK
FEH22: 30 years: +40 %: 15 mins: Summer	43.300	42.426	42.509	0.083	0.3	0.094	0.000	0.4	SW MH 1	0.135	OK
FEH22: 30 years: +40 %: 15 mins: Summer	43.200	42.218	42.416	0.198	40.8	0.223	0.000	38.2	SW MH 3	18.189	OK
FEH22: 30 years: +40 %: 480 mins: Winter	42.100	40.594	40.642	0.048	3.3	0.055	0.000	3.3	SW MH 31	157.720	OK

FEH22: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Depth

Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Junction	Total Discharge Volume (m³)	Status
FEH22: 100 years: +45 %: 15 mins: Summer	44.000	43.250	43.294	0.044	5.2	0.050	0.000	4.9	SW MH 13	2.213	OK
FEH22: 100 years: +45 %: 15 mins: Summer	43.800	43.050	43.068	0.018	0.0	0.020	0.000	0.8	SW MH 21	0.395	OK
FEH22: 100 years: +45 %: 30 mins: Summer	43.450	42.546	43.081	0.535	21.2	0.605	0.000	19.9	SW MH 14	18.655	Surcharged
FEH22: 100 years: +45 %: 30 mins: Summer	43.400	42.479	43.070	0.591	40.4	0.669	0.000	39.3	SW MH 15	36.509	Surcharged
FEH22: 100 years: +45 %: 720 mins: Winter	43.070	42.245	42.990	0.745	6.1	0.843	0.000	6.1	SW MH 16	104.609	Flood Risk
FEH22: 100 years: +45 %: 720 mins: Winter	43.100	42.032	42.990	0.958	6.8	1.084	0.000	6.4	SW MH 17	115.864	Flood Risk
FEH22: 100 years: +45 %: 720 mins: Winter	43.000	41.725	42.990	1.265	6.8	1.431	0.000	6.4	SW MH 18	123.652	Flood Risk
FEH22: 100 years: +45 %: 720 mins: Winter	43.350	41.177	42.990	1.813	7.3	2.051	0.000	7.1	SW MH 19	139.613	Surcharged
FEH22: 100 years: +45 %: 720 mins: Winter	43.550	41.000	42.990	1.990	7.8	2.251	0.000	7.7	SW MH 20 Catchpit	151.919	Surcharged
FEH22: 100 years: +45 %: 720 mins: Winter	43.000	41.000	42.990	1.990	2.7	2.251	0.000	2.5	SW MH 28 Catchpit	45.569	Flood Risk
FEH22: 100 years: +45 %: 720 mins: Winter	43.750	41.000	42.989	1.989	5.9	2.250	0.000	3.5	SW MH 29	471.554	Surcharged
FEH22: 100 years: +45 %: 720 mins: Winter	42.550	40.777	40.821	0.044	3.5	0.050	0.000	3.5	SW MH 30	471.463	OK
FEH22: 100 years: +45 %: 720 mins: Winter	42.230	40.530	40.559	0.029	3.5	0.033	0.000	3.5	SW13 (Existing)	471.376	OK
FEH22: 100 years: +45 %: 720 mins: Winter	41.980	39.920	39.948	0.028	3.5	0.000	0.000	3.5	SW MH 6252 (Existing)	471.376	OK
FEH22: 100 years: +45 %: 720 mins: Winter	43.070	42.141	42.990	0.849	3.6	0.960	0.000	2.1	SW MH 22	36.923	Flood Risk
FEH22: 100 years: +45 %: 720 mins: Winter	43.070	41.888	42.990	1.102	4.9	1.247	0.000	2.4	SW MH 23	46.756	Flood Risk
FEH22: 100 years: +45 %: 720 mins: Winter	43.290	41.566	42.990	1.424	6.7	1.611	0.000	6.6	SW MH 24	124.106	Flood Risk
FEH22: 100 years: +45 %: 720 mins: Winter	43.070	41.330	42.990	1.660	7.9	1.878	0.000	7.8	SW MH 25	145.032	Flood Risk
FEH22: 100 years: +45 %: 720 mins: Winter	43.400	41.173	42.990	1.817	15.2	2.055	0.000	15.1	SW MH 26	274.267	Surcharged
FEH22: 100 years: +45 %: 720 mins: Winter	43.650	41.000	42.990	1.990	15.9	2.251	0.000	15.8	SW MH 27 Catchpit	287.952	Surcharged

FEH22: 100 years: +45 %: 15 mins: Summer	43.290	42.390	42.585	0.195	32.1	0.220	0.000	18.7	SW MH 2	14.466	OK
FEH22: 100 years: +45 %: 15 mins: Summer	43.070	42.141	42.462	0.321	53.4	0.363	0.000	51.5	SW MH 4	30.299	Surcharged
FEH22: 100 years: +45 %: 15 mins: Summer	43.000	41.843	42.168	0.325	57.7	0.368	0.000	56.5	SW MH 5	32.942	Surcharged
FEH22: 100 years: +45 %: 240 mins: Summer	43.100	40.950	41.732	0.782	3.8	0.885	0.000	3.5	SW MH 7	78.730	Surcharged
FEH22: 100 years: +45 %: 360 mins: Summer	43.200	40.781	40.822	0.041	3.5	0.046	0.000	3.5	SW MH 8	182.586	OK
FEH22: 100 years: +45 %: 360 mins: Summer	41.860	40.670	40.709	0.039	3.5	0.000	0.000	3.5	SW MH 4253 (Existing)	182.586	OK
FEH22: 100 years: +45 %: 15 mins: Summer	43.150	41.885	42.139	0.254	53.6	0.287	0.000	51.9	SW MH 12	28.382	Surcharged
FEH22: 100 years: +45 %: 15 mins: Summer	43.150	41.985	42.269	0.284	51.6	0.321	0.000	49.5	SW MH 11	26.611	Surcharged
FEH22: 100 years: +45 %: 15 mins: Summer	43.250	42.304	42.584	0.280	51.4	0.316	0.000	45.8	SW MH 10	24.054	Surcharged
FEH22: 100 years: +45 %: 15 mins: Summer	43.310	42.485	42.590	0.105	13.9	0.118	0.000	9.9	SW MH 9	6.029	OK
FEH22: 100 years: +45 %: 15 mins: Summer	43.300	41.050	41.944	0.894	65.6	1.011	0.000	65.1	SW MH 6 Catchpit	36.196	Surcharged
FEH22: 100 years: +45 %: 15 mins: Summer	43.300	42.426	42.587	0.161	4.6	0.182	0.000	0.6	SW MH 1	0.474	OK
FEH22: 100 years: +45 %: 15 mins: Summer	43.200	42.218	42.547	0.329	41.5	0.372	0.000	38.6	SW MH 3	23.885	Surcharged
FEH22: 100 years: +45 %: 720 mins: Winter	42.100	40.594	40.644	0.050	3.5	0.056	0.000	3.5	SW MH 31	471.404	OK

FEH22: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Cellular Storage East	FEH22: 2 years: +0 %: 480 mins: Summer	41.551	41.551	0.551	0.551	16.7	78.532	0.000	0.000	2.8	122.945		54.182
Cellular Storage West	FEH22: 2 years: +0 %: 360 mins: Summer	41.135	41.135	0.185	0.185	10.0	31.409	0.000	0.000	3.1	54.880		84.675
Pond	FEH22: 2 years: +0 %: 15 mins: Summer	42.600	42.600	0.000	0.000	0.0	0.000	0.000	0.000	0.0	0.000		100.000

Status
OK
OK
OK

Greenway Primary School:	Date: 15/04/2026			CampbellReith consulting engineers
	Designed by: YL/HJ/AH	Checked by: LM	Approved By: LM	
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	CampbellReith:			

FEH22: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Cellular Storage East	FEH22: 30 years: +40 %: 480 mins: Winter	42.762	42.762	1.762	1.762	26.8	194.481	23.050	0.000	4.4	201.218		-13.466
Cellular Storage West	FEH22: 30 years: +40 %: 240 mins: Summer	41.512	41.512	0.562	0.562	33.8	95.493	0.000	0.000	3.7	83.303		53.408
Pond	FEH22: 30 years: +40 %: 480 mins: Winter	42.762	42.762	0.162	0.162	9.5	40.809	0.000	0.000	2.0	37.505		84.152

Status
Flood
OK
OK

Greenway Primary School:	Date: 15/04/2026			CampbellReith consulting engineers
	Designed by: YL/HJ/AH	Checked by: LM	Approved By: LM	
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	CampbellReith:			

FEH22: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Cellular Storage East	FEH22: 100 years: +45 %: 720 mins: Winter	42.990	42.990	1.990	1.990	25.7	226.909	55.478	0.000	5.9	576.944	1600	-32.386
Cellular Storage West	FEH22: 100 years: +45 %: 240 mins: Summer	41.733	41.733	0.783	0.783	43.7	133.042	0.000	0.000	3.8	79.374	165	35.087
Pond	FEH22: 100 years: +45 %: 720 mins: Winter	42.990	42.990	0.390	0.390	17.6	104.394	0.000	0.000	2.2	103.526		59.458

Status
Flood
OK
OK

FEH22: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Total Discharge Volume

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe 13	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW MH 13	SW MH 14	44.000	43.254	0.004	4.709	0.3	0	0.0	OK
Pipe 14	FEH22: 2 years: +0 %: 10080 mins: Winter	Pipe	SW MH 14	SW MH 15	43.450	42.554	0.010	31.558	0.2	0	0.1	OK
Pipe 15	FEH22: 2 years: +0 %: 10080 mins: Winter	Pipe	SW MH 15	SW MH 16	43.400	42.490	0.012	64.222	0.3	0	0.3	OK
Pipe 16	FEH22: 2 years: +0 %: 10080 mins: Winter	Pipe	SW MH 16	SW MH 17	43.070	42.258	0.013	81.154	0.4	0.01	0.3	OK
Pipe 17	FEH22: 2 years: +0 %: 10080 mins: Winter	Pipe	SW MH 17	SW MH 18	43.100	42.045	0.014	90.340	0.4	0.01	0.4	OK
Pipe 18	FEH22: 2 years: +0 %: 10080 mins: Winter	Pipe	SW MH 18	SW MH 19	43.000	41.739	0.013	95.302	0.4	0.01	0.4	OK
Pipe 19	FEH22: 2 years: +0 %: 10080 mins: Winter	Pipe	SW MH 19	SW MH 20 Catchpit	43.350	41.189	0.058	107.758	0.1	0.01	0.5	OK
Pipe 21	FEH22: 2 years: +0 %: 15 mins: Summer	Pipe	SW MH 21	SW MH 14	43.800	43.050	0.000	0.000	0.0	0	0.0	OK
Pipe 30	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW MH 29	SW MH 30	43.750	41.153	0.035	380.911	0.7	0.12	2.2	Surcharged
Pipe 33	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW13 (Existing)	SW MH 6252 (Existing)	42.230	40.553	0.023	380.909	1.3	0.05	2.2	OK
Pipe 22	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW MH 22	SW MH 23	43.070	42.150	0.010	28.794	0.3	0	0.2	OK
Pipe 23	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW MH 23	SW MH 24	43.070	41.898	0.014	35.075	0.2	0	0.2	OK
Pipe 24	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW MH 24	SW MH 25	43.290	41.583	0.017	94.667	0.4	0.01	0.6	OK
Pipe 25	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW MH 25	SW MH 26	43.070	41.348	0.020	111.233	0.3	0.01	0.7	OK

Pipe 26	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW MH 26	SW MH 27 Catchpit	43.400	41.196	0.088	213.944	0.2	0.01	1.4	OK
Pipe 9	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW MH 9	SW MH 10	43.310	42.490	0.010	14.508	0.2	0	0.1	OK
Pipe 10	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW MH 10	SW MH 11	43.250	42.318	0.014	56.496	0.3	0.01	0.4	OK
Pipe 11	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW MH 11	SW MH 12	43.150	41.999	0.015	61.931	0.4	0.01	0.4	OK
Pipe 7	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW MH 7	SW MH 8	43.100	41.022	0.022	167.010	0.5	0.02	1.1	OK
Pipe 8	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW MH 8	SW MH 4253 (Existing)	43.200	40.804	0.022	167.010	0.5	0.02	1.1	OK
Pipe 4	FEH22: 2 years: +0 %: 10080 mins: Winter	Pipe	SW MH 4	SW MH 5	43.070	42.153	0.012	73.523	0.4	0.01	0.3	OK
Pipe 5	FEH22: 2 years: +0 %: 10080 mins: Winter	Pipe	SW MH 5	SW MH 6 Catchpit	43.000	41.855	0.013	79.456	0.4	0.01	0.3	OK
Pipe 27	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW MH 27 Catchpit	Cellular Storage East	43.650	41.154	0.154	226.026	0.1	0.03	1.5	OK
Pipe 20	FEH22: 2 years: +0 %: 10080 mins: Winter	Pipe	SW MH 20 Catchpit	Cellular Storage East	43.550	41.105	0.105	118.031	0.1	0.02	0.5	OK
Pipe 29	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW MH 28 Catchpit	Cellular Storage East	43.000	41.154	0.154	37.484	0.1	0.01	0.2	OK
Pipe 29A	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	Cellular Storage East	SW MH 29	42.600	41.154	0.154	380.913	0.1	0.08	2.3	OK
Pipe 6A	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	Cellular Storage West	SW MH 7	43.100	41.022	0.072	167.011	0.1	0.04	1.1	OK
Pipe (Tank)	FEH22: 2 years: +0 %: 15 mins: Summer	Pipe	Pond	Cellular Storage East	43.750	42.600	0.000	0.000	0.0	0	0.0	OK
Pipe 12	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW MH 12	Cellular Storage West	43.150	41.900	0.015	65.314	0.4	0.01	0.4	OK
Pipe 1	FEH22: 2 years: +0 %: 15 mins: Summer	Pipe	SW MH 1	SW MH 2	43.300	42.453	0.045	0.000	0.0	0	0.0	OK
Pipe 2	FEH22: 2 years: +0 %: 10080 mins: Winter	Pipe	SW MH 2	SW MH 3	43.290	42.400	0.011	34.338	0.2	0	0.1	OK

Pipe 3	FEH22: 2 years: +0 %: 10080 mins: Winter	Pipe	SW MH 3	SW MH 4	43.200	42.230	0.012	58.415	0.3	0.01	0.2	OK
Pipe 6	FEH22: 2 years: +0 %: 10080 mins: Winter	Pipe	SW MH 6 Catchpit	Cellular Storage West	43.300	41.664	0.013	88.792	0.4	0.01	0.4	OK
Pipe 32	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW MH 30	SW MH 31	42.550	40.812	0.038	380.910	0.6	0.12	2.2	OK
Pipe 32 (1)	FEH22: 2 years: +0 %: 10080 mins: Summer	Pipe	SW MH 31	SW13 (Existing)	42.100	40.634	0.032	380.909	0.8	0.14	2.2	OK

FEH22: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Total Discharge Volume

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe 13	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 13	SW MH 14	44.000	43.256	0.006	11.621	0.3	0	0.1	OK
Pipe 14	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 14	SW MH 15	43.450	42.560	0.016	67.636	0.3	0.01	0.4	OK
Pipe 15	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 15	SW MH 16	43.400	42.498	0.020	131.506	0.5	0.01	0.8	OK
Pipe 16	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 16	SW MH 17	43.070	42.266	0.022	166.569	0.5	0.02	1.1	OK
Pipe 17	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 17	SW MH 18	43.100	42.054	0.096	183.638	0.6	0.02	1.2	OK
Pipe 18	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 18	SW MH 19	43.000	41.902	0.225	195.958	0.5	0.02	1.3	OK
Pipe 19	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 19	SW MH 20 Catchpit	43.350	41.902	0.225	220.780	0.2	0.02	1.4	Surcharged
Pipe 21	FEH22: 30 years: +40 %: 15 mins: Summer	Pipe	SW MH 21	SW MH 14	43.800	43.050	0.028	0.000	0.0	0	0.0	OK
Pipe 30	FEH22: 30 years: +40 %: 10080 mins: Winter	Pipe	SW MH 29	SW MH 30	43.750	41.386	0.039	768.832	0.7	0.14	2.7	Surcharged
Pipe 33	FEH22: 30 years: +40 %: 10080 mins: Winter	Pipe	SW13 (Existing)	SW MH 6252 (Existing)	42.230	40.555	0.025	768.831	1.4	0.06	2.7	OK
Pipe 22	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 22	SW MH 23	43.070	42.154	0.014	57.336	0.3	0	0.4	OK
Pipe 23	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 23	SW MH 24	43.070	41.902	0.175	71.141	0.3	0	0.5	OK
Pipe 24	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 24	SW MH 25	43.290	41.902	0.300	194.546	0.5	0.01	1.3	Surcharged
Pipe 25	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 25	SW MH 26	43.070	41.902	0.300	228.636	0.4	0.01	1.4	Surcharged

Pipe 26	FEH22: 30 years: +40 %: 10080 mins: Winter	Pipe	SW MH 26	SW MH 27 Catchpit	43.400	41.387	0.300	434.907	0.1	0.02	1.8	OK
Pipe 9	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 9	SW MH 10	43.310	42.493	0.014	29.520	0.2	0	0.2	OK
Pipe 10	FEH22: 30 years: +40 %: 10080 mins: Winter	Pipe	SW MH 10	SW MH 11	43.250	42.321	0.017	130.008	0.4	0.01	0.6	OK
Pipe 11	FEH22: 30 years: +40 %: 10080 mins: Winter	Pipe	SW MH 11	SW MH 12	43.150	42.002	0.018	142.463	0.4	0.01	0.6	OK
Pipe 7	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 7	SW MH 8	43.100	41.070	0.033	423.479	0.6	0.04	2.3	OK
Pipe 8	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 8	SW MH 4253 (Existing)	43.200	40.814	0.032	423.479	0.6	0.04	2.3	OK
Pipe 4	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 4	SW MH 5	43.070	42.162	0.021	172.456	0.5	0.02	1.0	OK
Pipe 5	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 5	SW MH 6 Catchpit	43.000	41.864	0.024	185.996	0.5	0.02	1.1	OK
Pipe 27	FEH22: 30 years: +40 %: 10080 mins: Winter	Pipe	SW MH 27 Catchpit	Cellular Storage East	43.650	41.387	0.300	458.358	0.1	0.04	1.9	Surcharged
Pipe 20	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 20 Catchpit	Cellular Storage East	43.550	41.902	0.225	240.118	0.1	0.05	1.5	Surcharged
Pipe 29	FEH22: 30 years: +40 %: 10080 mins: Winter	Pipe	SW MH 28 Catchpit	Cellular Storage East	43.000	41.387	0.225	72.950	0.1	0.01	0.3	Surcharged
Pipe 29A	FEH22: 30 years: +40 %: 10080 mins: Winter	Pipe	Cellular Storage East	SW MH 29	42.600	41.387	0.225	768.834	0.1	0.09	2.7	Surcharged
Pipe 6A	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	Cellular Storage West	SW MH 7	43.100	41.070	0.120	423.480	0.1	0.08	2.3	OK
Pipe (Tank)	FEH22: 30 years: +40 %: 15 mins: Summer	Pipe	Pond	Cellular Storage East	43.750	42.600	0.000	0.000	0.0	0	0.0	OK
Pipe 12	FEH22: 30 years: +40 %: 10080 mins: Winter	Pipe	SW MH 12	Cellular Storage West	43.150	41.903	0.018	151.660	0.4	0.01	0.6	OK
Pipe 1	FEH22: 30 years: +40 %: 15 mins: Summer	Pipe	SW MH 1	SW MH 2	43.300	42.509	0.101	0.000	0.1	0.01	0.4	OK
Pipe 2	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 2	SW MH 3	43.290	42.409	0.021	92.507	0.3	0.02	0.6	OK

Pipe 3	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 3	SW MH 4	43.200	42.241	0.022	141.005	0.4	0.02	0.9	OK
Pipe 6	FEH22: 30 years: +40 %: 10080 mins: Summer	Pipe	SW MH 6 Catchpit	Cellular Storage West	43.300	41.677	0.026	225.949	0.6	0.03	1.5	OK
Pipe 32	FEH22: 30 years: +40 %: 10080 mins: Winter	Pipe	SW MH 30	SW MH 31	42.550	40.815	0.041	768.831	0.7	0.14	2.7	OK
Pipe 32 (1)	FEH22: 30 years: +40 %: 10080 mins: Winter	Pipe	SW MH 31	SW13 (Existing)	42.100	40.638	0.035	768.830	0.9	0.17	2.7	OK

FEH22: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Total Discharge Volume

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe 13	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 13	SW MH 14	44.000	43.257	0.007	13.798	0.3	0	0.1	OK
Pipe 14	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 14	SW MH 15	43.450	42.629	0.117	83.116	0.4	0.01	0.5	OK
Pipe 15	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 15	SW MH 16	43.400	42.629	0.225	161.737	0.5	0.02	1.1	OK
Pipe 16	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 16	SW MH 17	43.070	42.629	0.225	205.633	0.6	0.02	1.3	Surcharged
Pipe 17	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 17	SW MH 18	43.100	42.629	0.225	227.038	0.6	0.03	1.5	Surcharged
Pipe 18	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 18	SW MH 19	43.000	42.629	0.225	241.889	0.5	0.03	1.6	Surcharged
Pipe 19	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 19	SW MH 20 Catchpit	43.350	42.629	0.225	273.232	0.2	0.02	1.7	Surcharged
Pipe 21	FEH22: 100 years: +45 %: 15 mins: Summer	Pipe	SW MH 21	SW MH 14	43.800	43.068	0.147	0.013	0.0	0.03	0.8	OK
Pipe 30	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 29	SW MH 30	43.750	42.628	0.042	955.187	0.8	0.17	3.1	Surcharged
Pipe 33	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW13 (Existing)	SW MH 6252 (Existing)	42.230	40.558	0.027	955.185	1.4	0.07	3.1	OK
Pipe 22	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 22	SW MH 23	43.070	42.629	0.300	71.247	0.4	0	0.5	Surcharged
Pipe 23	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 23	SW MH 24	43.070	42.628	0.300	87.944	0.3	0.01	0.6	Surcharged
Pipe 24	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 24	SW MH 25	43.290	42.629	0.300	240.609	0.5	0.01	1.4	Surcharged
Pipe 25	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 25	SW MH 26	43.070	42.629	0.300	282.930	0.4	0.02	1.7	Surcharged

Pipe 26	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 26	SW MH 27 Catchpit	43.400	42.629	0.300	538.643	0.2	0.03	3.3	Surcharged
Pipe 9	FEH22: 100 years: +45 %: 10080 mins: Winter	Pipe	SW MH 9	SW MH 10	43.310	42.492	0.014	36.774	0.2	0	0.2	OK
Pipe 10	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 10	SW MH 11	43.250	42.329	0.025	166.545	0.5	0.03	1.2	OK
Pipe 11	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 11	SW MH 12	43.150	42.010	0.026	181.658	0.5	0.03	1.3	OK
Pipe 7	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 7	SW MH 8	43.100	41.188	0.039	558.780	0.7	0.06	3.3	Surcharged
Pipe 8	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 8	SW MH 4253 (Existing)	43.200	40.821	0.039	558.780	0.7	0.06	3.3	OK
Pipe 4	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 4	SW MH 5	43.070	42.169	0.028	224.020	0.6	0.03	1.7	OK
Pipe 5	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 5	SW MH 6 Catchpit	43.000	41.870	0.031	240.344	0.5	0.03	1.8	OK
Pipe 27	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 27 Catchpit	Cellular Storage East	43.650	42.629	0.300	567.776	0.4	0.07	3.5	Surcharged
Pipe 20	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 20 Catchpit	Cellular Storage East	43.550	42.629	0.225	297.187	0.3	0.06	1.9	Surcharged
Pipe 29	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 28 Catchpit	Cellular Storage East	43.000	42.629	0.225	91.073	0.1	0.02	0.6	Surcharged
Pipe 29A	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	Cellular Storage East	SW MH 29	42.600	42.629	0.225	955.189	0.1	0.11	3.2	Flood
Pipe 6A	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	Cellular Storage West	SW MH 7	43.100	41.188	0.225	558.781	0.1	0.11	3.3	Surcharged
Pipe (Tank)	FEH22: 100 years: +45 %: 15 mins: Summer	Pipe	Pond	Cellular Storage East	43.750	42.600	0.031	0.000	0.0	0	0.0	OK
Pipe 12	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 12	Cellular Storage West	43.150	41.912	0.026	193.033	0.5	0.03	1.4	OK
Pipe 1	FEH22: 100 years: +45 %: 15 mins: Summer	Pipe	SW MH 1	SW MH 2	43.300	42.587	0.178	0.000	0.1	0.01	0.6	OK
Pipe 2	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 2	SW MH 3	43.290	42.415	0.027	125.555	0.4	0.03	1.1	OK

Pipe 3	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 3	SW MH 4	43.200	42.247	0.029	185.435	0.5	0.03	1.5	OK
Pipe 6	FEH22: 100 years: +45 %: 10080 mins: Winter	Pipe	SW MH 6 Catchpit	Cellular Storage West	43.300	41.678	0.027	300.082	0.6	0.03	1.6	OK
Pipe 32	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 30	SW MH 31	42.550	40.819	0.045	955.186	0.7	0.17	3.1	OK
Pipe 32 (1)	FEH22: 100 years: +45 %: 10080 mins: Summer	Pipe	SW MH 31	SW13 (Existing)	42.100	40.641	0.038	955.185	0.9	0.2	3.1	OK



CampbellReith
consulting engineers

Appendix 9

Southern Water Correspondence

Appendix

from Southern Water

Yvonne Lai
10 Chapel Walks
Manchester
Greater Manchester
M2 1HL

Your ref
24489

Our ref
DSA000051697

Date
25th of March 2026

Contact
Tel 0330 303 0119

Dear Ms Lai,

Level 1 Capacity Check Enquiry: Greenway School.

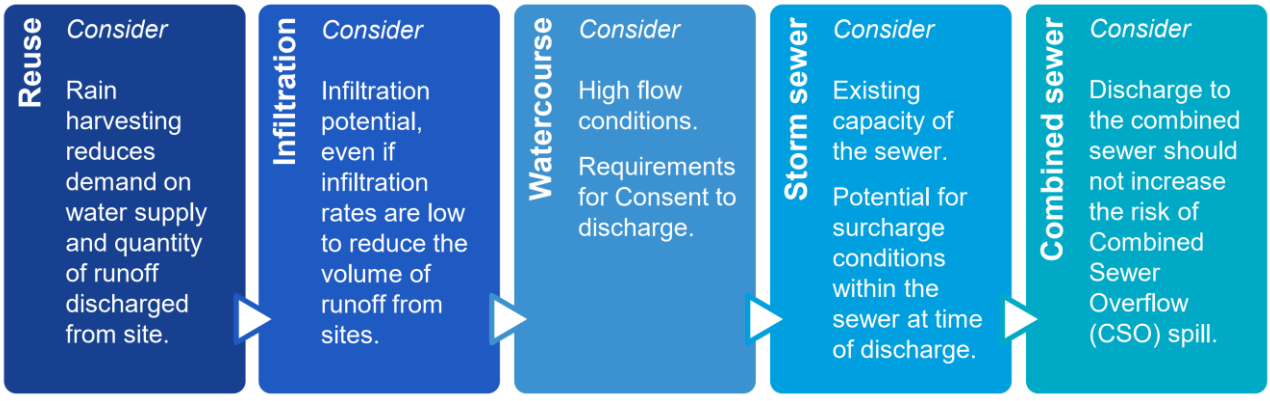
We have completed the capacity check for the above development site and the results are as follows:

Surface Water

The enquiry has been assessed to determine the capacity available for **7 l/s** at manhole reference **TQ16314353 (516472, 131330).**

There is currently adequate capacity in the local surface water/foul sewerage network to accommodate a surface water flow of **7 l/s** for the above development at manhole reference **TQ16314353 (516472, 131330).**

Although capacity in the surface water network has been identified, in all situations where surface water is being considered for discharge to our network, we require the below hierarchy for surface water to be followed which is reflected in part H3 of the Building Regulations. Whilst reuse does not strictly form part of this hierarchy, Southern Water would encourage the consideration of reuse for new developments.



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Guidance on Building Regulations is here: gov.uk/government/publications/drainage-and-waste-disposal-approved-document-h

We would welcome the opportunity to engage with you on the design for disposal of surface water, with a particular focus on the potential for incorporating Sustainable Drainage Systems (SuDS), for this development at the earliest opportunity and we recommend that civil engineers and landscape architects work together and with Southern Water.

Where a surface water connection to the foul or combined sewer is being considered, this should be agreed by the Lead Local Flood Authority, in consultation with Southern Water.

It should be noted that although the above assessment indicates that there is capacity available for your proposed surface water flows the LLFA (Local Lead Flood Authority) may impose/request that a lower flow is discharged to the public surface water sewer.

If the excess surface water flows are to be attenuated on site, it could have a significant effect on any proposed Sewer Adoption (S104) Agreements. Any attenuation proposals should be agreed before any works are implemented on site. Where capacity is limited/restricted, agreement should be sought if you are to include any highway drainage within your proposals as Southern Water is not obligated to accept highway flows.

Connecting to our network

It should be noted that this information is only a hydraulic assessment of the existing sewerage network and does not grant approval for a connection to the public sewerage system. A formal Sewer Connection (S106) application is required to be completed and approved by Southern Water Services. To make an application visit: developerservices.southernwater.co.uk

Please note the information provided above does not grant approval for any designs/drawings submitted for the capacity analysis. The results quoted above are only valid for 12 months from the date of issue of this letter. **Any revisions in flow rate or alternative point of connection will require a new Pre-Planning Application to be submitted.**

Please get in touch via the Get Connected customer dashboard if you have any queries.

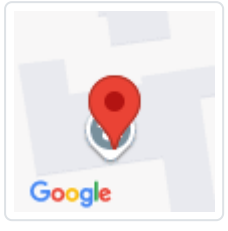
Yours sincerely,

Future Growth Planning Team
Developer Services

southernwater.co.uk/developing-building/planning-your-development

Back to dashboard

Application details



Site name
Greenway School

Application reference number
24489

Application status
Assessing Network Impact

Application type
Pre Development Enquiry Waste

Comments

Raise a query

24/03/2026 14:26:28 - Kelly Donaldson wrote

Dear Ms Lai,Southern water requires the easement and depending on the depth of the sewer line and the depths of the foundations, this slight over lap should be accepted. However, we are unable to accept at this point and this will need to be reviewed once planning has been submitted.Kind regards,Kelly DonaldsonDeveloper Services

24/03/2026 14:25:25 - Kelly Donaldson wrote

Dear Ms Lai,Please find attached the Pre-Development Enquiry acknowledgement letter. Your application will be progressed, and we will send you the response within 21 days.Yours sincerely,Kelly DonaldsonDeveloper Services

24/03/2026 11:24:32 - YvonneLai_CR

Hi Kelly,
Please find attached the initial drainage strategy drawing, where the foul sewer from the sewer records has been traced over with the 4m easement.
Please can you confirm whether the building outline encroachment into the easement will be acceptable to Southern Water?
The surface water system will be gravity fed.
Kind regards,
Yvonne

24/03/2026 10:56:58 - Kelly Donaldson wrote

Dear Ms Lai,In regards to foul, the 4m easement is acceptable.For Surface water, please may you confirm if the proposed flow rate of 7 l/s is pumped or gravity fed?Kind regards,Kelly DonaldsonDeveloper Services

23/03/2026 16:15:30 - YvonneLai_CR

Hi Kelly,
Please can you give us comment/guidance on whether:
1. As per our query document attached previously, it is anticipated that the proposed building will encroach on the foul sewer easement to a small extent. Please can Southern Water confirm the easement width of the sewer (our current understanding the sewer is >7m deep and thus 4m easement on either side of centreline is taken), whether this minor encroachment is acceptable, and any further steps will be required from us on this application.

2. The surface water connections proposed are acceptable to Southern Water, the connection to 6252 which is existing, and the 4353 which is proposed. Surface Water discharge from the site will be restricted to Qbar at 7L/s (in total for the two outfalls) based on 1.85ha of catchment area

contributing to the surface water drainage system. The division of flow rate between the two outfalls are to be confirmed following detailed design. From drainage survey of the existing development there are no flow restrictions applied to the development currently for the connection at 6252.

Kind regards,
Yvonne

23/03/2026 11:41:03 - Kelly Donaldson wrote

Dear Ms Lai,As there is no change in usage or pupils at the school and the discharge rate will remain the same. No application is required.Please may you advise why you have applied for this application, as we believe you might be after a difference application. This application is to check for capacity within the public network?Kind regards,Kelly DonaldsonDeveloper Services

---

23/03/2026 10:26:46 - YvonneLai_CR

Hi Kelly,
The current site usage is a school and will remain so after the proposed development. The foul discharge rate is not expected to change after the development as there will be no change in pupil numbers.
Kind regards,
Yvonne

12/03/2026 14:47:59 - Kelly Donaldson wrote

Dear Ms Lai,Thank you.Please may you advise the current site usage (School?) and the current discharge rate?Kind regards,Kelly DonaldsonDeveloper Services

---

12/03/2026 10:59:48 - YvonneLai_CR

Hi Kelly,
The site currently has 1 surface water connection to MH 6252 and 1 foul water connection to MH 5402.
We are proposing to retain the 2 connections, and add a new surface water connection at MH 4353.
The foul connection would serve 450 pupils/staff.
The surface water connection would be restricted to Qbar at 7L/s (in total for the two outfalls) based on 1.85ha of catchment area contributing to the surface water drainage system. The division of flow rate between the two outfalls are to be confirmed following detailed design.
As per our query document attached previously, it is anticipated that the proposed building will encroach on the foul sewer easement to a small extent. Please can Southern Water confirm the easement width of the sewer (our current understanding the sewer is >7m deep and thus 4m easement on either side of centreline is taken), whether this minor encroachment is acceptable, and any further steps will be required from us on this application.
Kind regards,
Yvonne

12/03/2026 09:40:53 - Kelly Donaldson wrote

Dear Ms Lai,Thank you for the information.Please may you advise what the proposed development is as well as the following.- Flow Rate?- Is the proposed point of connection for foul MH5402? Please may you confirm the Surface Water point of connection? - Is the system pumped or gravity fed?Kind regards,Kelly DonaldsonDeveloper Services

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25/02/2026 11:06:28 - YvonneLai_CR

Please refer to 'Southern Water Queries'

All documents

Below are all the documents associated to this application.

- 0.1 Acknowledgement - Full and complete.pdf
- 14500-CRH-XX-XX-FG-G-7009-P01_InitialDrainageStrategy.pdf
- VAT RECEIPT _DE2052384.PDF
- L25263AKF-CRH-XX-XX-FG-G-7000-P01_SiteLcn_2026-02-25-11-06-56_2026-02-25-11-07-07.pdf
- 3.1 SRP1029 Preliminary Flood Risk Assessment_2026-02-25-11-07-05.pdf
- 3.1 SRP1029 Topographical Survey_2026-02-25-11-06-58.pdf
- L25263AKF-CRH-XX-XX-FG-G-7000-P01_SiteLcn_2026-02-25-11-06-56.pdf
- Southern Water Queries.docx

- L25263AKF-CRH-XX-XX-FG-G-7000-P01_SiteLcn.pdf
- 3.1 SRP1029 Preliminary Flood Risk Assessment.pdf
- 3.1 SRP1029 Topographical Survey.pdf
- 7643-ECE-XX-00-D-A-0001 - Site Plan markup.pdf
- 3.1 SRP1029 Utilities Survey.pdf
- 3.1 SRP1029 Southern Water - Wastewater.pdf

Join the conversation

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