

St. JOHN'S THORNHAM SCHOOL, ROCHDALE

Flood Risk Assessment Report

For

Cranmer Education Trust



Document Control

Status	Rev	Date	Prepared by	Approved by	Revision Details
S02	P01	19.02.24	Eleni Zachara BEng MSc	Ian Entwisle Director	Initial Issue
S02	P01	18.03.24	Eleni Zachara BEng MSc	Ian Entwisle Director	Architect's Layout Revised



Disclaimer

This report has been prepared by Booth King Partnership Ltd. who have exercised such professional skill, care and diligence as may reasonably be expected of a properly qualified and competent consultant, experienced in preparing reports of similar scope.

However, to the extent that the report is based or relies upon information contained in records, reports or other materials provided to BKP, which have not been independently produced or verified, BKP gives no warranty, representation, or assurance as to the accuracy or completeness of such information.

Those using this information in subsequent assessments or evaluations do so at their own risk.



Executive Summary

Site Setting	The site comprises circa 0.72 hectares of brownfield and greenfield land located south of Castleton and northwest of Oldham, on Thornham Lane, M24 2SB. (E: 389148, N: 408913).
Flood Risk	The EA fluvial and tidal flood map shows that the site and its surroundings is wholly contained within an area designated as Flood Zone 1.
SUDS, Surface Water Management & Preliminary Drainage Strategy	Surface water flows generated by the development's hard surfaces will be attenuated into the wider system. According to the SUDS hierarchy, consideration has been given to sustainable methods such as infiltration/soakaways. Based on available GI information, infiltration is not expected to be viable, due to high water table. The development will include permeable paving and attenuation tank. Residual flows are proposed to be discharged into the public sewer network operated by United Utilities.
Controlled Water Pollution	The underlying ground/groundwater beneath the site should be protected from pollution. This will be aided by carrying out the recommendations within this report and by using best practice construction techniques.



Contents

1	Introduction	6
2	Site Setting	7
2.1	Site Description	7
2.2	Site Levels	7
2.3	Current Land Use	7
2.4	Proposed Development	8
2.5	Underlying Ground	8
2.6	Hydrology	8
3	Flood Risk	9
3.1	Flood Zones	9
3.1.1	Fluvial/Tidal	9
3.1.2	Surface Water	11
3.1.3	Groundwater	12
3.1.4	Anthropogenic Sources	13
3.1.5	Groundwater Source Protection Zone	13
3.2	Correspondence	15
3.2.1	United Utilities	15
3.2.2	Lead Local Flood Authority	15
3.2.3	Internal Drainage Board	16
4	Surface Water	17
5	Conclusions	19

References

Appendices

Appendix A – Site Plan

Appendix B - Topographical Survey

Appendix C - Borehole Logs

Appendix D – Architect's Layout

Appendix E - Drainage Arrangement



1 Introduction

Booth King Partnership Ltd. (BKP) were commissioned by Cranmer Education Trust to carry out a Flood Risk Assessment (FRA) for St John's CE Thornham Primary School. The report was undertaken in support of a future planning application for the Phase 1(1FE) and Phase 2(2FE) extension of the school.

This report presents the findings of the FRA, which has been carried out in accordance with the National Planning Policy Framework (NPPF), Technical Guidance to the NPPF and Planning Practice Guidance. Other documents consulted have included Environment Agency (EA) FRA Guidance Note 1, the local Strategic Flood Risk Assessment (SFRA) and the local surface water management (SWMP). A full list of documents used to inform this report is shown in the reference section.

This FRA aims to identify and assess the risks of all forms of flooding to and from the site and demonstrate how these flood risks will be managed, taking climate change into account. The FRA also considers the management of surface water run-off and outlines the proposed drainage strategy.

Although, the site has an area of less than 1 hectare and an FRA is not compulsory in accordance with the NPPF, it is considered a good practise to submit as much information as possible. The proposed development should not increase the risk of flooding elsewhere and this FRA has therefore been prepared to demonstrate that this has been achieved. Consideration has also been given to BREEAM accreditation, including the requirements of Pol 03, the risk of pollution to controlled waters and the site conditions prior to, during and after development.

It is the assumption wherever possible that ground levels post-development will remain as close to existing as is practical. If this or other key assumptions change, then the conclusions within this report may need to be reassessed to check that they are still applicable.

This report is based on information obtained from the recently undertaken site topographical and drainage record plans.

2 Site Setting

2.1 Site Description

The site comprises circa 0.72 hectares of brownfield and greenfield land located south of Castleton and northwest of Oldham, on Thornham Lane, M24 2SB. (E: 389148, N: 408913).

Figure 1 below provides an aerial view of the site location. Approximate development boundary is shown in red (also in Appendix A).

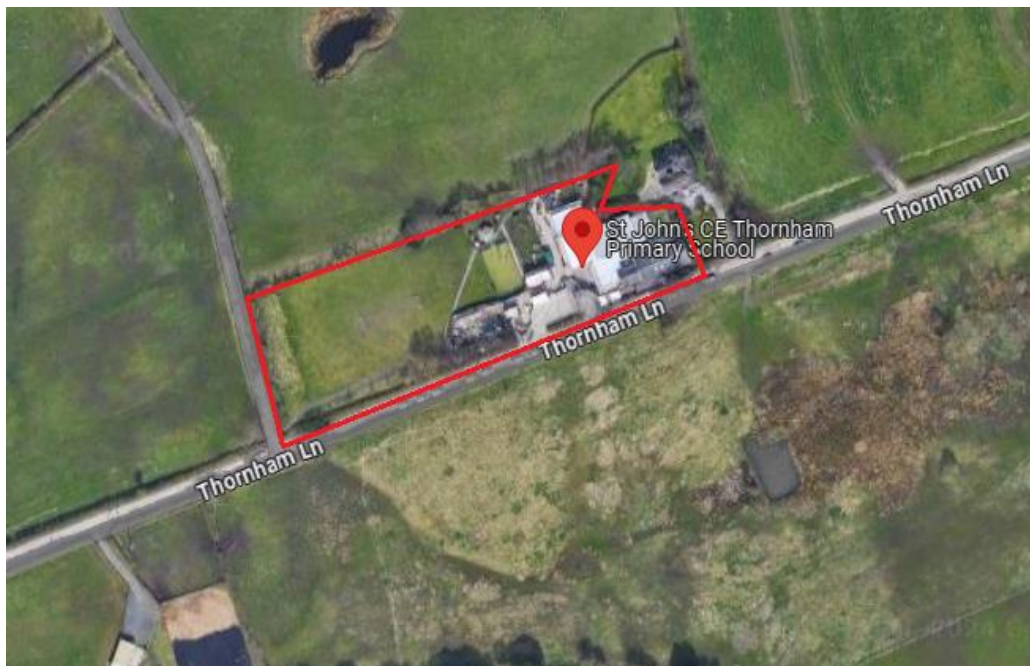


Figure 1 - Site Location

The A627 is a main arterial road serving Rochdale Town Centre and the site is close to the short off slip road.

2.2 Site Levels

The site generally falls from the northeast towards the southwest. The top height is approximately 154.5 meters above ordinance datum (AOD) in the northeast part of the site and falls to the southwest to approximately 148.5 AOD. The topographical survey can be found in Appendix B.

2.3 Current Land Use

Site

Grassed vegetation across the site. Trees and shrubs present along the site. The site landscaping formed green space, generally for play areas (football pitch, playground, outdoor jungle gym, etc).

Surrounding Area

The site is currently surrounded by open fields, however planning approval was given for residential properties with associated infrastructure and landscaping.



2.4 Proposed Development

The school is to be extended in two phases, as mentioned in section 1. The proposals include altering the existing landscape by extending the school to the west into the playground/MUGA designated area 1FE. Phase 2 is to extend the school even further to the west and again into the playground/MUGA area proposed in phase 1.

New use for landscaping is included within the proposals such as, car parking, bike store and public realm (forest school, reception play area, etc). Refer to Appendix D for Architect's proposals.

2.5 Underlying Ground

A site wide Phase 2 geo-environmental investigation, Risk Assessment & Remediation Strategy has been carried out in support of the outline planning application on behalf of Rochdale Borough Council (LK Group CL-602-LKC 20 1219-02 February 2020).

A summary of the findings below in Table 1.

Strata	Typical Description	Min Depth to top of Strata (mbgl)	Max Depth to top of Strata (mbgl)	Max Thickness (m)
Topsoil	Blackish brown sandy slightly gravelly SILT with frequent rootlets.	0.00	0.00	0.40
Made Ground	Bituminous macadam (0.07m thick) over granular subbase.	0.00	0.00	0.80
Granular	Medium dense to dense orange clayey SAND.	0.40	0.80	>3.00
Cohesive	Variable strength (very soft through to firm to stiff) variably sandy silty gravelly CLAY	3.40	4.40	1.60
Peat	Pocket of black fibrous PEAT encountered within WS102 only.	2.10	2.10	0.10

Borehole Logs are shown in Appendix D.

2.6 Hydrology

The nearest surface water feature is identified as Rochdale Canal 800m to the west of the site.

There are no current surface water abstractions listed within at least 2km of the site.

3 Flood Risk

As an initial phase in identifying whether a site is potentially at risk of flooding, BKP has consulted the Environment Agency's (EA) website Flood Zone Mapping. This mapping is (often) based on coarse scale modelling and provides only an initial indication of the flood risk to a site. The Environment Agency Flood Zone maps were developed using a very coarse Digital Elevation Map (DEM) and are superseded by a more detailed analysis of modelled flood levels and topographic survey levels.

3.1 Flood Zones

3.1.1 Fluvial/Tidal

Flood maps are produced by the EA for the whole of the UK to highlight areas at particular risk of flooding by categorising them into different Zones according to the likelihood of flooding. These maps are based on a broad assessment of areas using digital mapping techniques and extracts from the EA flood maps for the site and its surroundings are included in the figures below.

The EA fluvial and tidal flood map in figure 1, below, shows that the site and its surroundings is wholly contained within an area designated by the EA as Flood Zone 1 (unshaded areas).

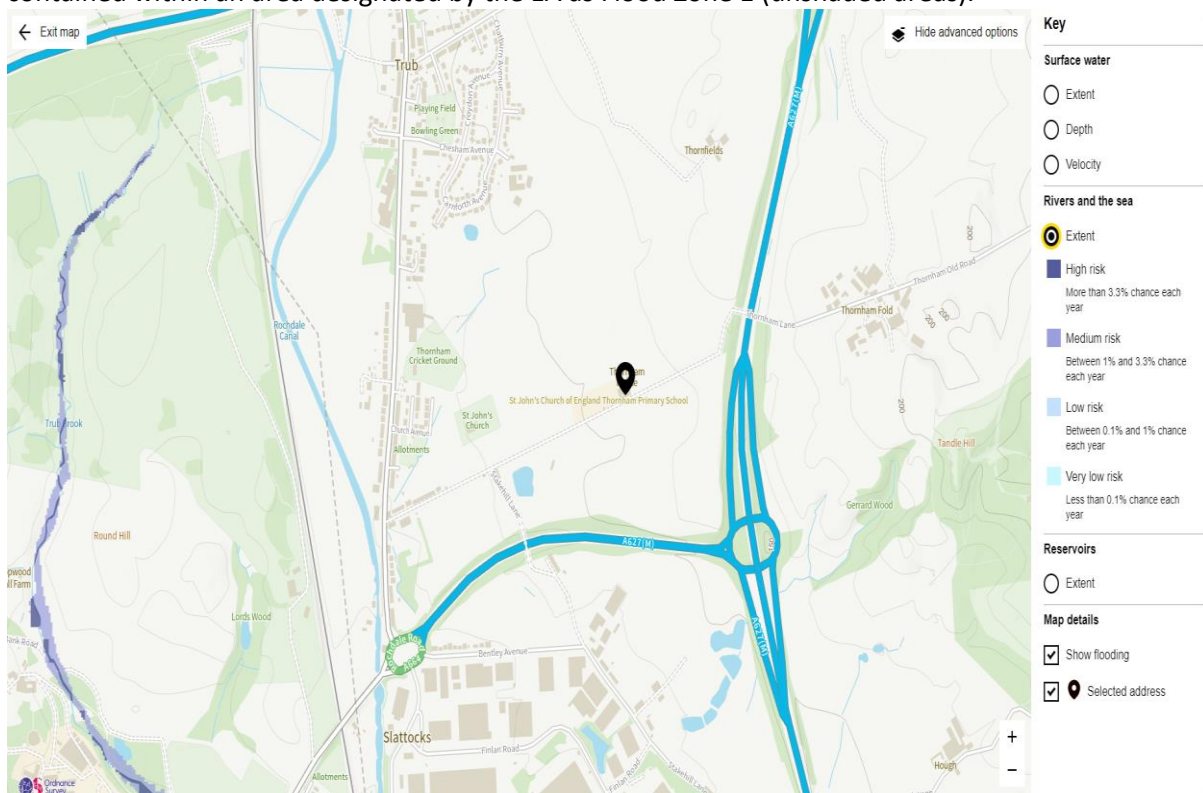


Figure 2 – Environment Agency Flood Map - River and Sea

Zone 1 areas are defined in NPPF Table 1 as “land assessed as having a less than 1 in 1000 annual probability of river or sea flooding (<0.1%)”. The compatibility of different end uses with the various Flood Zones is shown in NPPF Table 3 (see Figure 2 below).



Table 3: Flood risk vulnerability and flood zone ‘compatibility’

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	✗	✗	✗

Key: ✓ Development is appropriate.
 ✗ Development should not be permitted.

Notes to table 3:

This table does not show:

- the application of the Sequential Test which guides development to Flood Zone 1 first, then Zone 2, and then Zone 3;
- flood risk assessment requirements; or
- the policy aims for each flood zone.

Figure 3 – NPPF Table

The site is proposed to be used for residential use which falls within the ‘more vulnerable’ classification within Table 2. All uses, non–residential uses for health services, nurseries and educational establishments, are deemed appropriate in Flood Zone 1.

The NPPF also includes a Sequential Test, the aim of which is to locate areas of development in areas at lowest risk from flooding. However, as the entirety of the site is located within Flood Zone 1 it is already located within an area at lowest risk of flooding from tidal and fluvial sources.

3.1.2 Surface Water

The EA's surface water flood map shown in Figure 4 rates the surface water flooding risk at the site as very low.

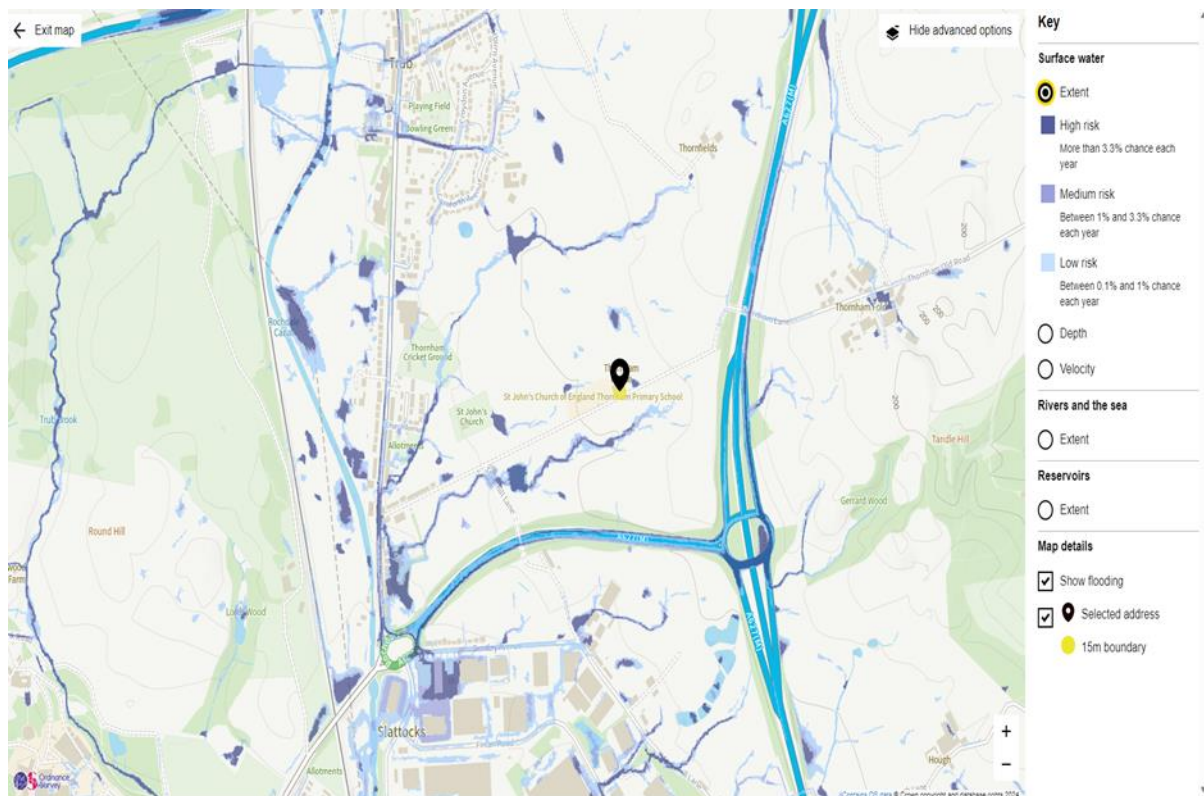


Figure 4 – Environment Agency Flood Map – Surface Water

No flooding is reported to the site within the overall development, however, there is High Risk area outside the north boundary with an estimated maximum flood depth of less than 900mm.

Surface water flood risks usually result from pooling of surface waters and overland flow during heavy rainfall that is not able to drain away.

Post development for 1FE, the introduction of permeable areas and attenuation tank within the site will significantly reduce the existing overland flows being discharged into the United Utilities network temporarily, which at present services the site.

Post-development for Phase 2, the project will be funded by the residential developer. The school will be provided with new access from the residential development to the East, which will re-orientate the main school access. The school may be allocated with a field to the West of the site to aid the outdoor space needed. Therefore, the surface water outfall would be relocated to reflect the changes to the access to the school.

Management of surface water is being considered as part of the development proposals and a preliminary drainage strategy drawing 14791-BKP-00-XX-DR-C-501-P01-Drainage GA Phase 1FE can be found in Appendix E.



3.1.3 Groundwater

The Rochdale Borough’s Strategy for Flood Risk Management 2014 - 2024 states that:

“5.14 Groundwater flooding occurs where water levels in rock and soil are high enough for the water to appear near to or above ground. It can be caused by rainfall either locally or some distance away. Whilst this is uncommon as a type of flooding, limited smaller scale flooding, often of cellars and under floors has occurred. Further work to identify areas where this is a significant source of flood risk will be undertaken by the LLFA working with other risk management agencies.”

From the interactive web map for groundwater productivity, can be seen in Figure 5 that the site is located at Class 2b, moderately productive aquifer which the flow is virtually all through fractures and other discontinuities.

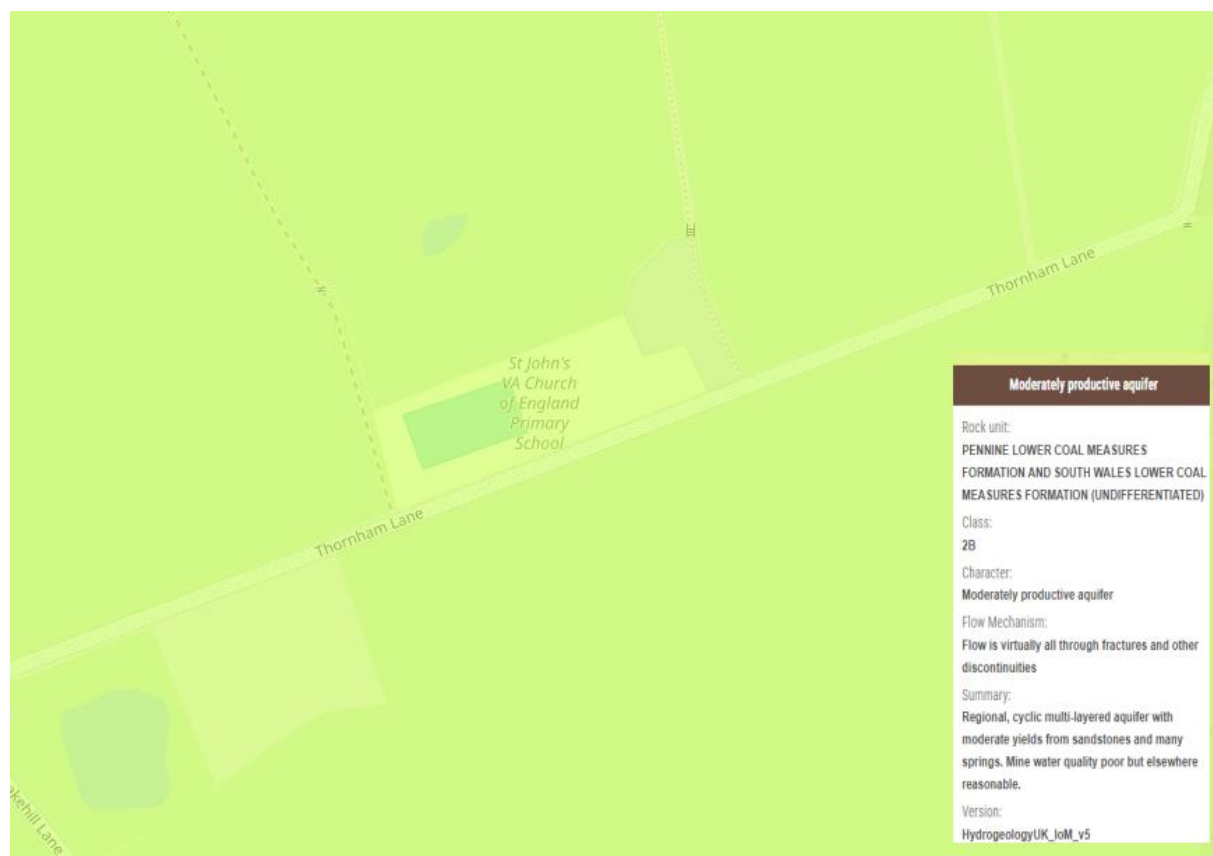


Figure 5 – mangomap - groundwater

Phase 2 geo-environmental investigations shows that groundwater was discovered at WS102.

BH/TP	Water Strike Depths (mbgl)	Casing depth (mbgl)
WS101	Dry	2.00
WS102	1.3, 1.65	2.00

3.1.4 Anthropogenic Sources

An extract from the EA's reservoir flood map. Shown in figure 6, indicates that the site is not at risk from reservoir flooding in the unlikely event of reservoir failure.

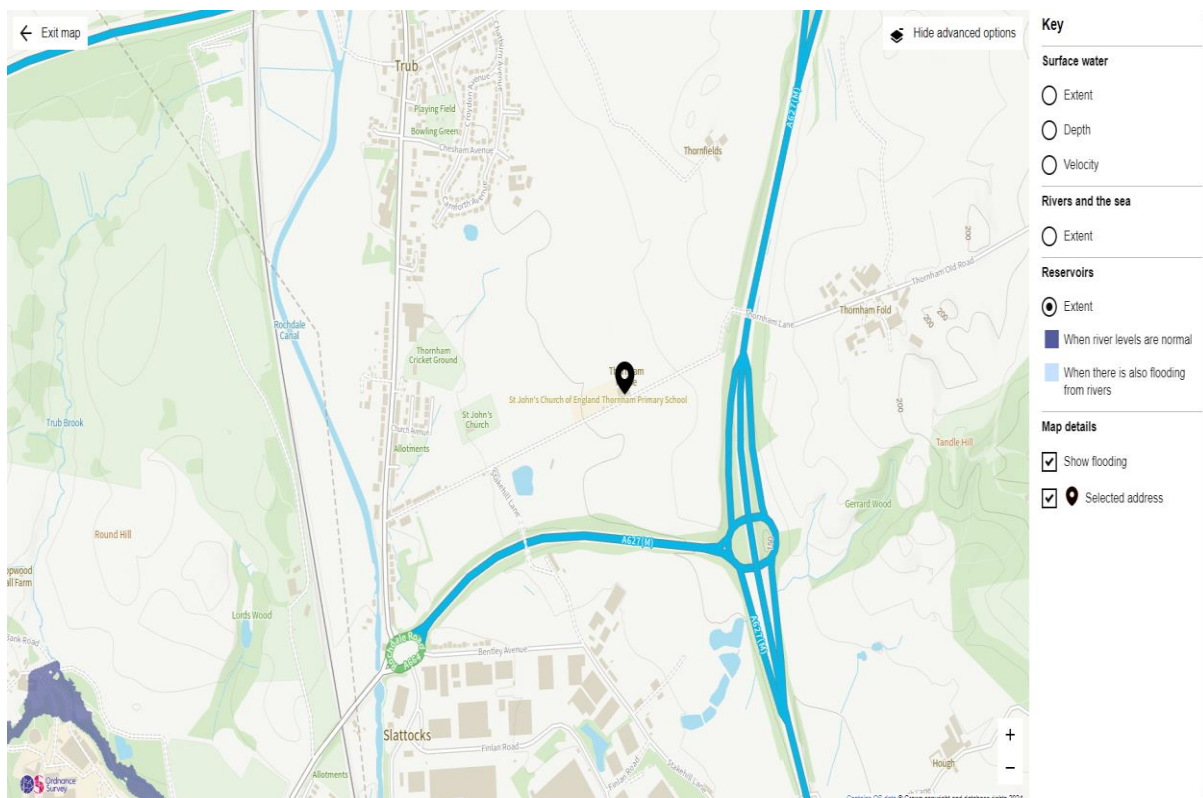


Figure 6 – Environment Agency Flood Map – Reservoirs

3.1.5 Groundwater Source Protection Zone

In addition to groundwater vulnerability the Environment Agency also defines groundwater Source Protection Zones (SPZs) around groundwater abstraction points. It states that SPZ's are defined:

"...based on the time it takes for pollutants to reach an abstraction point. Depending on the nature of the proposed development and the location of the development site with regards to the SPZs, restrictions may be placed on the types of SuDS appropriate to certain areas."

The definitions for each zone are included below:

- Inner zone – SPZ1 - This zone is 50-day travel time of pollutant to source with a 50 metres default minimum radius.
- Outer zone – SPZ2 - This zone is 400-day travel time of pollutant to source. This has a 250 or 500 metres minimum radius around the source depending on the amount of water taken.

- Total catchment – SPZ3 - This is the area around a supply source within which all the groundwater ends up at the abstraction point. This is the point from where the water is taken. This could extend some distance from the source point.

As shown in figure 7 below, the site is not located within any of the zones.

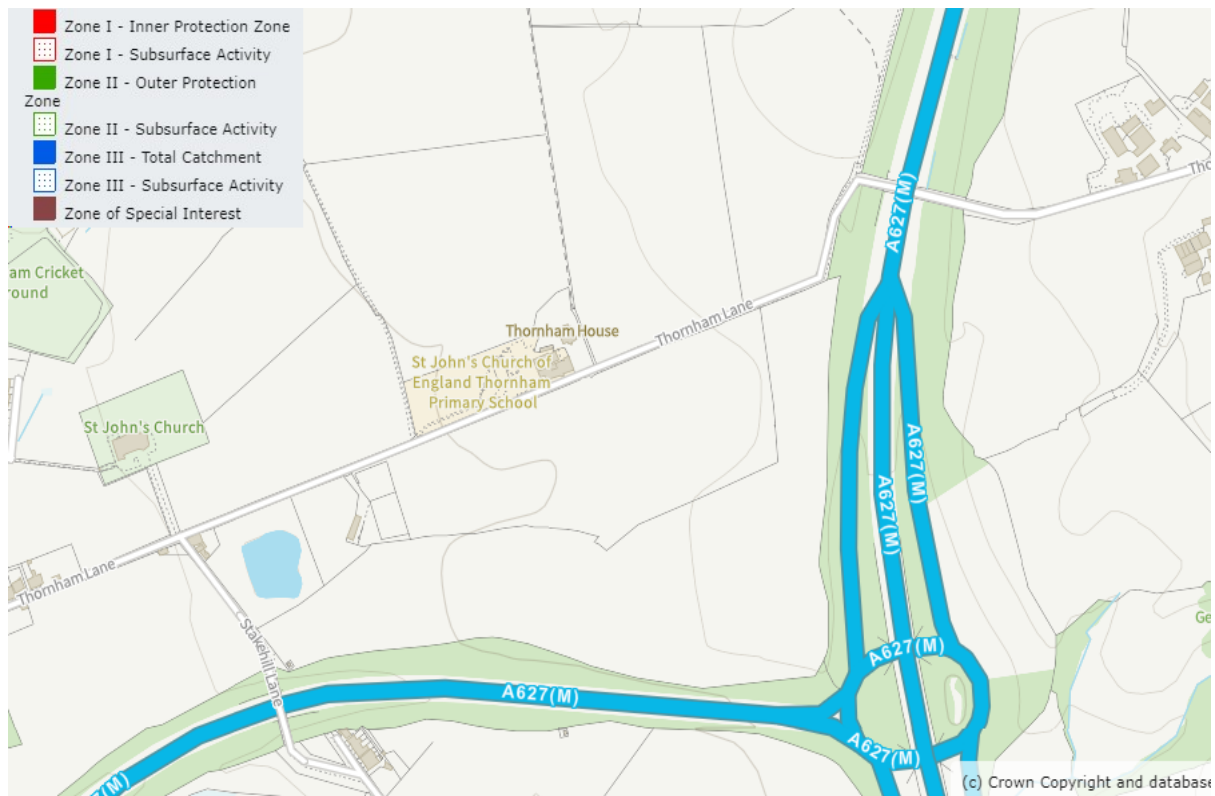


Figure 7 – Groundwater Source Protection Zone Vulnerability Map (Online Magic Map)



3.2 Correspondence

As part of the FRA process the Local Authorities Lead Local Flood Authority (Rochdale County Council) and the local public water utility company (United Utilities) were contacted to ascertain if they held flood risk information regarding the site, for example records relating to historic flooding or other relevant flooding information. A summary of each response is given below.

3.2.1 United Utilities

An email enquiry was issued to United Utilities Water, and we are waiting for their detailed response.

3.2.2 Lead Local Flood Authority

The Level 1 Strategic Flood Risk Assessment for Greater Manchester – Update (March 2019) states that:

CDA Policy			
Authority	Brownfield		
	sites	Greenfield sites	Other
			flooding in a 1 in 100 year plus climate change event
Oldham	50% less than pre-development	Current runoff up to 1 in 100 AEP event + climate change	FRAs required for all development over 0.5 ha in CDAs and to have regard to recommended runoff rates; development should be designed so that there is no flooding to the development in a 1 in 30 AEP event and no property flooding in a 1 in 100 year plus climate change event
Rochdale	50% less than pre-development	Current runoff up to 1 in 100 AEP event + climate change	Any site within a CDA requires regard to SFRA and full compliance with any strategy for CDA areas

Figure 8 – Extract from Level 1 Strategic Flood Risk Assessment for Greater Manchester

Also, states that:

“For brownfield sites, where current infrastructure may be staying in place, runoff should attempt to mimic that of Greenfield rates, unless it can be demonstrated that this is unachievable or hydraulically impractical.”

3.2.3 Internal Drainage Board

The Association of Drainage Authorities (ADA) confirmed that an internal drainage board does not operate within the study area, as can be seen by the absence of shaded areas in Figure 8. This implies that natural water levels within the area are not thought to have been artificially altered.

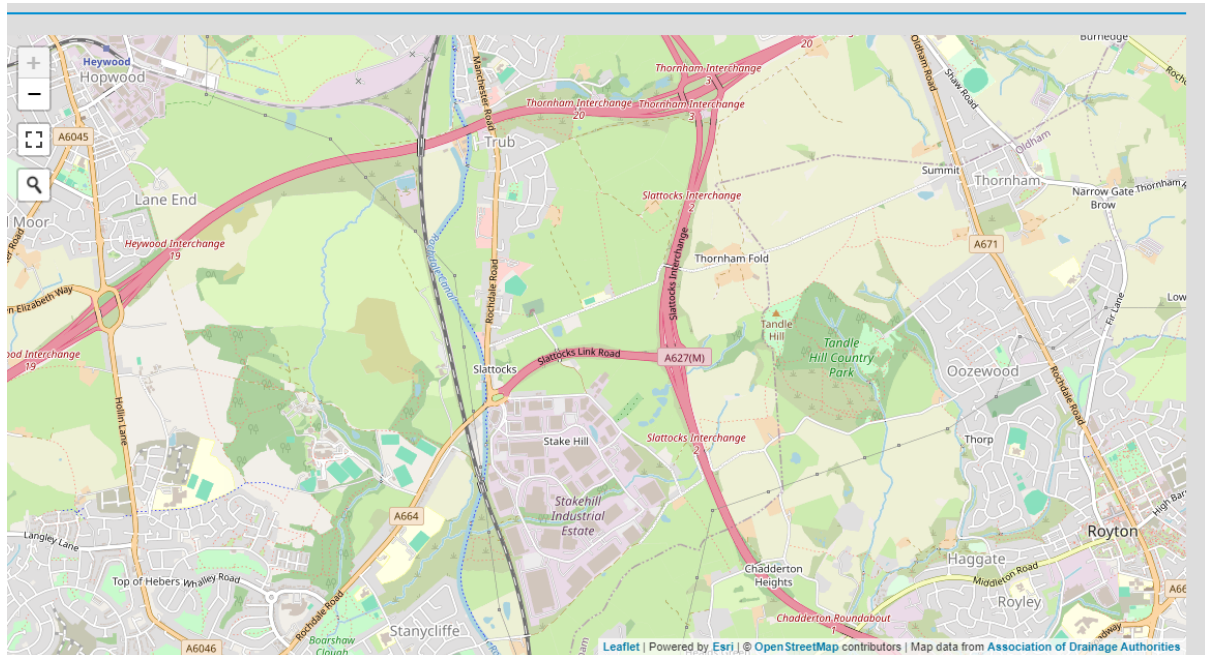


Figure 9 – Internal Drainage Board Interactive Map



4 Surface Water

In accordance with the NPPF and SFRA, consideration should be given to natural water flows at the site. The development should not adversely affect flow or increase flood risk elsewhere, including increasing run-off rates. The disposal of surface water should be dealt with in a sustainable way and climate change should also be accounted for. The site drainage strategy is discussed in preliminary drainage strategy drawing 14791-BKP-00-XX-DR-C-501-P01-Drainage GA Phase 1FE (Appendix E).

4.1 Previous Situation and Development Proposals

The existing site is currently a working school. There is a large existing building which covers the east part of the site with adjacent carpark for the staff.

Post-development the site permeable area will be with the introduction of permeable paving to selected external areas and small green spaces which will provide a route for surface water flows to naturally soak into the underlying ground where possible. Nevertheless, surface water collected from impermeable areas, such as roofs, will need to be managed.

Climate Change

There is evidence to suggest that the climate is changing with sea levels predicted to continue to rise along with more frequent short-duration, high-intensity rainfall and more frequent periods of long-duration rainfall. The NPPF recommends that the effects of climate change be accounted for in FRA, with consideration of the EA flood maps and local authority SFRA.

Increased rainfall or higher intensity short-duration rainfall may increase as a result of climate change. The requirement is 45% for the 1 in 100-year event and 40% for the 1 in 30 year event within the new surface water drainage design to take account of climate change. Climate change may also lead to variations in groundwater level which will also be considered during the drainage design.

4.2 Sustainable Drainage Systems (SUDS)

SUDS are a desirable way to manage surface water disposal within new developments and SUDS methods for surface water drainage management are discussed further within the SUDS Manual.

In following the standard hierarchy of drainage solutions, consideration should firstly be given to the discharge of surface water runoff by sustainable methods such as infiltration. Review of currently available geological information for the surrounding area would suggest that ground conditions within the site may not support infiltration due to the shallow depth of groundwater recorded in the area.

The types of benefits that can be achieved by SUDS will be dependent on the site, but fit broadly into four categories: water quantity, water quality, amenity and biodiversity. These are also referred to as the four pillars of SuDS design (Figure 10) with a design objective.

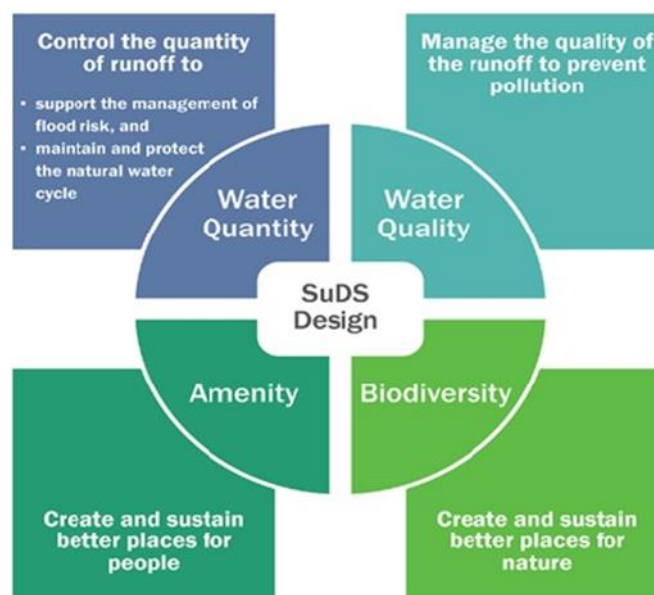


Figure 10 – Four Pillars of SuDS

The proposed development will address the above 4 pillars of SuDS design criteria with the inclusion of a range of sustainable features through a comprehensive treatment train.

- **Water Quantity:** the quantity of run-off from the site will be significantly reduced, as set out in more detail in the preliminary drainage strategy drawing 14791-BKP-00-XX-DR-C-501-P01-Drainage GA Phase 1FE (Appendix E), whilst taking account of likely increases in future rainfall due to climate change.
- **Water Quality:** the quality of run-off from the site will be improved by the inclusion of a significant treatment train including permeable construction build-up for MUGA/playground area and attenuation tank.

The flows arising from the building roof will initially be treated via a network of pipes features prior to discharge to a cellular attenuation system.

All flows will be collated within the site prior to discharge into the adopted United Utilities network.

- **Biodiversity** will be addressed by the introduction of a vegetation areas around the site, as well as by the inclusion of a significant planting regime creating a better environment for nature to thrive. Introducing a low maintenance green roof to the site, can provide important refuge to flora and fauna in connection with surrounding green spaces.
- **Amenity** is provided through the proposed treatment train, which presents the opportunity to create visually attractive areas within the proposed site which have the ability to connect people to water. Such features have been shown to improve the well-being of people that live within the proposed development.



5 Conclusions

1. The site is wholly contained within in EA Flood Zone 1. Reference to NPPF Table 3 shows that an Exception Test is not required as residential end-use is deemed appropriate in Zone 1.
2. The site is considered to be at low overall risk of flooding. EA mapping indicates that surface water flooding does not occur in the vicinity of the proposed site and this potential risk has been considered as part of the preliminary site surface water drainage strategy.
3. The risk of flooding elsewhere will not be increased as a result of the development.
4. The nearest surface water feature is located approximately 800m to the west.
5. Attenuation will be provided on the site to ensure that the maximum run off rate of 5.0 l/s is not exceeded during a 1 in 100-year storm event, inclusive of a 45% allowance for climate change and during the 1 in 30-year storm event plus 40% climate change allowance.
6. The risk of off-site flooding would not increase as a result of the development and safe access and egress will be maintained.
7. Foul flows are proposed to be taken to the public network operated by United Utilities.

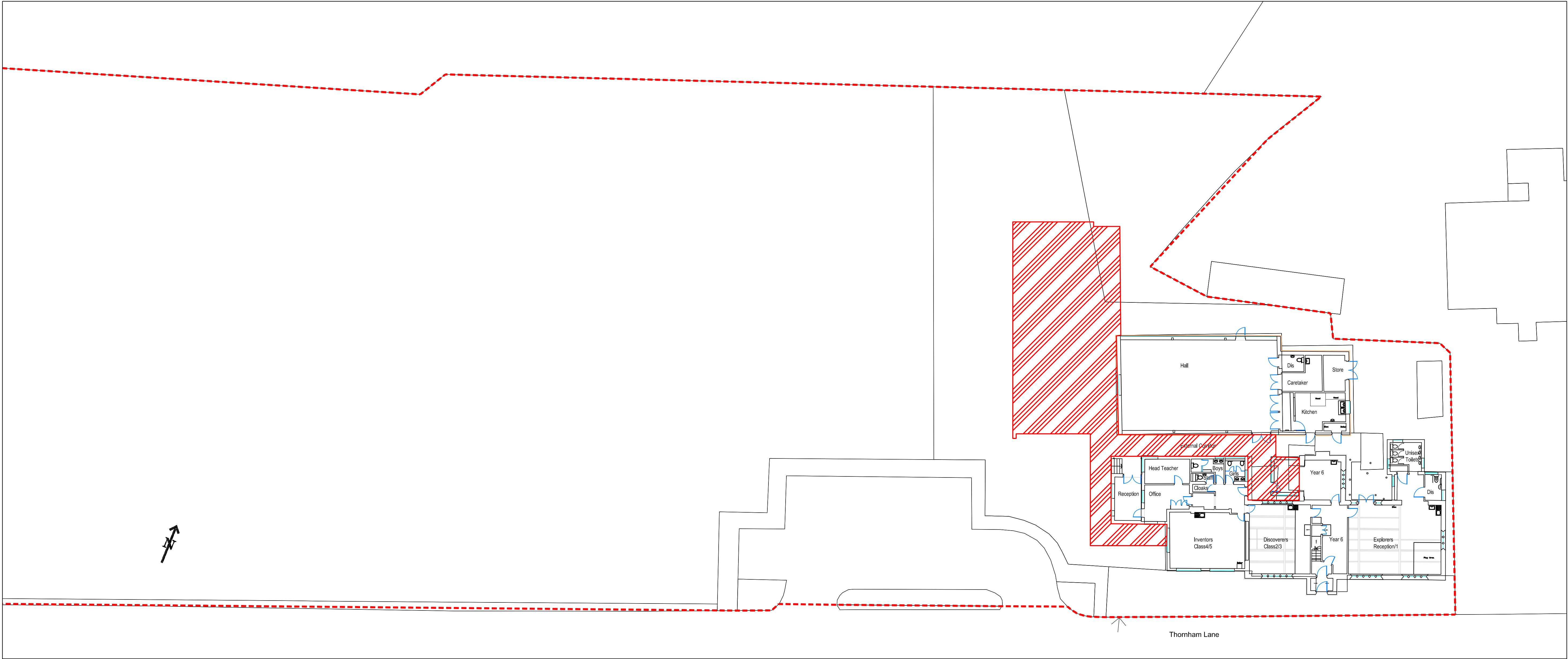


References

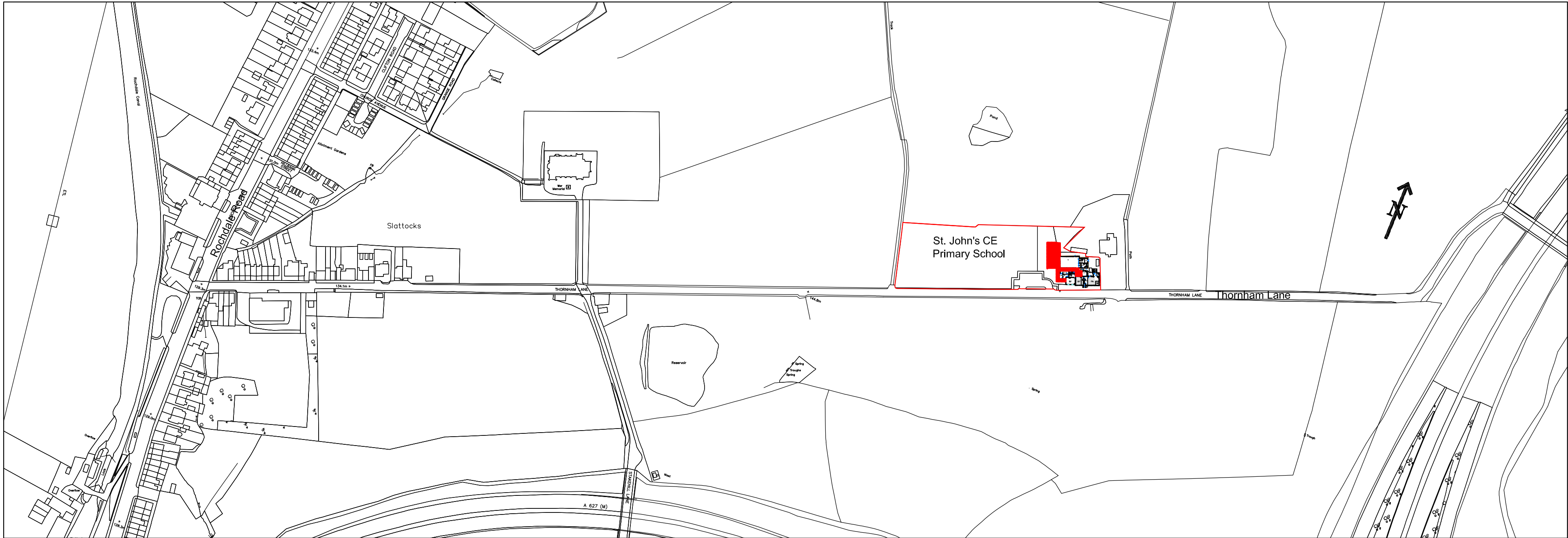
8.	C753. The SuDS Manual. CIRIA. 2015.
9.	Level 1 Strategic Flood Risk Assessment for Greater Manchester – Update. Final Report, March 2019
10.	Greater Manchester Surface Water Management Plan Stage 1 – A Strategic Assessment of Surface Water Flood Risk. Final Report, January 2012
11.	Phase 2 Geo-Environmental Investigation, Risk Assessment and Remediation Strategy. Document Ref.: CL-602-LKC 20 1219-02. LK Group, February 2020.
12.	National Planning Policy Framework. March 2012.
13.	Planning Practice Guidance. http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/
14.	Technical Guidance to the National Planning Policy Framework. March 2012.
15.	Topographical survey.
16.	Rochdale Borough's Strategy for Flood Risk Management 2014 – 2024. March 2014
17.	Climate change allowances for peak rainfall (data.gov.uk) – Climate Allowance.
18.	Magic Map Application (defra.gov.uk) – Source Protection Zones.



Appendix A – Site Plan



EXISTING PLAN
(1:200)

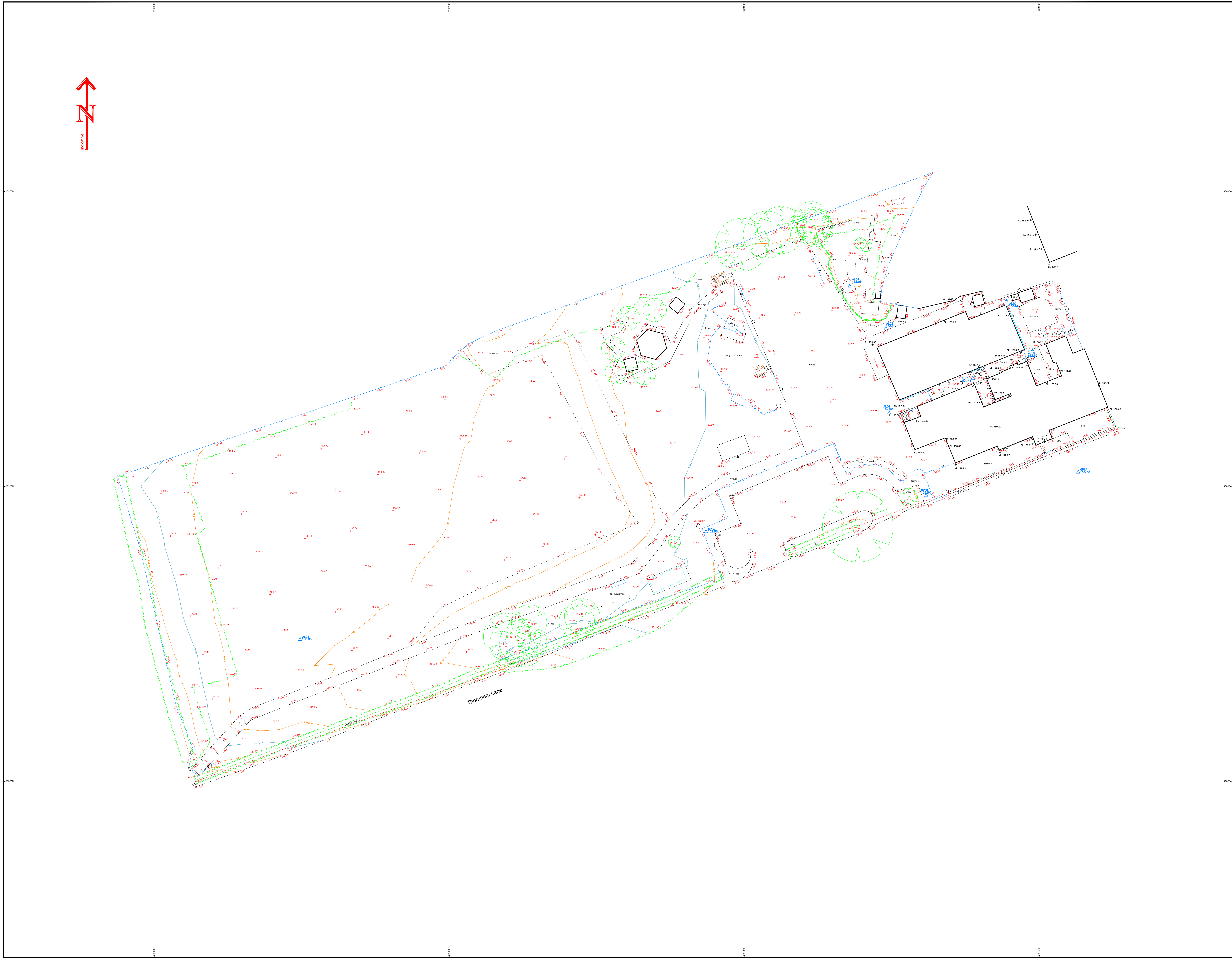


EXISTING LOCATION PLAN
(1:2500)

Figured dimensions to be used. Do not scale from drawing.			
Rev.	Revision detail	By	Chk. Date
 ROCHDALE BOROUGH COUNCIL			
PROPERTY & HIGHWAY SERVICES No. 1 Riverside, Smith Street, Rochdale, OL16 1XU Tel: (01706) 647474			
Client			
Project St John's CE Primary School Half Form Entry			
Title EXISTING PLAN SITE LAYOUT			
Drawn by RW	Date Nov 2021	Purpose of Issue As-Built	Scale 1:200, 2500 @ A1
Checked by	Date	Project No. 2003947	
Approved by	Date	Drawing No. AB-01	Rev.



Appendix B – Topographical Survey



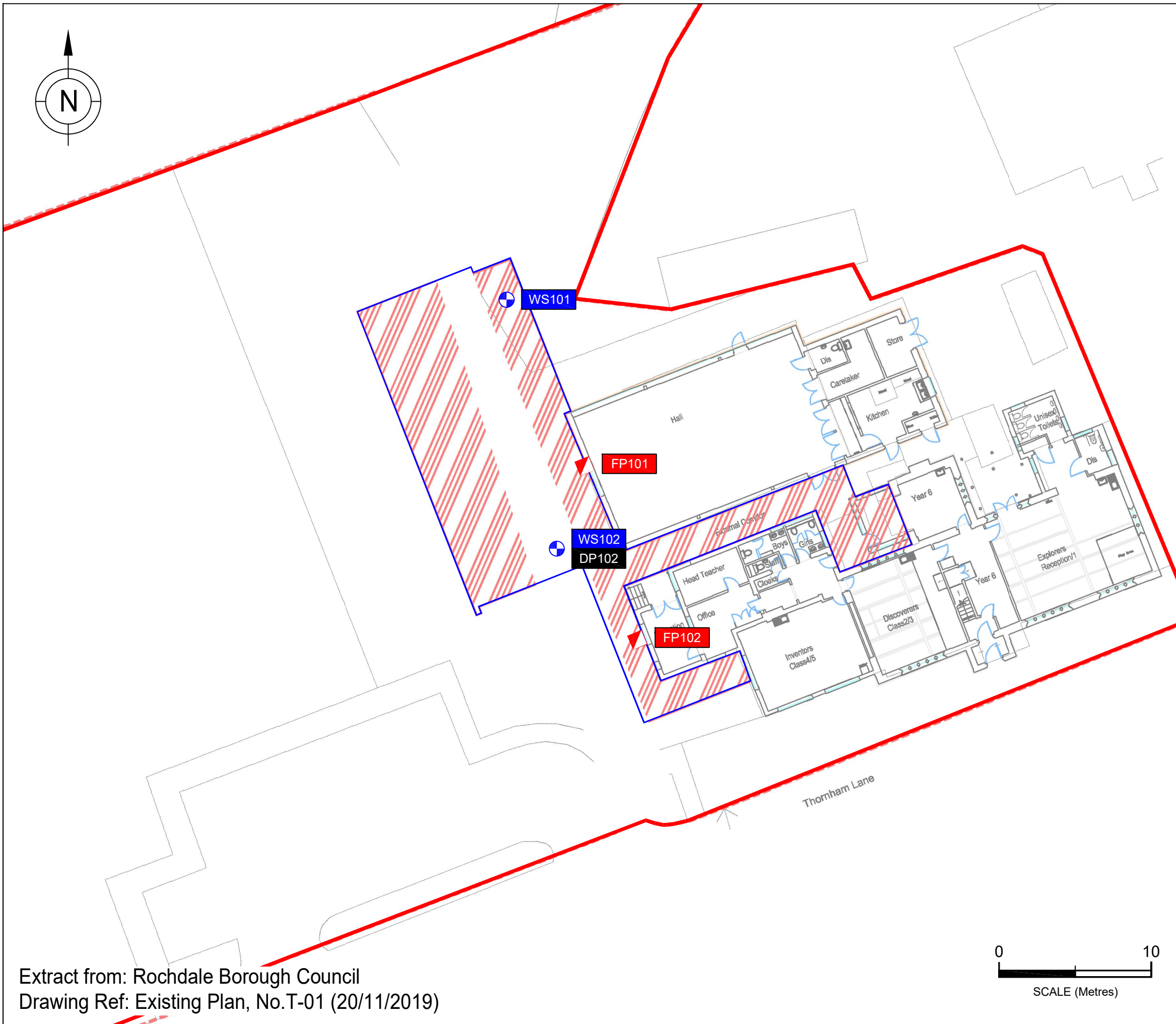
Survey Station Coordinates			
Stn	Easting	Northing	Level
AL01	389124.29	408912.65	152.92
AL02	389123.71	408927.12	153.10
AL03	389024.42	408874.45	150.86
AL04	389117.58	408934.34	153.05
AL1A	389130.45	408918.67	153.64
AL1B	389148.56	408923.35	153.57
AL1C	389144.15	408931.61	153.51
GP1A	389156.30	408902.85	153.79
GP51	389130.56	408906.83	153.54
GP52	389090.23	408922.72	152.88

Surveyed	AL AF	Drawn	BP
Date	July 2019	Checked	NAD
File name	10458A-TOPO	Revision No.	Sheet size A0
Drawing No.	SSL:10458A:200:1:1		





Appendix C – Borehole Logs



KEY

- School Site Boundary
- Extension Boundary
- Window Sample Borehole (WS)
- Foundation Pit (FP)
- Dynamic Probe (DP)

Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.



Client: Rochdale Borough Council			
Site: St John's CE (Thornham) Primary School			
Title: Site Investigation Location Plan			
Job No.: LKC 20 1219	Scale (See Scale Bar): 1:250 @ A3	Figure: 4	Revision:
Drawn By: AC	Checked By: BR	Drawn: Feb 2020	

Extract from: Rochdale Borough Council
Drawing Ref: Existing Plan, No.T-01 (20/11/2019)

Appendix D

Profile Logs

**LK CONSULT LTD**Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com**Site**

St Johns Primary School

**Probe
Number****DP102**

Method Follow on Dynamic Probe to 11.00mbgl.	Cone Dimensions	Ground Level (mOD) 153.00	Client Rochdale Borough Council	Job Number LKC 20 1219
	Location (Observed measurements) 389113 E 408938 N	Dates 30/01/2020	Engineer LKC	Sheet 1/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)	Blows for Depth Increment															
					0	2	4	6	8	10	12	14	16	18	20					
			153.00	0.00																
			152.50	0.50																
			152.00	1.00																
			151.50	1.50																
			151.00	2.00																
			150.50	2.50																
			150.00	3.00																
			149.50	3.50																
			149.00	4.00																
			148.50	4.50																
			148.00	5.00																
5.00-5.10	1																			
5.10-5.20	1																			
5.20-5.30	1																			
5.30-5.40	1																			
5.40-5.50	2																			
5.50-5.60	1																			
5.60-5.70	2																			
5.70-5.80	6																			
5.80-5.90	8																			
5.90-6.00	8																			
6.00-6.10	8																			
6.10-6.20	7																			
6.20-6.30	8																			
6.30-6.40	6																			
6.40-6.50	6																			
6.50-6.60	6																			
6.60-6.70	4																			
6.70-6.80	4																			
6.80-6.90	4																			
6.90-7.00	3																			
7.00-7.10	4																			
7.10-7.20	3																			
7.20-7.30	4																			
7.30-7.40	2																			
7.40-7.50	2																			
7.50-7.60	2																			
7.60-7.70	5																			
7.70-7.80	5																			
7.80-7.90	4																			
7.90-8.00	2																			
			145.00	8.00																

Remarks**Scale
(approx)** **Logged
By**

1:40

BR

Figure No.

LKC 20 1219.DP102

Method Follow on Dynamic Probe to 11.00mbgl.	Cone Dimensions	Ground Level (mOD) 153.00	Client Rochdale Borough Council	Job Number LKC 20 1219
	Location (Observed measurements) 389113 E 408938 N	Dates 30/01/2020	Engineer LKC	Sheet 2/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)	Blows for Depth Increment
8.00-8.10	4		145.00	8.00	
8.10-8.20	6				
8.20-8.30	5				
8.30-8.40	2				
8.40-8.50	3				
8.50-8.60	3		144.50	8.50	
8.60-8.70	3				
8.70-8.80	3				
8.80-8.90	3				
8.90-9.00	3				
9.00-9.10	5		144.00	9.00	
9.10-9.20	7				
9.20-9.30	6				
9.30-9.40	8				
9.40-9.50	9				
9.50-9.60	7		143.50	9.50	
9.60-9.70	7				
9.70-9.80	8				
9.80-9.90	6				
9.90-10.00	6				
10.00-10.10	12		143.00	10.00	
10.10-10.20	11				
10.20-10.30	11				
10.30-10.40	11				
10.40-10.50	12				
10.50-10.60	10		142.50	10.50	
10.60-10.70	14				
10.70-10.80	12				
10.80-10.90	12				
10.90-11.00	12		142.00	11.00	
			141.50	11.50	
			141.00	12.00	
			140.50	12.50	
			140.00	13.00	
			139.50	13.50	
			139.00	14.00	
			138.50	14.50	
			138.00	15.00	
			137.50	15.50	
			137.00	16.00	

Remarks

Scale (approx)	Logged By
1:40	BR
Figure No.	
LKC 20 1219.DP102	

Excavation Method

Hand Excavated Foundation
Inspection Pit to 0.6mbgl.

Dimensions

0.2m x 0.3m x 0.6m.

Ground Level (mOD)

153.00

Client

Rochdale Borough Council

**Job
Number**

LKC 20 1219

Location (Observed measurements)

389123 E 408919 N

Dates

30/01/2020

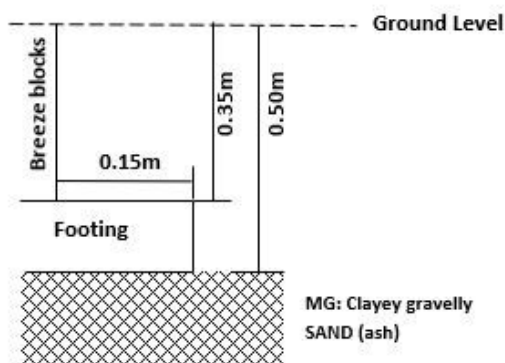
Engineer

LKC

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				152.90	0.10	MADE GROUND: Tarmacadam.		
				152.50	0.50	MADE GROUND: Yellowish brown SAND and GRAVEL with occasional polystyrene material and tarmac fragments. Sand is fine to coarse. Gravel is fine to coarse and subangular comprising limestone and sandstone. Probable MOT.		
				152.40	0.60	MADE GROUND: Blackish brown gravelly clayey SAND with occasional ash. Sand is fine to coarse. Gravel is fine to medium and subangular comprising mudstone and sandstone.		
						Complete at 0.60m		


Remarks

Elevation estimated from www.freemaptools.com/elevation-finder
GPS coordinates accurate to 6m.
Foundation pit dry and stable.
Concrete footing encountered at 0.35mbgl.

Scale (approx)

1:50

Logged By

BR

Figure No.

LKC 20 1219.FP101

Excavation Method

Hand Excavated Foundation
Pit to 0.9mbgl.

Dimensions

0.2m x 0.3m x 0.9m.

Ground Level (mOD)

153.00

Client

Rochdale Borough Council

**Job
Number**
LKC 20 1219

Location (Observed measurements)

389134 E 408906 N

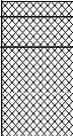
Dates

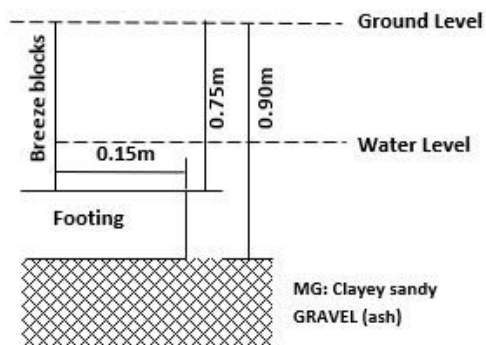
30/01/2020

Engineer

LKC

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			Water strike(1) at 0.60m.	152.90 152.70 152.10	0.10 (0.20) 0.30 (0.60) 0.90	MADE GROUND: Brick pavement. MADE GROUND: Yellowish brown SAND and GRAVEL with occasional polystyrene material and tarmac fragments. Sand is fine to coarse. Gravel is fine to coarse and subangular comprising limestone and sandstone. Probable MOT. MADE GROUND: Blackish brown gravelly clayey SAND with occasional ash. Sand is fine to coarse. Gravel is fine to medium and subangular comprising mudstone and sandstone. Complete at 0.90m		


Remarks

Elevation estimated from www.freemaptools.com/elevation-finder
GPS coordinates accurate to 6m.
Foundation pit stable.
Potential footing encountered at 0.75mbgl.
Water encountered at 0.60mbgl, approximate measurements of foundations taken.

Scale (approx)

1:50

Logged By

BR

Figure No.

LKC 20 1219.FP102

Excavation Method

Drive-in Windowless Sampler
to 6.35mbgl.

Dimensions

150mm to 2.00m

Ground Level (mOD)

153.00

Client

Rochdale Borough Council

Job
Number
LKC 20 1219

Location (Observed measurements)

389113 E 408938 N

Dates

30/01/2020

Engineer

LKC

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.40	D1 PID < 0.1ppm				(0.40)	TOPSOIL: Blackish brown slightly gravelly sandy SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium and subrounded comprising mudstone.		
0.40-0.60	D2 PID < 0.1ppm			152.60	0.40			
0.60-1.00	D3 PID < 0.1ppm			152.40	(0.20) 0.60	Yellow slightly gravelly silty SAND with rare rootlets. Sand is fine to coarse. Gravel is fine to medium and subrounded comprising mudstone and sandstone.		
1.20-1.65	SPT N=15		2,3/4,4,3,4			Medium dense brown slightly gravelly silty SAND. Sand is fine to coarse. Gravel is fine to medium and subrounded comprising coal, mudstone and sandstone.		
1.20-1.65	X4				(2.50)			
1.50-2.00	B5							
2.00-2.45	SPT N=12		3,5/5,4,1,2					
2.00-2.45	X6							
2.50-3.00	B7							
3.00-3.45	SPT N=12		2,2/1,3,3,5	149.90	3.10	Yellowish brown slightly gravelly silty SAND. Sand is fine to coarse. Gravel is fine to medium and subrounded comprising mudstone and sandstone.		
3.00-3.45	X8			149.60	(0.30) 3.40			
3.60-4.00	B9					Firm to stiff consistency brown slightly gravelly sandy silty CLAY. Sand Sand is fine to coarse. Gravel is fine to medium and subrounded comprising coal, mudstone and sandstone.		
4.00-4.45	SPT N=32		5,5/6,6,10,10		(1.60)			
5.00-5.45	SPT N=19		3,3/4,5,5,5	148.00	5.00	NO RECOVERY. Continuous SPT.		
5.45-5.75	SPT 0*/0 N=28		/7,7,7,7		(1.35)			
5.75-6.05	SPT 0*/0 N=32		/7,8,9,8					
6.05-6.35	SPT 0*/0 N=36		/8,9,9,10	146.65	6.35	Complete at 6.35m		

Remarks

Borehole stable.
Perched surface water encountered at 0.70mbgl.
Continuous SPT undertaken between 5.00-6.35mbgl.
GPS coordinates accurate to 6m.
Elevation estimated from www.freemaptools.com/elevation-finder

Scale
(approx)

1:50

Logged
By

BR

Figure No.

LKC 20 1219.WS101

Excavation Method

Drive-in Windowless Sampler
to 5.00mbgl, follow on
Dynamic Probe to 11.00mbgl.

Dimensions

150mm to 2.00m

Ground Level (mOD)

153.00

Client

Rochdale Borough Council

Job
Number
LKC 20 1219

Location (Observed measurements)

389113 E 408938 N

Dates

30/01/2020

Engineer

LKC

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30-0.80	D1 PID < 0.1ppm			152.93 152.80 152.70	0.07 (0.40) 0.20 0.30	MADE GROUND: Tarmacadam.		
0.80-1.20	D2 PID < 0.1ppm			152.20	0.80	MADE GROUND: Yellowish orange SAND and GRAVEL. Sand is fine to coarse. Gravel is fine to coarse and angular to subangular comprising limestone and sandstone. Probable MOT.		
1.20-1.65	SPT N=5		2,2/0,1,2,2			MADE GROUND: Yellow GRAVEL. Gravel is fine to coarse and angular to subangular comprising sandstone.		
1.20-1.65	X3		Water strike(1) at 1.30m.		(1.30)	MADE GROUND: Brown gravelly very clayey SAND with occasional bands of organic clay. Sand is fine to coarse. Gravel is fine to medium and subangular comprising coal and sandstone. Probable reworked natural.		V1
1.50-2.00	B4		Water strike(2) at 1.65m.			Loose yellowish brown slightly gravelly silty SAND. Sand is fine to coarse. Gravel is fine to medium and subrounded comprising mudstone and sandstone.		V2
2.00-2.45	SPT N=3		1,0/1,0,1,1	150.90	2.10	Black fibrous PEAT.		
2.00-2.45	X5			150.80	2.20			
2.20-2.40	D6 PID < 0.1ppm							
2.50-3.00	B7					Very loose to loose yellowish brown slightly gravelly silty SAND. Sand is fine to coarse. Gravel is fine to medium and subrounded comprising mudstone and sandstone.		
3.00-3.45	SPT N=4		0,0/0,1,2,1		(2.20)			
3.00-3.45	X8							
4.00-4.45	SPT N=0		1,1/0,0,0,0	148.60	4.40	Brown slightly gravelly very sandy silty CLAY. Sand is fine to coarse. Gravel is fine to medium and subrounded comprising coal, mudstone and sandstone.		
					(0.60)			
				148.00	5.00	Complete at 5.00m		

Remarks

Borehole stable.
Perched surface water encountered and 0.30mbgl.
Thin layer of PEAT identified between 2.10-2.20mbgl.
Elevation estimated from www.freemaptools.com/elevation-finder
GPS coordinates accurate to 6m.
Borehole complete at 5.00mbgl. DP undertaken at base of borehole to 11.00mbgl. Ref: DP102
Groundwater encountered at 1.30-1.65mbgl.

Scale
(approx)

1:50

Logged
By

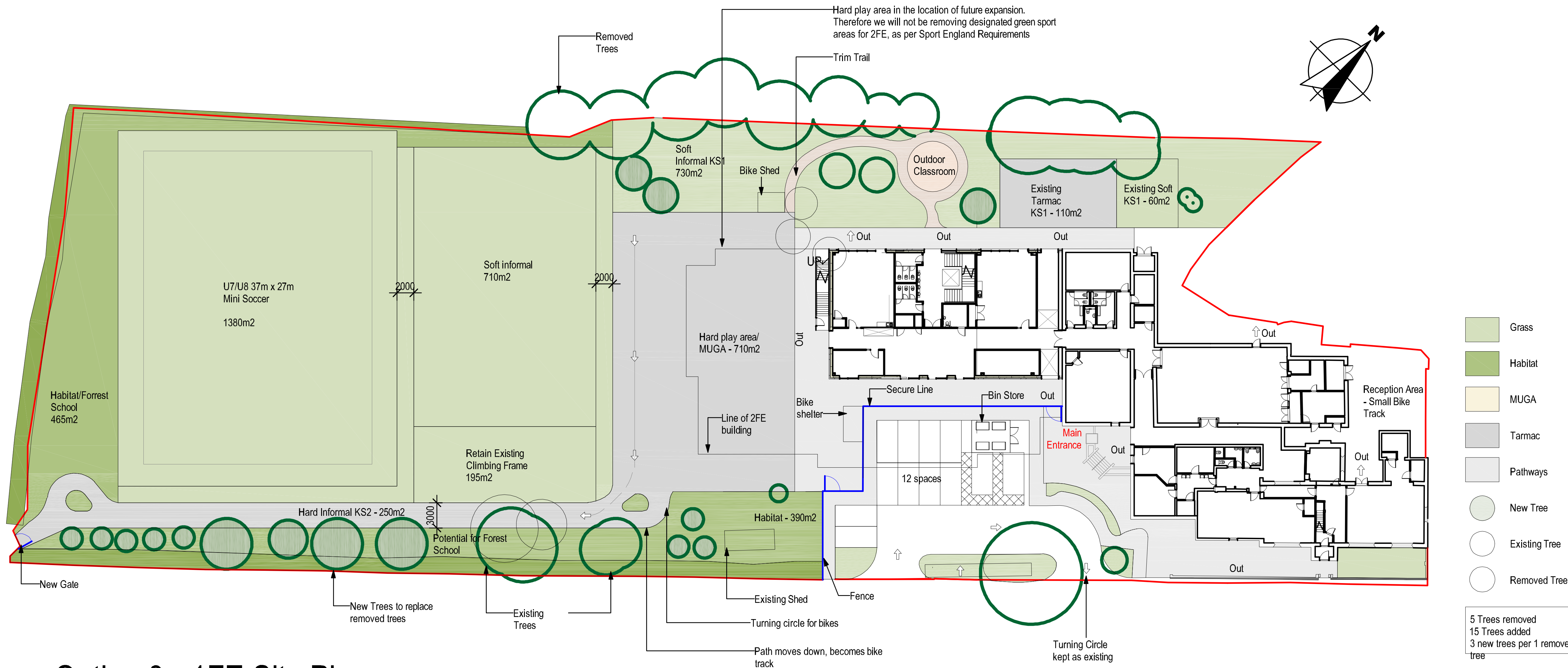
BR

Figure No.

LKC 20 1219.WS102



Appendix D – Architect’s Layout

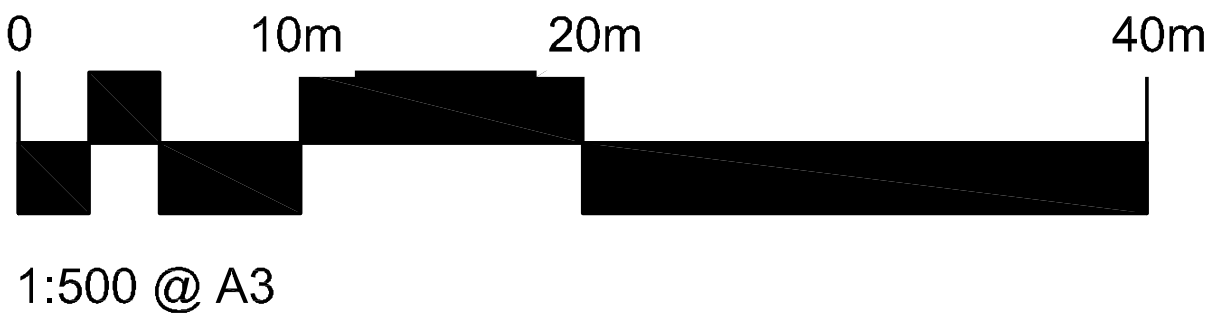


Option 3 - 1FE Site Plan
1 : 500 @
A3

Outdoor areas:

Soft outdoor (Sports):	Recommended 4200m2	Proposed: 1380m2 (U7/8 Mini Soccer)
Hard outdoor (Sports):	Recommended 715m2	Proposed: 710m2
Soft informal:	Recommended: 1020 m2	Proposed: 1930m2
Hard Informal:	Recommended: 410m2	Proposed: 855m2 (Includes Forest School)

MUGA example



P5	Mark up for changed from meeting 01.09.23	04.09.23	SD	PEH
P4	Updated Site Plan	11.07.23	SD	PEH
P3	Car park layout	05.06.23	SD	PEH
P2	Updated with school comments	30.05.23	SD	PEH
Revision	Description	Date	Drawn	Checked

Halliday Meecham Architects Limited

111 Piccadilly Manchester M1 2HY
+44 (0)161 661 5566

4 Devonshire Street London W1W 5DT
+44 (0)203 440 5175

hma@hallidaymeecham.com
www.hallidaymeecham.com

Client:	St Johns Thornham			
Project:	Middleton			
Phase/Location:	Proposed Site Plan 1FE Option			
Drawing:	3			
Scale @ A3	Date:	Drawn:	Checked:	Job No.
1:500	05/23/23	SD	PEH	5635
Drawing Ref.	5635-HMA-SJT-00-DR-A-00201			Revision
				P5



Appendix E – Proposed Drainage Arrangement

DRAINAGE STRATEGY

This site is part of two Phase development Phase 1Fe & Phase 2FE, with the latter being subject to the development of Housing on adjacent land. It is anticipated the Phase 2FE will include a suitable offsite water body & network to discharge into. At present Booth-king Partnership has no control on the time frame for this development and the strategy below will be set out to reflect this.

Due to the nature of the site being a School we have dismissed the option for any open water features based on health and safety grounds.

A previous Phase 2 SI report has been referred to (pre-2019) and the ground conditions underlying the site have been found to have shallow standing water levels, the use of shallow soakaway was not suitable for disposal of surface water runoff. Soil infiltration tests were found not to be conclusive, further Phase 1 & 2 SI reports are planned and this strategy will be updated to reflect any additional findings.

Surface Water Drainage strategy

The surface water drainage proposals for this site are to discharge into a Private network via a conventional below ground piped network using a storage tank and flow control device to limit flows to agreed discharge rates.

The following final discharge outfall options are then available.

- Housing development starts imminently and an outfall connection is made to discharge into the new offsite Redrow network/depression storage. We currently believe this to be unlikely until the completion of the Phase 1FE stage.
- Phase 1FE is completed without Redrow development in place.
The network will be set-out with future discharge position in mind and to suit on site topography.
An immediate outfall will be made into the existing combined sewer within the site boundary and ultimately discharging into the adopted UU combined sewer on Thornham Lane, subject to approval from UU and a Section 106 agreement being granted.
At present this appears to be the only viable option on the completion of Phase 1FE.
 - Surface water discharge rate needs to be agreed first with United Utilities and LLFA (Assumed 5l/sec TBC).
 - The attenuation tank will be designed to cater for roof and hardstanding areas. Storage will be provided to cater for storm periods up to 1 in 100 years with an allowance of 45% for climate change. Flows will be attenuated via flow control devices. Ultimately, flows will be restricted to the discharge rates shown above before entering United Utilities sewers.

Whilst this is lower down the hierarchy identified by the EA, within the NPPF and the LLFA it still represents a suitable SUDS solution which is compatible with the particular constraints of the site detailed in the FRA and site investigation report.

DRAINAGE STRATEGY

FOUL WATER

It's planned to convey all foul water into the pre- existing on site private network.
The on-site foul water network connects to an existing UU combined water sewer in Thornham Lane.

