



STAR RADCLIFFE ACADEMY

OUTLINE DRAINAGE STRATEGY

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1.0 INTRODUCTION

1.1 Purpose of this report

This Outline Drainage Strategy has been prepared to support the planning application for the proposed Star Radcliffe Academy development.

The assessment includes a summary of the site, an estimate of the existing and proposed surface water discharge rates, an infiltration assessment, a SuDS assessment, and outline drainage proposals and performance criteria.

This report should be read in conjunction with the Flood Risk Assessment (renaissance, FS1013-REN-XX-XX-T-C-0160, August 2023).

The proposals within this report are intended to demonstrate the feasibility of the overarching drainage strategy to support the planning proposal.

2.0 THE SITE

2.1 Site Location

The proposed development site is located off Spring Lane, Radcliffe.

The site location is described below:

- Post Code M26 2SZ
- OS X (Easting) 378714
- OS Y (Northing) 407606
- Nat. Grid SD 787076

The site location is illustrated in Figure 2.1 below.



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Figure 2.1: Indicative Site Location

2.1 Site Description

The site is circa 4.56 hectares comprising approximately 43% impermeable hard standing. Based on aerial imagery and the topographical survey information (Appendix A), the site is occupied by a school (Spring Lane School) and leisure centre with swimming pool (Radcliffe Leisure Centre) in the south as well as tarmac hardstanding associated with car parking beyond. The north-west of the site is occupied by open grassland.

The topographical survey (Appendix A) indicates that the site lies approximately between 77.000m AOD at the north-western boundary and 69.300m AOD at the south-eastern boundary.

A 2300mm diameter surface water culvert is indicated to cross the southern portion of the site, flowing from west to east.

2.2 Existing Site Drainage

CCTV and utility surveys have been carried out to trace the existing drainage on site.

The foul drainage network associated with the existing buildings is indicated to discharge from the site on the eastern boundary underneath the Metrolink track, however, the survey information does not extend far enough to trace the connection into the public sewer network.

CCTV survey information indicates the surface water from the site discharges into the existing combined drainage and the culvert running beneath the southern portion of the site.

A further CCTV survey has been commissioned to confirm the connectivity of the culvert and existing combined drainage into the downstream sewer network / watercourse.

Refer to Appendix B for the United Utilities sewer records.

2.3 Geology

The lower south-eastern part of the site is largely underlain by granular made ground to about 2m depth overlying glacial till. Further granular made ground exists over the upper north-western part of the site but this is largely restricted to an area of former allotments. The natural ground in this area consists of glacial sand and gravel extending 4m in depth resting on glacial till.

The deeper solid geology is the Pennine Middle Coal Measures formation comprising mudstone, siltstone and sandstone. Boreholes have indicated that the depth to the bedrock varies from 12.6m to 20.5m below the existing ground level.

For further details, reference should be made to the phase 2 geo-environmental report produced by Geotechnics.

2.4 Hydrology and Hydrogeology

The closest surface water feature is the Manchester, Bolton and Bury Canal which lies 4m to the north of the site.

Based on the geology across the site, a summary of the Environment Agency aquifer designations is presented below:

STRATUM	COVERAGE	Aquifer Designation
Till, Devensian	Eastern portion of the site	Secondary Aquifer (Undifferentiated). The classification is assigned where it is not possible to attribute either category A or B to the aquifer
Glaciofluvial Sheet Deposits	Western portion of the site	Secondary A Aquifer. This geology is of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic level
Pennine Middle Coal Measures Formation	Full Site	Secondary A Aquifer. This geology is of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic level

Table 2.1 – EA Aquifer Designations of Site Geology

A summary of the pertinent hydrogeological features identified within the geo-environmental data report are provided below:

STRATUM	Distance (m) & Direction	Aquifer Designation
Nearest Groundwater Abstraction	250m	There are two entries within 250m relating to the same location, a pond/reservoir located 13m to the north-east (immediately north of the former Radcliffe West Fork Embankment). Water has been abstracted from a reservoir fed by surface water drainage for use as process water in the paper and printing industry

		initially by the East Lancashire Paper Mill Co. and then by St. Regis Paper Company U.K. Ltd.
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Table 2.2 –Summary of Hydrogeological Features

2.5 Proposed Development

The proposed redevelopment consists of the demolition of the existing Spring Lane School and Radcliffe Leisure Centre (also known as Coney Green Leisure Centre). Following these demolition works it is proposed to construct a new 3-storey secondary school building along with a new artificial grass pitch, a multi-use games area (MUGA), a grass pitch, new car parking areas and access roads.

The proposed access road to the south of the site is to be adopted by Bury Council and so does not form part of our assessment of the onsite drainage as it will be covered under a separate design.

Refer to proposed development plans in Appendix C for further details of the proposed development.

3.0 EXISTING & PROPOSED SURFACE WATER DISCHARGE RATES

3.1 Pre-Development Surface Water Run-Off Rates

The privately drained area of the development site is approximately 4.56 Ha (45600m²) comprising 1.98 Ha (19800 m²) of impermeable area and 2.58 Ha (25800m²) of permeable soft landscaping. Refer to the topographical survey in Appendix A and existing drained areas plan in Appendix D for further details.

3.2 Existing Brownfield Run-Off Rates

The existing surface water runoff rate from the site has been calculated using the Rational Method for direct runoff.

$$Q = 2.78CiA$$

Where:

Q = Maximum flow rate (l/s)

C = runoff coefficient

i = Rainfall Intensity (mm/hr)

A = Catchment Area (Ha)

The runoff coefficient for the area considered in the calculation has been taken as 1.0.

The rainfall intensity adopted in the calculation is 50 mm/hr.

Based on the existing drained area plan (Appendix E), the Catchment Area is 1.98 Ha.

The existing runoff rate for the site is therefore 275.5 l/s.

3.3 Existing Greenfield Run-Off Rates

As a comparison, the greenfield run-off for the site area has been considered. This has been calculated using the ICP SUDS method in InfoDrainage (Appendix F). The rates presented below are what would be typical of a site with an equivalent area which remains undeveloped / covered in grass or vegetation.

The existing site is partly developed and therefore an urbanised catchment ratio of 0.46 has been adopted in the calculations. This value is based on the proportion of the site that is currently developed according to the existing drained area plan within Appendix E.

The equivalent greenfield run-off rate is tabled below: -

RETURN PERIOD	$Q_{\text{GREENFIELD}}$ (l/s)
1 in 1-year	51.9
1 in 2-year	58.8
1 in 30-year	91.8
1 in 100-year	103.7
Q_{bar}	59.7

Table 3.2 – Greenfield Run-off Rates

3.4 Proposed Surface Water Discharge Rate

The non-Statutory Technical Standards for Sustainable Drainage Systems (2015) states that for greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1-year and 100-year rainfall events should never exceed the peak greenfield runoff rate for the same event. For developments which were previously developed (brownfield), the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1-year and 1 in 100-year rainfall events must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event but should never exceed the rate of discharge from the development prior to redevelopment for that event.

As set out within the Bury Council SFRA, developments should aim to restrict the runoff rate from site to *greenfield run-off rate where feasible*.

It is proposed that the discharge rate from site is limited to a maximum of QBAR, 59.7 l/s, for all storm events up to the 1 in 100-year storm with an allowance for climate change.

Restricting the run-off to this rate would result in an 78.3% betterment from the existing run-off rates which complies with the requirements outlined in the Non-Statutory Technical Standards for Sustainable Drainage noted above.

3.5 Attenuation Requirements

The proposed development results in approximately 21890m² of impermeable area.

The post development discharge rates will include for an increase in the rainfall intensity of 40% and 45% for the 1 in 30-year and 1 in 100-year storm events respectively to allow for climate change. This is consistent with a design life for the development of 100 years, as outlined by the National Planning Practice Framework (NPPF).

A quick storage estimate for the 1 in 100 year +45% allowance for climate change InfoDrainage, indicates that the approximate attenuation volumes shown in table 3.4 are required to limit the peak surface water discharge to 59.7 l/s. The InforDrainage calculations can be seen in Appendix G.

RETURN PERIOD	DEVELOPMENT AREA (ha)	SURFACE WATER ATTENUATION ESTIMATE (m ³)
1:100 Year +45% CC	2.189	993-1503

Table 3.4 – Surface Water Attenuation Estimate

4.0 SURFACE WATER DISCHARGE & SUDS ASSESSMENT

4.1 Surface Water Discharge Assessment

In accordance with NPPF, the following hierarchy of surface water drainage options has been considered:

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

Infiltration has been considered. Due to the potential contamination risk posed given the presence of made ground on site, the limited infiltration rates, and elevated ground water levels in some locations, infiltration has been discounted as the primary method of discharging surface water from the site. Localised areas of infiltration are being proposed at this stage, however further site investigation will be required to confirm the feasibility.

Opportunities for discharge to a watercourse have been considered. The closest named watercourse is the Manchester, Bolton & Bury Canal which lies immediately to the northwest of the site. The topography of the site is such that the drainage network would be too deep at the point of connection for this to be a suitable discharge point. Bury Council have confirmed that a culverted watercourse flows beneath the southern portion of the site from west to east. Pre-planning advice has been sought from Bury Council LLFA to understand any of their requirements for the surface water drainage network to be connected into the culvert.

Surface water discharge rates from the site are to be restricted to QBAR for the 100-year storm event. Refer to the Outline Drainage Strategy for the Micro-Drainage outputs and initial storage estimate calculations.

Foul water flows will be collected by a dedicated gravity network designed in accordance with BS EN 752 before discharging to the existing combined drainage on site. The connectivity of the existing combined drainage network on site into the public sewer network will need to be confirmed with a CCTV survey. The foul connection will also be subject to agreement under Section 106 of the Water Industry Act.

4.2 Sustainable Urban Drainage

Table 4.1 below provides a summary of typical SuDS techniques outlined within the CIRIA C753 SuDS manual. Based on a review of the suitability of SuDS techniques it is proposed that the development may incorporate the following:

SUDS TECHNIQUE	DESCRIPTION	SUITABILITY FOR DEVELOPMENT SITE	
Rainwater Harvesting	Collection of rainwater run-off for use	Not suitable due to limited potential use for rainwater	×
Soft Landscaping	Grassed areas that allow direct infiltration of rainwater	Suitable	✓
Filter Drains	Linear drains / soakaways with either granular fill and perforated pipe, or dense vegetation that treat runoff from adjacent impermeable areas	Possibly suitable in localised areas – subject to further site investigation works	?
Swales	Shallow landscape channel that can infiltrate or convey runoff.	Possibly suitable in localised areas – subject to further site investigation works	?
Infiltration Basins	Depressions in the ground designed to store and infiltrate runoff to the ground. Can be landscaped to provide amenity value.	Possibly suitable in localised areas – subject to further site investigation works	?
Wet Ponds	Basins with permanent pool of water providing water quality treatment, wildlife, and amenity benefit.	Not suitable due to safety adjacent to school site	×

	Designed to provide temporary storage for additional runoff.		
Extended Detention Basins	Dry basins that are designed to temporarily store runoff providing water quality treatment.	Suitable to provide a mechanism for partial infiltration – subject to further site investigation works	?
Constructed Wetland	Ponds and shallow wetland areas with vegetation to improve pollution removal and enhance wildlife habitat.	Not suitable due to limited space	×
Porous Paving	Granular build-up beneath permeable paving systems that can be used to either store runoff (lined system) and increase time of concentration or allow percolation into the ground.	Type B system suitable to car park area – subject to further site investigation works	?
Trees Pits	Managed permeable paving systems around tree pits that can be used to either store runoff (lined system) and increase time of concentration or allow percolation into the ground.	Suitable	✓
Soakaways	Infiltration device to temporarily store runoff and allow it to percolate into the ground.	Suitable to provide a mechanism for partial infiltration – subject to further site investigation works	?
Green Roof	Vegetated roof area that reduces runoff and increases time of concentration.	Bio-solar roof provided but not utilised for storage due to architectural constraints	×
Blue Roof	Roof area designed to store and reduce peak runoff rates during intense storms.	Not suitable due to architectural constraints	×
Underground Storage	Attenuation structures installed below ground to provide runoff storage.	Suitable within soft landscaping to the east of the site	✓

× Not suitable

? Potentially suitable subject to further investigation

✓ Suitable

Table 4.1 – SUDs Techniques & Suitability for Development Site

4.3 Water Quality Assessment

The drainage from the site is from the roof and hard paving areas. Water quality is generally affected by frequent rainfall events (1 in 1-year events or less), which is circa 5mm/hr for the proposed development site. To assess the water quality, consideration will be given to the guidance within the National Standard for Sustainable Urban Drainage (NSSUD) and CIRIA Guide C753. The pollution hazard levels for different land uses are presented in table 4.2 and are based on the definitions in the NSSUD and C753.

POLLUTION HAZARD LEVEL	LAND USE
Very Low	Residential roofs
Low	Individual property driveways, non-residential roofs, residential car parks, low traffic roads, non-residential car parking with infrequent change (e.g. Schools, offices)
Medium	Commercial yards and delivery areas, non-residential car parking with frequent change (e.g. hospital, retail), minor roads
High	Site with heavy pollution (e.g. Haulage yards, lorry parks, waste sites, sites with chemical and fuels are delivered, handled, stored etc.)

Table 4.2 – Pollution Hazard Levels

The pollution hazard level is low based on Table 4.2 with the primary consideration given to removal of gross solids and sediment.

The following tables indicate the minimum number of treatment stages required before surface run-off should reach the infiltration or receiving water body and are extracted from the NSSUD.

POLLUTION HAZARD LEVEL	LAND USE	LOW	MEDIUM	HIGH
G1	Source Protection Zone 1, within 50m of a well, spring or borehole that supplies potable water.	1	3	Consult the EA
G2	Into or immediately adjacent to a sensitive receptor that could be influenced by infiltrated water. Includes designated nature conservation, heritage, and landscape sites – including Biodiversity Action Plan (BAP) habitats and Protected Species.	1	3	
G3	Source Protection Zone II and III or Principal Aquifer	1	3	
G4	Secondary Aquifer	1	2	
G5	Unproductive strata	1	2	

Table 4.3 – Groundwater Minimum Treatment Stages

POLLUTION HAZARD LEVEL	NORMAL SURFACE WATER	SENSITIVE SURFACE WATER
Low	0	1
Medium	2	3
High	Consult the EA	

Table 4.4 – Surface Water Body Minimum Treatment Stages

Infiltration is potentially viable in localised areas and discharge into the secondary aquifer will require 1 level of treatment for a low pollution level.

Discharge of surface water to the receiving culverted watercourse will require no treatment stages due to the low pollution hazard level. However, the adoption of SuDS, sumps and good practice will provide inherent treatment to improve the water quality of the runoff.

External areas will pass through silt traps/sumps prior to entering the attenuation and flow control devices. The silt traps and sumps will allow most of the sediment and solids to settle out under low flows, prior to discharging to the culvert.

5.0 OUTLINE DRAINAGE STRATEGY

Refer to Appendix I for the general arrangement drawing of the proposed below ground drainage strategy.

5.1 Surface Water System

The development will have a dedicated surface water network that will collect the rainwater from the proposed building and hard standing areas. The network will then discharge under gravity to the culverted watercourse running across the site subject to agreement with Bury Council LLFA.

The surface water discharge from the site is to be limited to the rate detailed within Section 3.2 of this report using a flow control device within the final manhole of the network prior to discharging into the culvert. Proposed discharge rates are to be confirmed with Bury Council LLFA and United Utilities as part of the detailed design.

Attenuation will be provided in the form of permeable surfacing build-ups and a detention basin. It should be noted that the drainage of the pitches has been designed to fully infiltrate, however this will be subject to further infiltration testing and at this stage they have been included in the overall impermeable area figure.

The surface water drainage network is to be designed in accordance with Building Regulations Part H, BS EN 752 and Code for Adoption. In addition, the following requirements will also be adopted in accordance with the Non-Statutory Technical Standards for Sustainable Drainage: Practice Guidance:

- The below ground drainage system will be designed to ensure flooding does not occur on site for the 1 in 30-year rainfall event with no internal flooding for the 1 in 100-year rainfall event.
- The surface water system is to be designed to accommodate the 1-, 2-, 30- and 100-year rainfall events with an increase in the rainfall intensity of 40% and 45% for the 1 in 30-year and 1 in 100-year storm events respectively to allow for climate change. The system will be designed for a maximum storm duration of 6 hours.

Based on initial comments from Manchester Metrolink, all drainage and associated surface finishes adjacent to the Metrolink line to the east of the site will be designed to fall away from the embankment to prevent any impacts on its stability.

5.2 Foul Water System

The site will have a dedicated foul water network that will collect the foul water associated with the development before connecting into the existing combined network in the southern part of the site.

CCTV surveys have shown that the existing combined sewer discharges off site under the tram line to the east where it connects into the public sewer. However, the existing pipe is defective with dips in level along its length being recorded during the surveys. Given that there are no other public sewers within the vicinity of the site and the difficulties involved with installing a new drainage run under the tram line, it is proposed to install a package pumping station within the final manhole on site. This will allow a rising main to be installed within the existing drainage where it passes under the tram line and connected into the public sewer beyond. The proposals will need to be agreed with United Utilities through the submission of a Section 106 application.

The drainage system is to be designed in accordance with Building Regulations Part H, BS EN 752 and Codes for Adoption.

5.3 Phasing & Surface Water Management During Construction

The development is intended to be delivered in a single phase.

Surface water management during construction will be addressed by the Main Contractor as part of their 'Construction Management Plan'.

A brief overview of the key considerations relating to surface water management and flood risk that will need to be incorporated into the Main Contractor's construction methodology include:

- Subject to the level of contamination beneath the site and site remediation required, as well as the quality of working platform compaction to reduce infiltration, consideration should be given to the risk of residual contamination on site affecting groundwaters and adjacent watercourses.
- The risk of diesel spillage and other contamination risk during construction activities are to be assessed and measures implemented to ensure they do not cause a risk to groundwaters and the adjacent watercourse.

6.0 FUTURE MANAGEMENT & MAINTENANCE

The proposed drainage solution uses SuDS techniques in accordance with the CIRIA SUDS Manual C753. The following SuDS features have been adopted in the drainage strategy for Star Radcliffe Academy:-

- Permeable Paving
- Extended Detention Basin
- Soft Landscaping
- Tree Pits
- Inspection chambers, manholes and catchpits.
- Pipes.
- Drainage channels and gullies.
- Flow control device

A suitable maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.

The Main Contractor delivering the development is to update the general requirements to reflect the product specific requirements of the as-installed proprietary SuDS and incorporate these into the Operation & Maintenance Manual for the building.

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

The maintenance of the specified SuDS should be detailed in accordance with the CIRIA SuDS Manual C753, as per the operation and maintenance guidance outlined below.

6.1 General Maintenance & Inspection Requirements

No work shall be carried out on the drainage system without permission from a nominated person, who has access to information/a working knowledge of the system.

Maintenance/inspection work shall be carried out in a safe/planned manner.

All work is to be carried out by competent persons suitably trained and equipped in accordance with current statutory safe working policies.

Entry into confined spaces shall be kept to a minimum and be restricted to suitably qualified/equipped personnel working in accordance with current statutory safe working policies.

Drainage systems shall be inspected on a regular basis or when any problems arise. Any debris/defects discovered shall be recorded and a programme of cleaning/ repair initiated. Urgent repairs/cleaning shall be actioned as soon as practicable.

It is recommended that the drainage system is inspected a minimum of twice a year, with the system also being inspected after all major storm events.

Clearing of the drainage system can be achieved by a number of methods depending on the nature of the work;

- Rodding – manual/mechanical with flexible rods.
- Jetting – high-pressure water jetting.
- Plunging.

6.2 Inspection Chambers, Manholes and Catchpits

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

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

6.3 Pipes

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

Pipes are proprietary products and therefore the materials used can vary across the site. As such, the manufacturer's recommendations should be followed. Access for maintenance of the pipes is provided through inspection chambers and manholes.

6.4 Drainage Channels and Gullies

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

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

MAINTENANCE SCHEDULE	REQUIRED ACTION	TYPICAL FREQUENCY
Regular Maintenance	Litter and debris removal.	Monthly or as required.
	Check and remove large debris and/or vegetation growth near pipe runs.	Monthly or as required.
	Inspect for evidence of poor operation and/or weed growth. If required, take remedial action. Inspect silt accumulation rates and establish appropriate brushing frequencies.	Monthly for 3 months, then six monthly intervals. Also, 48 hours after large storms.
Remedial Actions	Inspect access/outlet boxes and rod through poorly performing channels and outlets as initial	As required.

	remediation.	
	Seek advice as to remediation techniques suitable for the type of performance issue.	As required, if above actions do not improve performance.
Monitoring	Initial inspection including channel outlet boxes and gully sumps.	Monthly for 3 months, then six monthly intervals. Also, 48 hours after large storms.

6.5 Flow Control Device

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

Vortex flow control devices are proprietary products and therefore can vary from manufacturer to manufacturer. As such, the manufacturer's recommendations should be followed. Normally, little maintenance is required as a vortex flow control device has no moving parts.

If blockages occur, they tend to do so at the intake of the vortex flow control device.

Vortex flow control devices are generally fitted with a pivoting by-pass door, which allows the manhole chamber to be drained down should blockages occur.

The smaller conical units, below the minimum recommended size, are also supplied with rodding facilities or vortex suppressor pipes as standard.

Following installation of the vortex flow control device it is vitally important that any building materials etc. are removed from the unit and the chamber.

After the system is made fully functional, it is recommended that each unit be inspected monthly for three months and thereafter at six monthly intervals with hose down if required. Units should also be inspected within 48 hours after large storms.

6.6 Permeable Pavements

Regular inspection and maintenance are important for the effective operation of pervious pavements. Maintenance responsibility for a pervious pavement and its surrounding area should be placed with an appropriate responsible organisation. Before handing over the pavement to the client, it should be inspected for clogging, litter, weeds and water ponding, and all failures should be rectified after handover, the pavement should be inspected regularly, preferably during and after heavy rainfall to check effective operation and to identify any areas of ponding.

MAINTENANCE SCHEDULE	REQUIRED ACTION	TYPICAL FREQUENCY
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over the whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site specific observations of clogging or manufacturers recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely

		to collect the most sediment.
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required.
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying.	As required – once per year on less frequently used pavements.
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered	As required
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action.	Three-monthly, 48 h after large storms in first six months.
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

6.7 Extended Detention Basin

Maintenance responsibilities for a basin should always be placed with an appropriate organisation. Adequate access should be provided to all detention basin areas for inspection and maintenance, including for appropriate equipment and vehicles. Litter and debris removal should be undertaken as part of general landscape maintenance for the site and before any other SuDS management task. All litter should be removed from the site.

The maintenance requirements for detention basins are outlined within Table 13.2 of the CIRIA SUDS Manual C753. A copy of that table is replicated below to set out the maintenance schedule for the cellular attenuation tank component of the proposed drainage systems.

Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	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 banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually
Occasional Maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

6.8 Tree Pits

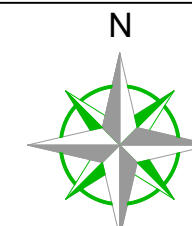
Maintenance requirements of trees will be greatest during the first few years, when the tree is becoming established. Early maintenance should involve regular inspection, removal of invasive vegetation and possible irrigation during long dry periods, particularly in soils with high void ratios. Tree roots need to establish good root-soil contact before they can efficiently

extract water from the soil. The expertise of an arboriculturist/landscape architect with local knowledge should be sought regarding appropriate irrigation schedules. Maintenance responsibility for a tree pit or planter should always be placed with an appropriate organisation.

The maintenance requirements for tree pits are outlined within Table 19.3 of the CIRIA SUDS Manual C753. A copy of that table is replicated below.

Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Remove litter and debris	Monthly
	Manage other vegetation and remove nuisance plants	Monthly (during growing season), or as required
	Inspect inlets and outlets	Half yearly (spring – before nesting season, and autumn)
Occasional Maintenance	Check tree health and manage tree appropriately	Annually
	Remove silt build-up from inlets and surface and replace mulch as necessary	Annually, or as required
	Water	As required (in periods of drought)
Remedial actions	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly

APPENDIX A
Existing Topographical and Utilities Survey Information



NOTES:
in all cases
0000 9-17
All other cases

1. *Damage information provided has been determined without main entry into the chambers. Whilst every effort has been made to ensure it correctly identifies the damage(s)/member detail, it is recommended that this information should be checked in person or via callout to future proposals/inspections.*
2. *All sewer runs are presumed to be straight line connections between chambers unless proven otherwise by the use of a sonde or CCTV survey.*
3. *Further clarity on the damage will be confirmed on the CCTV report to follow.*
4. *Elements of gas and water have been added from statutory records.*
5. *Elements of CCTV have been added from statutory records.*
6. *Elements of emissions have been added from statutory records.*

UTILITY LINETYPES

1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400
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UTILITY SURVEY INFORMATION
Contracted Survey Area

[illegible]

LEGEND

[illegible]

PAS 129 : 2014 LEVEL B SURVEY

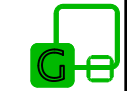
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DISCLAIMER

Whilst every effort has been taken in the preparation of this drawing, the Engineer and/or Appointed Professional may have altered since the survey, drawing was produced. The user shall make further enquiries and investigations to satisfy himself as to the accuracy of this drawing and position of the apparatus. The Engineer does not warrant that the information verified by the use of suitable detection devices and safe working practices is the true position of the apparatus. The location of apparatus should be recommended by the owner. No representation is made by Greenhatch Group, its agents or contractors, that the location of the apparatus is true, sufficiency or otherwise of this drawing and the position of the apparatus.

All apparatus shall be treated as live unless proved otherwise by the owner. It is the user's responsibility to ensure that the information on the location of apparatus is provided to all personnel (including the owner and/or contractors) working in proximity to the apparatus.

Rev	Date	Description	Drawn	Q. Ref.
-----	------	-------------	-------	---------



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- Topographical Surveys
- Site Engineering
- Utility / CCTV Surveys
- Measured Building Surveys
- 3D Laser Scanning
- Revit & BIM Models

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CLIENT

**Mott
MacDonald**

PROJEC

**Land off Spring Lane
Radcliffe, Bury
M26 2SZ**

TITLE

Utility Survey	
SCALE	DATE

A1@ 1: 500	26/01/2022
MAB/MA/STM	GH12865

Level datum	See notes
Grid orientation	See notes
Job number	42645

Drawing No.	Rev.
42645_T_UG	0

This plan should only be used for its original purpose. Greenhatch Group accepts no responsibility for this plan if supplied to any party other than the original client.

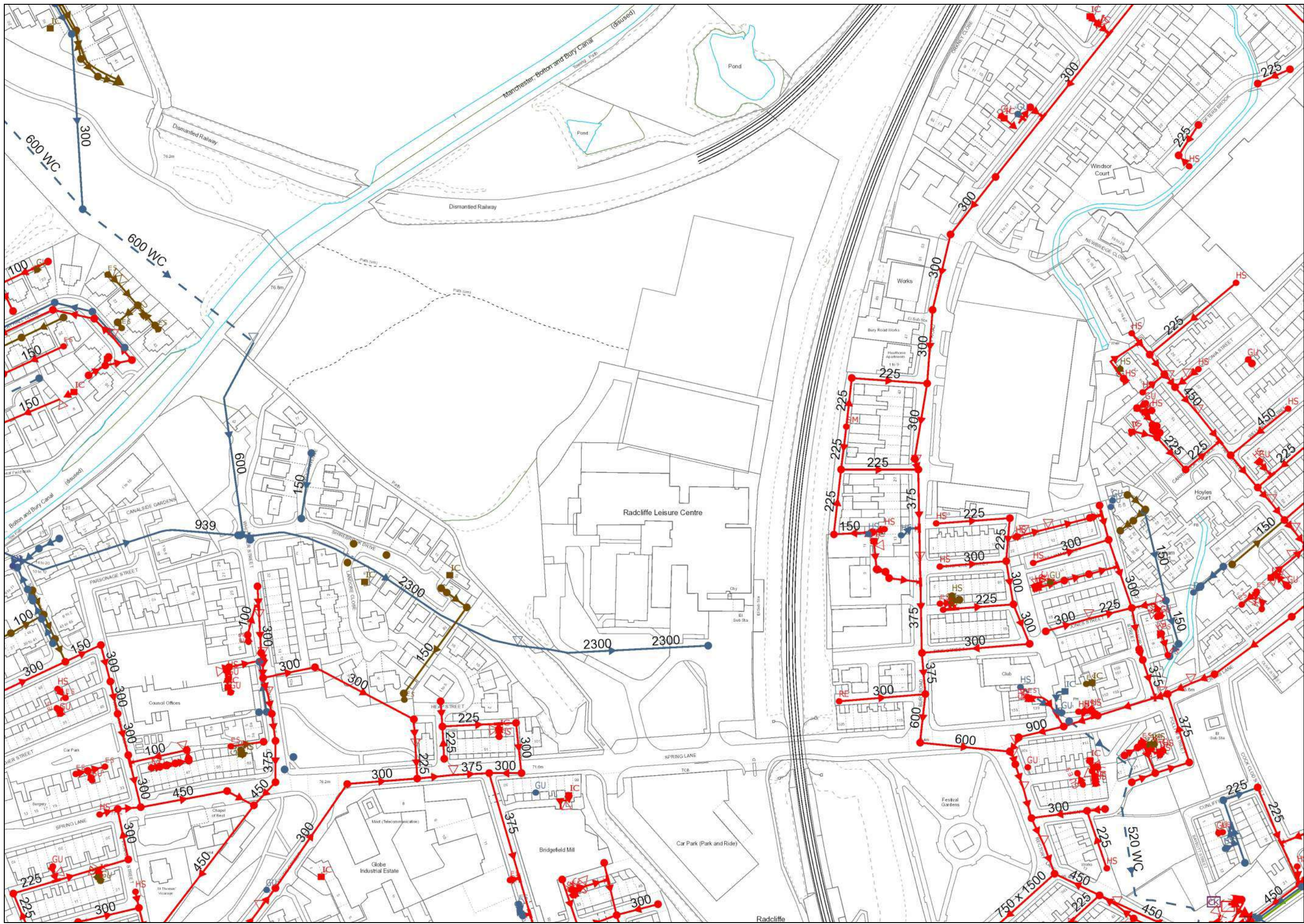
All dimensions should be checked on site prior

Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

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APPENDIX B
United Utilities Sewer Records



United Utilities Maps
for SafeDig

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Centre X:	378736
Centre Y:	407606
Scale :	2000
UserName:	MOTTMACNRT

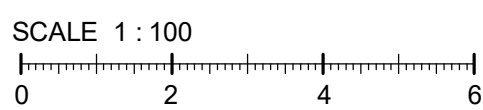
Extract from maps of United Utilities'
Underground Assets

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

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APPENDIX C
Proposed Development Plans



Area Schedule (Gross Internal Area)		
Level	Name	Area
LEVEL 00	Ground	2801.68 m ²
LEVEL 01	First	1510.19 m ²
LEVEL 02	Second	1704.48 m ²
Grand total: 3		6016.35 m ²

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M2 4EW

United Kingdom

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E: manchester@ahr.co.uk

www.ahr.co.uk

client name

Department for Education

project

Star Academy Radcliffe

drawing

Ground Floor + Sports

computer file

Added On: file path: root\file\T103\AHR_22.MA.dwg

project number

2003.00.187.000

drawing number

103-03-AHR-01-00-D-A-2001

scale

1 : 100

rev

date

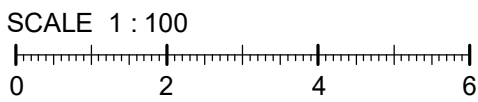
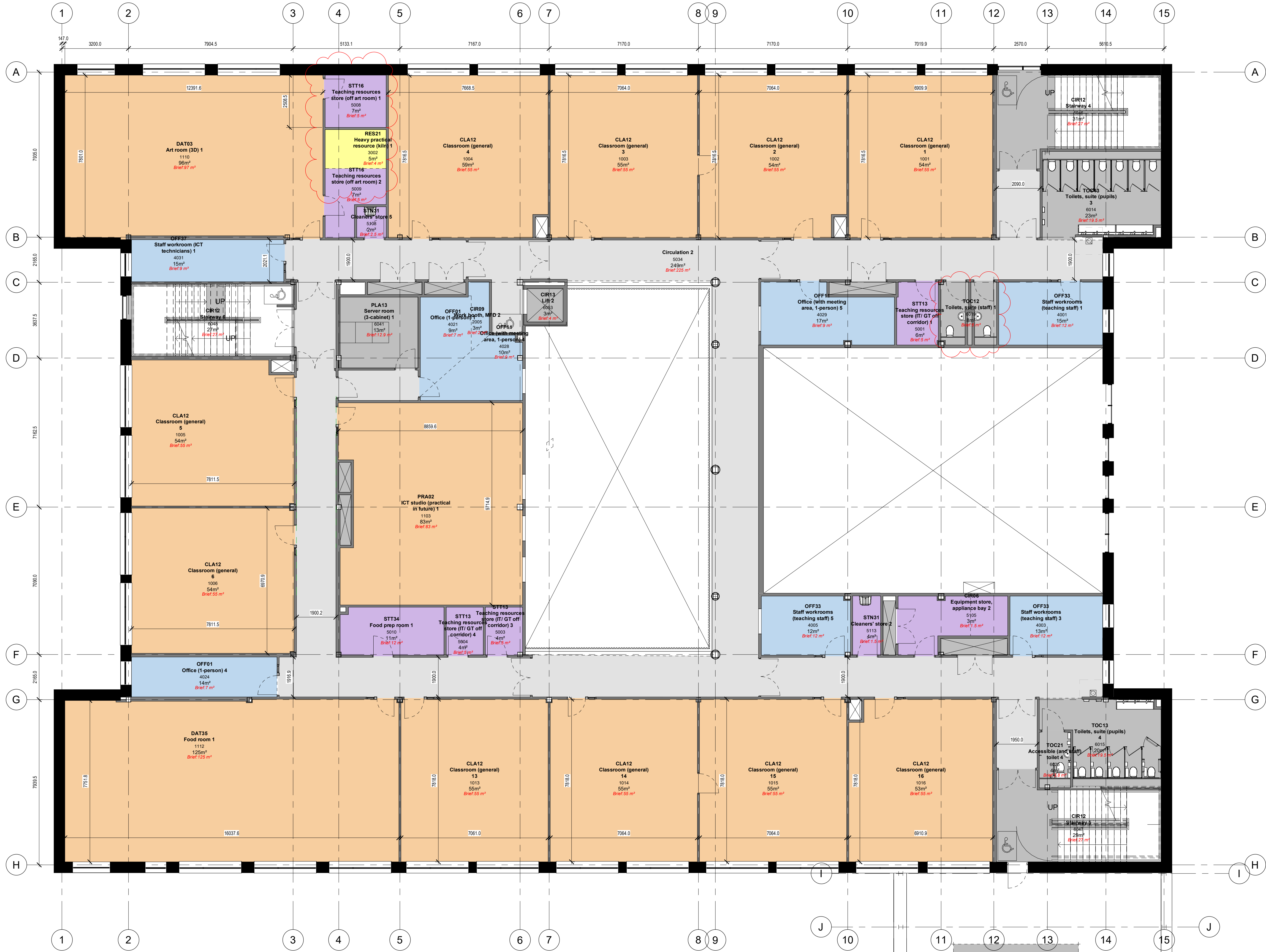
@AD

issue status

This drawing is to be used in conjunction with all related drawings. Any alterations must be checked and verified on site before commencing any works or proceeding with the drawing. The engineer should be notified immediately of any discrepancy.

	AHR Architects Ltd 5th Floor, 55 Princess Street, Manchester M2 4EW United Kingdom
T = +44(0)161 8287900 E: manchester@ahr.co.uk www.ahr.co.uk	
client name Department for Education	
project Star Academy Radcliffe	
drawing Ground Floor & Sports	
computer file A:\star Acad\for paper\acfr\FITC's A&R DZ.MA.dwg	plot date
project number 2003.00.187.000	scale 1 : 100 @A0
drawing number FIS-03-AH-R-01-D0-A-2001	rvt p/n rev issue status

This drawing is to be used in conjunction with all related drawings or documents must be checked and verified on site before commencing any work at ground floor shop.

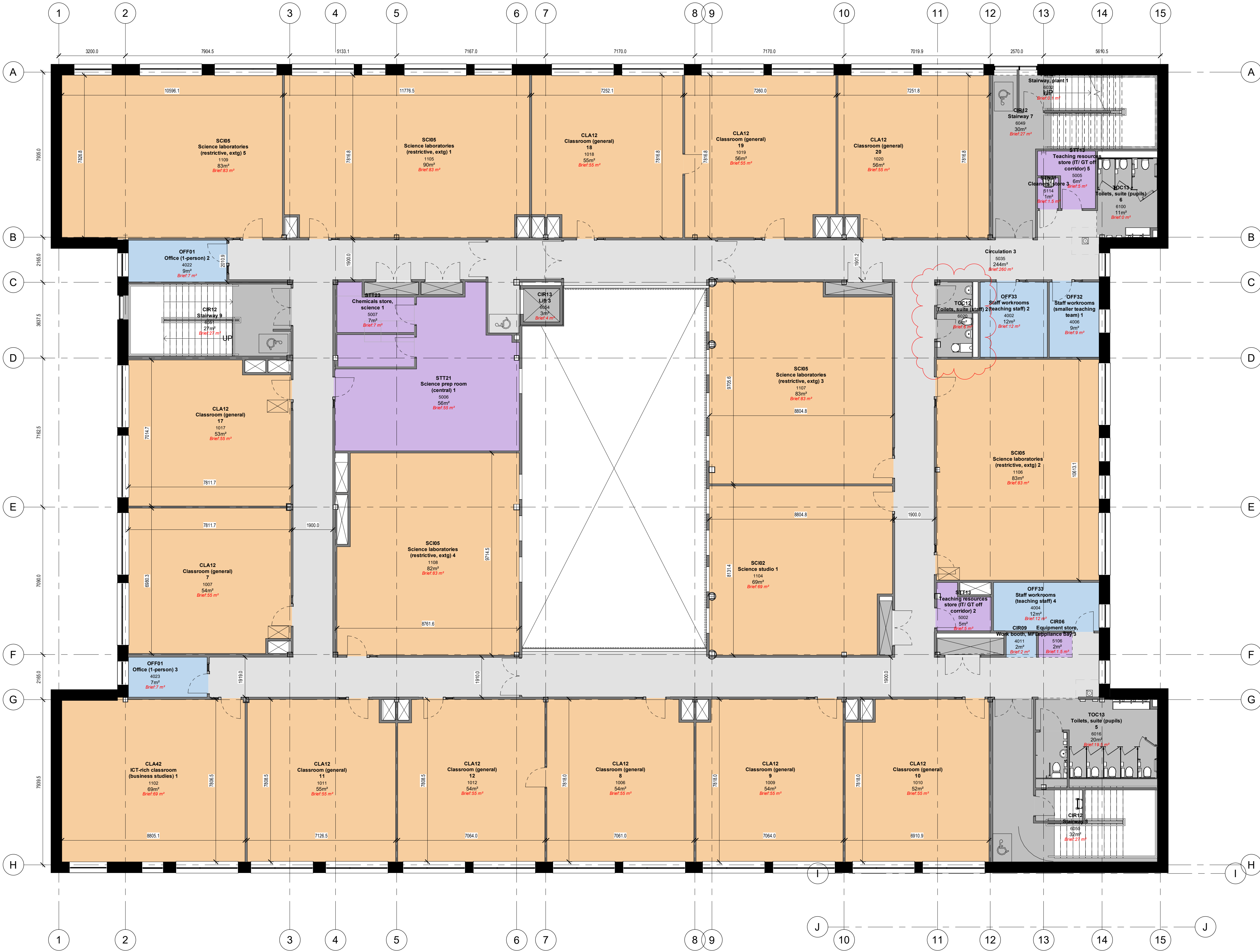


P11	Issued for review and comment	06.11.23	BT	IK
P10	Issued for planning	31.08.23	BT	IK
P09	Issued as S4 - LAP Authorisation	11.08.23	BT	IK
P08	Corridor to IT Server room updated	31.07.23	BT	IK
P07	Issued for Stage 3	04.08.23	BT	IK
P06	Updated following CEM 4	12.07.23	BT	IK
P05	Issued for final comment	06.07.23	SH	IK
P04	WIP issue following Academy comments	04.07.23	SH	IK
P03	Updated to incorporate steel frame	29.06.23	SH	IK
P02	Updated following CEM 3	27.06.23	SH	IK
P01	Stacks added to the back of classrooms	05.06.23	SH	IK
Rev	Description	Date	Dr	App
SH		09/29/22	IK	

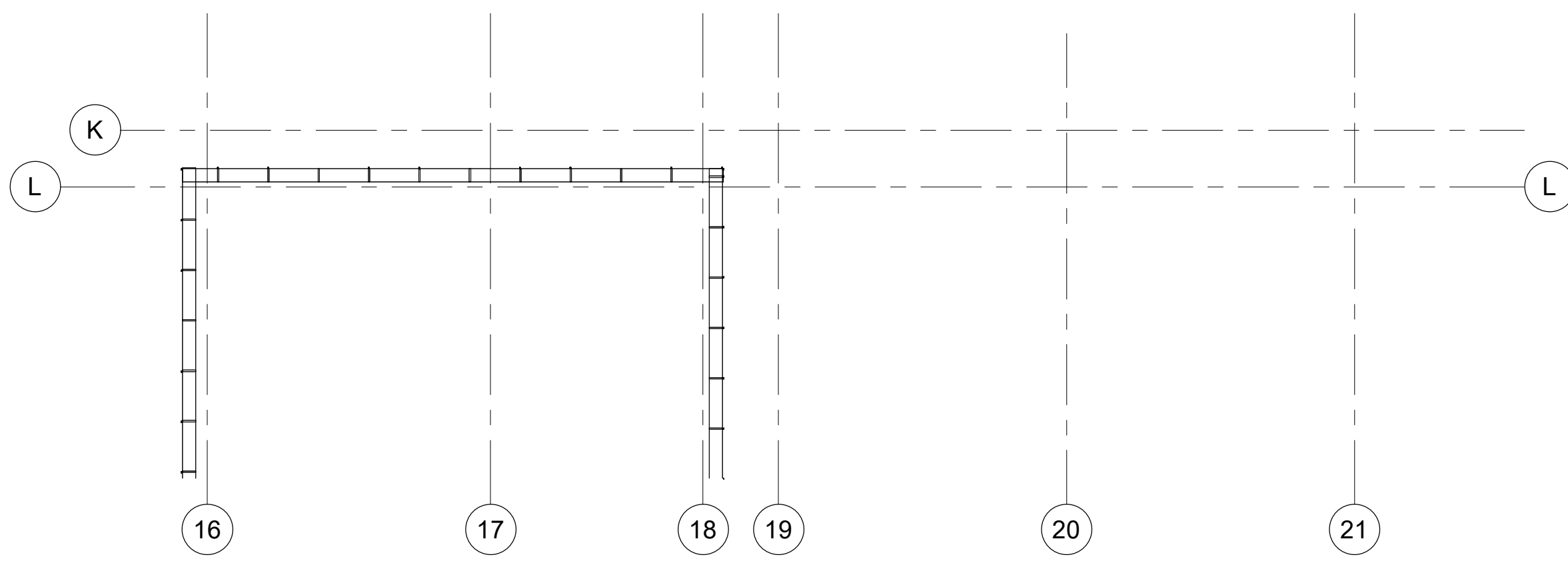
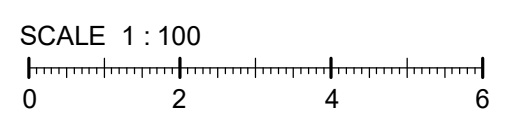
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client name	Department for Education		
project	Star Academy Radcliffe		
drawing	First Floor		
computer file	Autodesk Docs\Star Academy Radcliffe\FS1013-AHR-ZZ-22-A-A-0001.rvt	plot date	
project number	2023.00187.000	scale	1 : 100 @A1
drawing number	FS1013-AHR-01-01-D-A-2002	rev	P11
		issue status	S4
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1 Level 02 - GA Plan - Sheet 1
1 : 100



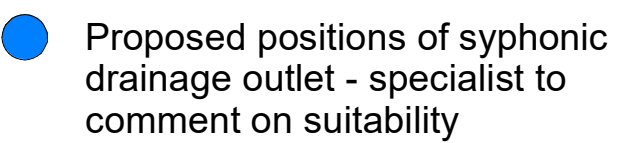
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P08	Drawing number updated	31.07.23	BT	IK
P07	Issued for Stage 3	04.08.23	BT	IK
P06	Updated for CEMAs	24.07.23	BT	IK
P05	Issued for final comment	06.07.23	SH	IK
P04	WIP issue following Academy comments	04.07.23	SH	IK
P03	Updated to incorporate steel frame	29.06.23	SH	IK
P02	Updated following CEM 3	27.06.23	SH	IK
P01	Stacks added to the back of classrooms	05.06.23	SH	IK
Rev	Description	Date	Dr	App
SH		09/29/22	IK	



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client name	Department for Education
project	Star Academy Radcliffe
drawing	Second Floor
computer file	Autodesk Docs\Star Academy Radcliffe\FS1013-AHR-ZZ-22-M-A-001.rvt
project number	2023.00187.000
drawing number	FS1013-AHR-01-02-D-A-2002
scale	1 : 100 @A1
rev	P11
issue status	S4
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project

Star Academy Radcliffe

drawing

Roof Plan

computer file Autodesk Docs /Star Academy Radcliffe/FS1015-4HR-ZZ-ZZ-M-A-0001.rvt	plot date
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drawing number	rev	issue status

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SCALE 1 : 100