FLOOD RISK ASSESSMENT AND DRAINAGE REPORT

PROPOSED CONVERSION OF FORMER SCHOOL TO RESIDENTIAL USE

Michael House School the Field Shipley Henor Derbyshire DE75 7JH

Prepared For: **Red Eagle One (Shipley) Ltd**

Prepared By: **Michael W Conway**
110 Melbourne Road
Ibstock
LEICESTERSHIRE LE67 6NN
Tel: 07967 718075
E: mickconway@btinternet.com.co.uk

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1 INTRODUCTION

1.1 **Red Eagle One** have commissioned **Michael W Conway** to undertake a joint Flood Risk Assessment (FRA) and Drainage Assessment in support of a Planning Application for the proposed re-development of buildings and land located at Michael House School, Field Lane, Shipley.

1.2 The development proposal comprises the conversion of the existing school buildings into residential units. Proposed development details are provided in Appendix A.

1.3 The site is larger than 1 hectare in size and within Flood Zone 1; the Report assesses the flood risk to the site.

1.4 This Report assesses the flood risk to the site and proposes an appropriate foul and surface water drainage strategy for the proposed development.

1.5 It has been carried out in accordance with the requirements of the National Planning Policy Framework (NPPF) and associated Planning Practice Guidance (PPG).

1.6 It investigates the flood risk posed to the site from fluvial, pluvial, sewer and groundwater-based sources.

1.7 A section in this Report provides recommendations for mitigation and an analysis of any likely residual risks.

1.8 An initial drainage strategy for both foul and surface water seeks to identify the potential constraints that need to be considered as the development proposals progress. As the sewer records and information available from the LLFA web site gave little base information, the Client has undertaken full sewer/ drains recording, CCTV and jetting study to provide base data for the site the results of which, are shown on Plan Appendix B – Existing Sewer.

Severn Trent Water advise that although our statutory sewer records do not show any public sewers within the area you have specified, there may be sewers that have been recently adopted under, The Transfer Of Sewer Regulations 2011. Public sewers have statutory protection and may not be built close to, directly over or be diverted without consent and you are advised to contact Severn Trent Water to discuss your proposals. Severn Trent will seek to assist you obtaining a solution which protects both the public sewer and the building.4

2.0 SOURCES OF INFORMATION

The Report has been based upon a variety of information sources as listed below:

- Environmental Agency on-line flood mapping
- Severn Trent Water Sewer Records
- Drainage records from CCTV and physical drain tracing

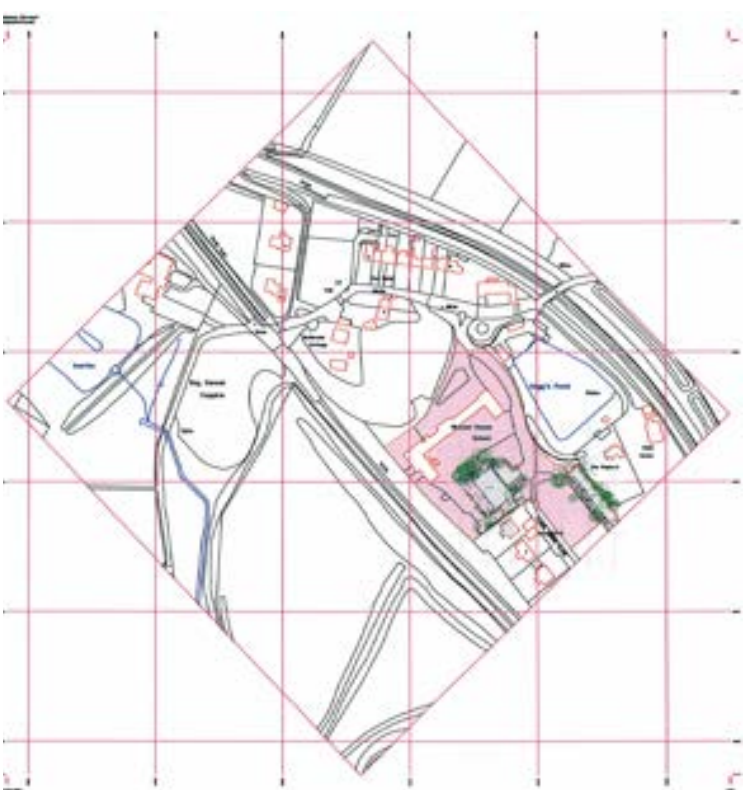
3.0 Site Description

3.1 The site is approximately 2.226Ha in size and located off Field Lane, Shipley, Derbyshire

3.2 The site location information is as follows:

OS X (Eastings)	444492
OS Y (Northings	344716
Nearest Post Code	DE75 7JH

3.3 Location of the site highlighted in pink



2.2 Topography

Site Topography

2.3 An onsite topographic survey has been carried out and is provided in Appendix D.

2.4 The site is irregular in shape and falls gently from north to south from a level of 87.00 AOD to a level of 81.50 AOD on the southern boundary.

Existing Drainage

2..5 The DEFR Standards for Sustainable Drainage Systems (March, 2015) states that the following options must be considered for disposal of surface water run-off in order of preference:

- Discharge to ground
- Discharge to a surface water body
- Discharge to a surface water sewer
- Discharge to a combined sewer

A CCTV survey has been carried out to trace the existing drains serving the existing buildings, the results of this survey is shown Appendix B,

The site having been in use in some form of commercial use since its original use as Coal Mine Office, extended and altered over the years, are served by a combined sewer network with the addition of a separate storm sewer serving gullies and roof water downspouts to the north east of the front elevation of the main building, this storm sewer finally connects to the combined sewer which runs down the south east boundary.

The site has two connections to the combined public sewer running along the bridleway 20m to the south west of the site, sewer records shown in Appendix C

Geology

2. The British Geological Survey (BGS)
Bedrock Geology
Pennine middle coal measures formation of –mudstone –Siltstone and sandstone
Cranfield Institute soilscapes (landis) lists the area as:

Restored soils mostly from quarry and opencast spoil with drainage being variable due to compaction having on-site drainage implications.

Based on the available data on the underlying soils and geology, it appears that the site will posses low infiltration rates.

It is recommended that a ground investigation is undertaken to confirm the underlying ground conditions on site. Should infiltration measurements be

undertaken they should be conducted in accordance with BRE365 guidance. This would provide further information on the ground conditions and provide an approximate infiltration rate for the underlying soil strata however it is unlikely that infiltration drainage will be feasible.

Flood warnings/flood alert

The site being in Flood Zone 1 does not fall within a Flood Warning Area and so does not receive the Flood Warning Service from the Environment Agency.

3.0 PLANNING CONTEXT

Flood and Water Management Act In combination with the Flood Risk Regulations, 2009 (which enact the EU Floods Directive in England and Wales), the Flood and Water Management Act places significantly greater responsibility on Local Authorities to manage and lead on local flooding issues. The Act and Regulations together raise the requirements and targets that Local Authorities need to meet; this includes:

• To play an active role in leading flood risk management in an area.

• The development of a Local Flood Risk Management Strategy.

• To prepare preliminary flood risk assessments (PFRAs), flood hazard and risk maps, and flood risk management plans (FRMPs).

• To develop and implement drainage and flood risk management strategies.

• To be responsible for the approval, adoption, and subsequent maintenance of Sustainable Urban Drainage Systems (SuDs).

The Local Lead Flood Authority (LLFA) for the area is Derbyshire County Council (DCC), who have the responsibility for the management of flood risk for the local area, the only flood information they hold is in relation to localised flooding to the front car park in an extreme event.

The National Planning Policy Framework (NPPF)

The NPPF sets out the government's planning policies for England and the expectations of how these policies should be applied. It acts as guidance for local planning authorities and decisionmakers, both in drawing up plans and making decisions about individual planning applications.

Section 14 of the NPPF sets out how the government intends decision-making authorities to meet the challenge of climate change plus flooding and coastal change.

Paragraph 155 sets out how inappropriate development in areas at risk of flooding should be avoided by directing development away from these areas,

but where development is necessary, making it safe for its lifetime without increasing the flood risk elsewhere.

Paragraph 159 advises: “If it is not possible for development to be located in zones with a lower risk of flooding, the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in national planning guidance.”

Paragraph 160 advises that: “The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. For the exception test to be passed it should be demonstrated that: The development would provide wider sustainability benefits to the community that outweigh the flood risk; and 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.”

Paragraph 163 continues to advise that: “When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) 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 sustainable drainage systems, 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.

Planning Practice Guidance (PPG) The PPG associated with the NPPF provides more detailed guidance on how the requirements of the NPPF can be met in practice. It includes recommendations on the allowances for climate change and for the application of the sequential and exception tests. Three critically important tables are included within the PPG that set the framework for discussion and analysis of site-specific flood risk.

Table 1 of the Planning Practice Guidance defines flood zones based upon event return probability and is used to steer development and classify land for development. The table is reproduced below.

Table 1 – Flood Zone Classification.

Flood Zone Definitions		
Flood Zone 1	Low Probability – less than 1 in 1000 annual probability of river or coastal flooding	Appropriate for all land uses
Flood Zone 2	Medium Probability – between 1in 100 and 1 in 1000 annual probability or river flooding or 1 in 200 and 1 in 1000 annual probability of coastal flooding	Essential infrastructure and the water-compatible, less vulnerable and more vulnerable uses are appropriate in this zone. The highly vulnerable uses are only appropriate in this zone if the Exception Test is passed.
Flood Zone 3a	High Probability – having a greater than 1 in 100 year annual probability of river flooding or 1 in 200 year probability of coastal flooding.	The water-compatible and less vulnerable uses of land are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone. The more vulnerable uses and essential infrastructure should only be permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.
Flood Zone 3b	Functional Floodplain - having a greater than 1 in 20 year annual probability of river flooding or 1 in 200 year probability of coastal flooding	Only the water-compatible uses and essential infrastructure that has to be there should be permitted in this zone. It 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. Essential infrastructure in this zone should pass the Exception Test.

Table 2 of the Planning Practice Guidance defines development type by associated vulnerability to flooding and is reproduced below.

Vulnerability Classification	Development Type
Essential Infrastructure	Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly Vulnerable	Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as "essential infrastructure")
More Vulnerable	Hospitals. • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	Police, ambulance and fire stations which are not required to be operational during flooding. • Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non–residential institutions not included in "more vulnerable", and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).
Water Compatible	Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel working. • Docks, marinas and wharves. • Navigation facilities. • Ministry of Defence defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Table 3 of the Planning Practice Guidance (Flood Risk Vulnerability and flood zone 'compatibility') outlines the circumstances in which development may or may not be appropriate and when an Exception Test will be required. The table is reproduced below.

	Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	√	√	√	√	√
	Zone 2	√	√	Exception Test required	√	√
	Zone 3a	Exception Test required	√	x	Exception Test required	√
	Zone 3b	Exception Test required	√	x	x	x

* † 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 flood plain) essential infrastructure that must be there and has passed the Exception Test, and water- compatible uses, should be designed to:

• remain operational and safe for users in times of flood

• result in no net loss of flood plain storage

• not impede water flows and not increase flood risk elsewhere.

Table 3 – Flood risk vulnerability and Flood Zone compatibility.

Flood risk status

The Environment Agency online flood mapping shows that the site lays within Flood Zone 1 (see Figure 4 below).



Discharge to Ground

3.1.2 The potential for surface water to discharge to ground has been assessed through a review of the likely ground conditions and possible infiltration structures.

3.1.3 The area in which this site is located is generally underlain by impermeable Clays. Soakaway an examination of the coal mining report shows the subsoil is unsuitable for soakage

3.1.4 As well as the underlying ground conditions, the site has previously been used as a School with large buildings and hard surfaced play areas giving a 60% impervious site area 3 Acres 1.226Ha

Discharge to Surface Water Body

3.1,5 There are no suitable surface water bodies near to the site that can be used for surface water discharge and the existing buildings and hard surfaced areas drain to the combined sewer located to east of the site.

Discharge to Surface Water Sewer/Combined Sewer

3.1.6 Discharge to the public sewer network should only be considered once all other options for draining surface water from the site have been exhausted.

As the existing site is drained to the existing combined sewer the drainage strategy is to use a train of SuDS drainage methods to control and limit surface water flows to the combined sewer

Sustainable Drainage Systems (SuDS)

3.2.1 To maximise the potential use of SuDS at the site, a review has been undertaken as shown in Table 1 in accordance with the SuDS Hierarchy. This review highlights the components referenced in the SuDS Hierarchy and provides recommendations on whether the components could be incorporated into the development.

Table 1: SuDS Selection Based on the SuDS Hierarchy

Component	Recommendation
Green (living) roofs	such as enhanced aesthetics and ecology. its exoosure to wind an orientation must be considered. Access to undertake the construction and maintenance easily and safely is also a high priority. If feasible, depending on the roof design, a green roof will provide water quality, biodiversity and aesthetic benefits to the site. Additionally, the green roof/s will offer some attenuation for run-off, reducing volumes of run-off and in higher frequency events (i.e. 1in2 year storms) will result in no run-off for the building. **The proposed roofs are pitched and are not suitable for green roofs**
Basins and Ponds	Ponds and attenuation basins can provide overland storage of surface water whilst also providing additional biodiversity and aesthetic/amenity value **There are no open areas on the site which are suitable for basins or ponds**
Filter Strips and Swales	Swales are linear vegetated drainage features, which provide overland conveyance and storage of surface water whilst trapping sediments and hydrocarbons within run-off. They also create biodiverse areas for planting and habitat. **Swales could well be used in the central open space area alongside footways**
Infiltration Devices	Infiltration devices are not considered suitable for the main drainage system due to the impermeable nature of the existing ground.
Permeable Paving	Whilst incorporating attenuation storage, permeable paving also provides treatment through filtration of silt (and attached pollutants), settlement and retention of solids, adsorption of pollutants and biodegradation of organic pollutants, including petrol and diesel. The extended external parking will be tanked permeable paving
Tanked Systems	This is the least sustainable option in terms of the SuDS Hierarchy. However, the use of tanked systems would still be of benefit compared to traditional drainage systems as it does allow run-off to be slowed down to an acceptable discharge rate. The permeable paving will discharge to storage tanks to control the discharge rate to the combined sewer
Gray water systems	The roof of the converted dwellings shall be drained to gray water storage tanks providing water for garden, toilet flushing and clothes washing

4 Surface Water Drainage Design

4.1 Existing Site Run-Off

4.1.1 The development area currently comprises exiting buildings, tarmac play areas and associated landscaped areas

Table 2: Site Areas

Parameter	Existing (m2)	Existing (%)	Proposed (m2)	Proposed (%)
Impermeable area	*6993*	*54*	*5203*	*40*
Permeable area	*6029*	*46*	*7818.55*	*60*
Total area	*13022*	*100*	*13022*	*100*

4.1.2 The surface water runoff from the site currently connects to the combined sewer

4.2 Design Considerations

4.2.1 Consideration has been given to the following when calculating the proposed impermeable areas.

- The 2013 EA 'Rainfall Run-off Management for Developments' Report (SC030219) states that urban creep, the process of gradually increasing impermeable area within an urban area (through paving soft landscaped surfaces and constructed outbuildings etc), is an acknowledged issue. To include an allowance for urban creep, the impermeable area used in the drainage calculations has been increased by 10% in accordance with the recommendation made in SC030219.

4.2.2 Site discharge should be as close to greenfield rates as possible. However, as the greenfield rates from this site are low (See Appendix E), in accordance with best practice, outflow controls will be set to discharge at a rate of 5 litres/second.

4.2.3 The climate change allowance used in the Drainage Strategy is in line with updated EA guidance values published in February 2016 for increased rainfall intensities by 2115.

4.3 Existing Greenfield Run-Off Rates

4.3.1 The existing run-off rates for a variety of return periods have been calculated using the Wallingford method.

4.3.2 The greenfield run-off rates are based on the parameters provided below in Table 3.

Table 3: Rural Run-off Calculator Parameters

Parameter	Value
Area (ha)	1.226
SAAR (mm)	700
Soil Type	4

4.3.3 The calculations are presented in Appendix C and summarised below in table 4.

Table 4: Existing Greenfield Run-Off Rates

Parameter	Value for site (l/s)
QBAR	5.92
Q1	4.91
Q30	11.84
Q100	15.21

4.3.4 As the greenfield rates from this site are low, in accordance with best practice, outflow controls will be set to discharge at a rate of 5 litres/second.

4.4 Flood Risk Reduction

4.4.1 As infiltration is not possible on this site, reducing post development run-off volumes to pre-development volumes is achieved through attenuation.

4.4.2 By controlling run-off rates to 5 litres/second and providing attenuation for all storm events up to and including a 1 in 100-year storm plus 40% climate change allowance, the risk of downstream flooding will be minimised.

4.4.3 Details of the drainage system and attenuation are presented in the design drawings and calculations in Appendix G.

4.4.4 The calculations include an assessment of the attenuation for the 100-year storm +40% climate changes.

4.4.5 A total attenuation volume of approximately 80 cubic metres is proposed to cater for the 100 year +40% storm event.

4.5 Exceedance Flooding and Overland Flow

4.5.1 The area is subject to existing overland flow routes.

4.5.2 In order to minimise the risk from surface water flooding, it is proposed to maintain this flow route through the site using the proposed roadways. See appendix G for details

4.5.3 It should be noted that the drainage system has been designed to cater for the 1 in 100 year + 40% climate change storm. ie in this storm event all surface water will be collected on site and slowly released. Thus, the flow route will only be in use in the event of drainage network failure, storms in excess of the 1 in 100 year + 40% climate change storm or flows from offsite flowing through the site.

4.6 Consents, Offsite Works and Diversions

4.6.1 The proposed surface water drainage strategy is to discharge to the existing combined sewer, As the drainage strategy is to implement a train of SuDS into the storm runoff then the impact on the combined sewer is to reduce the impact on the combined sewer.

4.7 Maintenance

4.7. A SuDS maintenance plan has been prepared to outline the management of the potential SuDS features. The maintenance plan is provided in Appendix H.

5 Water Quality

5.1 Post-Development Water Quality Treatment

5.1.1 In line with the 2015 SuDS Manual (CIRIA 0753), certain criteria should be applied to manage the quality of run-off to support and protect the natural environment effectively. Treatment design, wherever practicable, should be based on good practice, comprising the following principles:

- Manage surface water run-off close to source
- Treat surface water run-off on the surface
- Treat surface water run-off to remove a range of contaminants
- Minimise risk of sediment remobilisation

5.1.2
- Minimise impacts from accidental spills

5.1.3 Managing pollution close to the source can help keep pollutant levels and accumulation rates low, essentially allowing natural treatment processes to be effective. This in turn can help maximise the amenity and biodiversity value of downstream surface SuDS components and keep maintenance activities straightforward and cost-effective.

The proposed development comprises two types of land use; residential roofs and a car parks/low traffic driveway. These land uses are classified as having very low and low hazard pollution levels, respectively. This table is provided below in Table 5.

Table 5: Pollution Hazard Indices from 2015 SuDS Manual (C753)

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	**Very Low**	0.2	0.2	0.05
Other roofs (typically c nert.ati indusial: roofs)	**Low**	0.3	0.2 (up to 0.8 where there is potential for metals in leach from the roof	0.05
Individual property driveways, residents oar parks, low traffic roads (e.g. cul de sacs. homezones and general access roads) and non-residential oar parking with infrequent Change (e.g. school, offices) i.e. < 300 traffic movements/day	**Low**	0.5	0.4	0.4
Commercial yard and delivery areas,non-residential car parking with frequent change (e.g. hospitals. Retail) roads except low traffic roads and trunk roads/motorways	**Medium**	0.7	0.6	0.7
Sites with heavy pollution (e.g. haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites) sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites: trunk roads and motorways'	**High**	0.8	0.8	0.9

The proposed drainage strategy utilises the following SuDS features:

- Tanked permeable paving

The indicative SuDS mitigation indices, provided in Table 26.3 of the 2015 SuDS Manual (C753) have been reviewed for the roof and paving. This table is provided below in Table 6.

Table 6: Indicative SuDS Mitigation Indices from 2015 SuDS Manual (C753)

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

	Mitigation indices[1]		
Type of SuDS component	**TSS**	**Metals**	**Hydrocarbons**
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[3]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[4,5]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

5.1.6 To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contaminant type), as follows:

Total SuDS mitigation index (for each contaminant type) pollution hazard index (for each contaminant type)

5.1.7 For each type of land-use, the pollution hazard indices, mitigation indices and concluding hazard have been outlined in Table 7 below.

Table 7: Roof Space Water Quality Mitigation Summary

Residential Roofs				SuDS Manual Reference
	TSS	Metals	Hydrocarbons	
Pollution Hazard Index	0.2	0.2	0.05	Table 26.2
Mitigation Index (Permeable Paving)	0.7	0.6	0.7	Table 26.3
Total Mitigation Index	0.7	0.6	0.7	Worst case only

Result Total SuDS mitigation index ≥ pollution hazard index and therefore hazard is exceeded

Table 8: External Pavement Space Water Quality Mitigation Summary

Residential Roofs				SuDS Manual Reference
	TSS	Metals	Hydrocarbons	
Pollution Hazard Index	0.5	0.4	0.4	Table 26.2
Mitigation Index (Permeable Paving)	0.7	0.6	0.7	Table 26.3
Total Mitigation Index	0.7	0.6	0.7	Worst case only
Result	Total SuDS mitigation index ≥ pollution hazard index and therefore hazard is exceeded			

5.1.8 Therefore, it can be concluded that the provision of permeable paving exceeds the required pollution mitigation indices and provides sufficient treatment as part of the surface water management train, in accordance with the 2015 SuDS Manual (CIRIA 0753).

5.1.9 Given that the site is not located in a Source Protection Zone, it is not considered necessary to apply a more cautionary approach.

6.0

6.1

Foul Run-Off

6.1.1

Discharge to Public Sewer Network

6.1.2

Severn Trent Water are the foul sewerage suppliers for the area. The identified points of connection from the site are into the public foul sewer network located in the bridleway 20m to the south west of the site. A Sewer Connection Application will be submitted to Severn Trent Water for Approval.

Appendix A



Notes:-

For guidance only. Do not scale off this drawing

1:10 - 0	100mm	200mm	300mm	400mm	500mm	600mm	700mm	800mm
1:100- 0	1m	2m	3m	4m	5m	6m	7m	8m
1:20 - 0	400mm	800mm	1200	1600
1:50 - 0	1m	2m	3m	4m

Existing Impermeable Areas

1.30Ha

Proposed Impermeable Areas

2467.3
1496
1401
335
5699.3total
0.57Ha

Existing Services Legend:-

- ENERGIS
- TRANSCO
- Water Mains
- Foul Sewer
- Surface Water Sewer
- Combined Sewer
- NEDL
- NEDL - Two cables running parallel
- NEDL - Three cables running parallel
- NEDL - Four cables running parallel
- NEDL - Five cables running parallel
- British Telecom
- Virgin Media (formerly NTL)
- Street lighting cable
- Street lighting cable - 2no. cables
- Street lighting cable - 3no. cables
- Highway drain

FOR APPROVAL

REV.	DATE	AMENDMENT	BY

CLIENT

RED FOUR (RIPLEY) LTD

-

PROJECT

RESIDENTIAL REDEVELOPMENT OF MICHAEL HOUSE SCHOOL

DRAWING TITLE

EXISTING SERVICES (LOCATED) and DRAINAGE AREAS

SCALE as shown | SHEET SIZE A1

Michael W Conway
110 Melbourne Road
Ibstock
Leicestershire
LE67 6NN

07967718075
mickconway22@btinternet.com

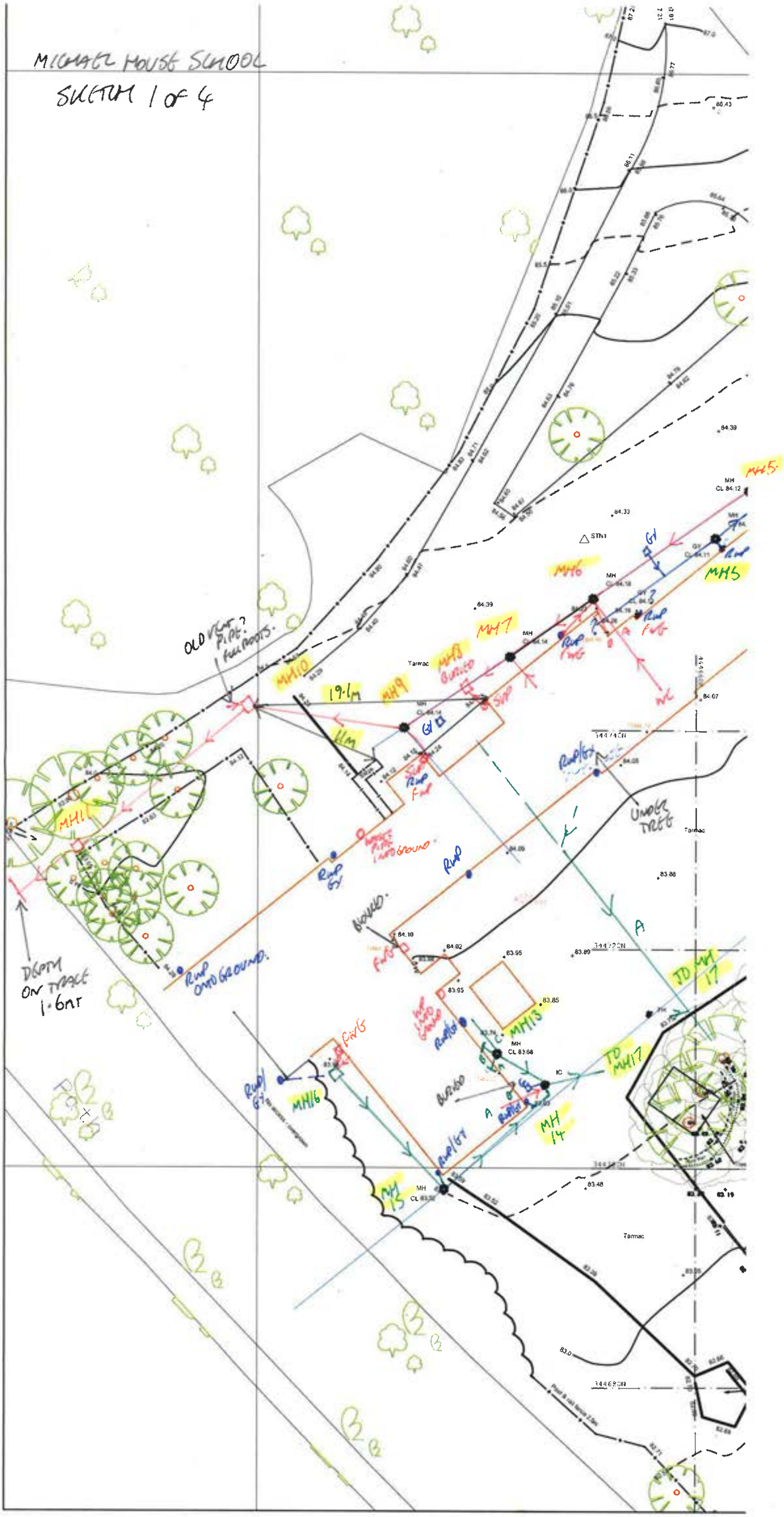
DRAWN	MWC	DRAWING NO.	Rev.
DATE	Feb 19	E21-24-010	.

Appendix B

AQUA-JET SDC LTD
01283 730333
11+12/10/21

MICHAEL HOUSE SCHOOL

SHEET 1 of 4


MH5
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MH 14
MH 15
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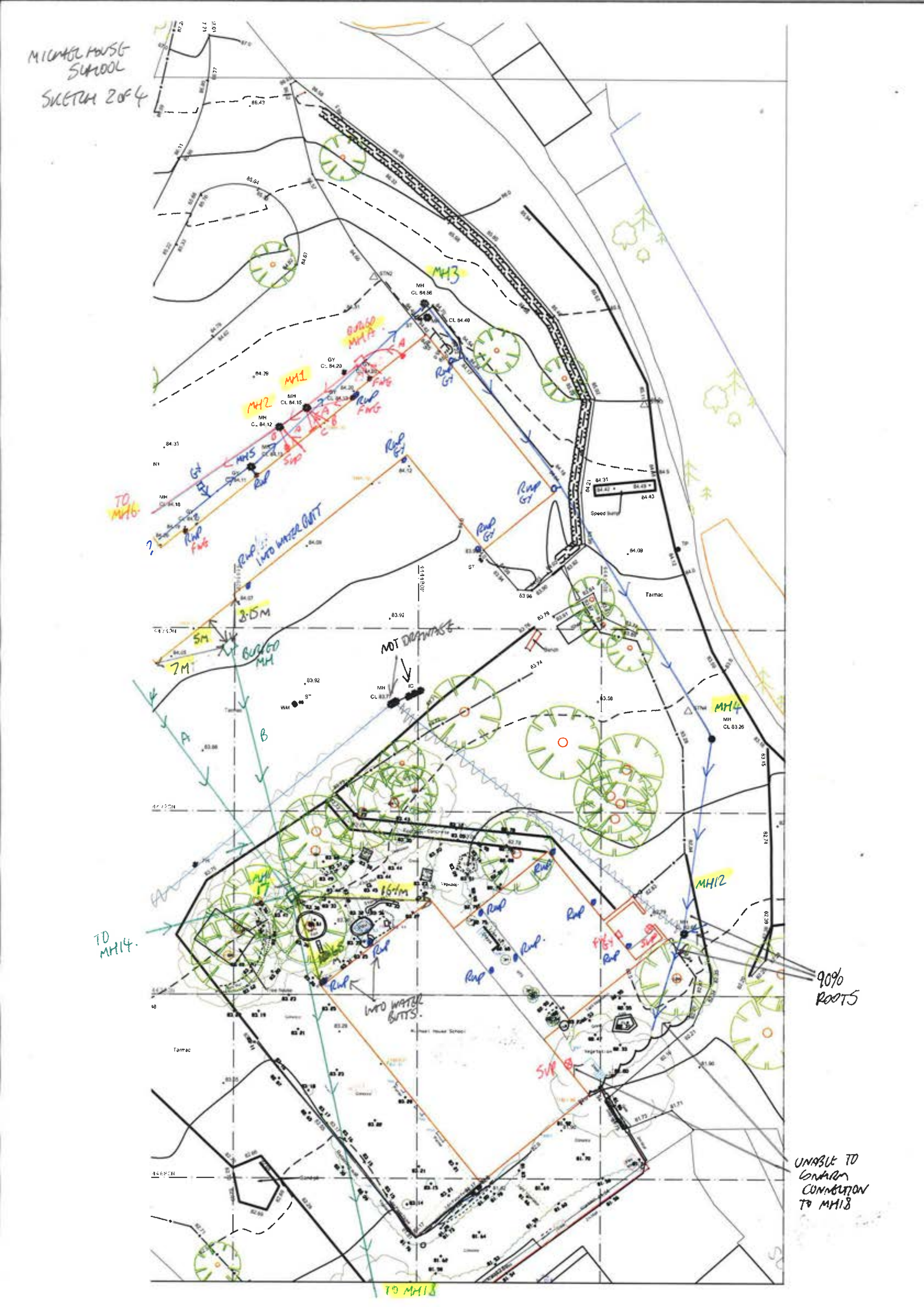
MH CL 84.18
MH CL 84.14
MH CL 83.68
MH CL 83.52
19.1m
11m
1.6m
DEPTH ON TRACE
OLD VENT PIPE? FULL OF ROOTS.
RWP
RWP UNDERGROUND.
RWP UNDER GROUND
RWP FWG
RWP GV
RWP FWG
RWP GV
RWP GV
RWP GV


MICHAEL HOUSE SCHOOL
SKETCH 2 OF 4
MH3
MH1
MH2
MH5
MH4
MH12
MH17
BURIED MH A
BURIED MH
TO MH6
TO MH14.
TO MH18
INTO WATER BUTT
INTO WATER BUTTS.
NOT DRAINAGE
8.15M
5M
7M
16.1M
90% ROOTS
UNABLE TO CONFIRM CONNECTION TO MH18
Tarmac
Speed bump

MICHAEL HOUSE SCHOOL
SKETCH 3 OF 4

Former Michael House School
Ripley

CCTV & sewer records
plan scale 1:500

DYE TESTED BUT CONNECTION NOT CONFIRMED TO MICHAEL HOUSE SCHOOL SYSTEM. COULD BE DUE TO SILTED CONDITION.

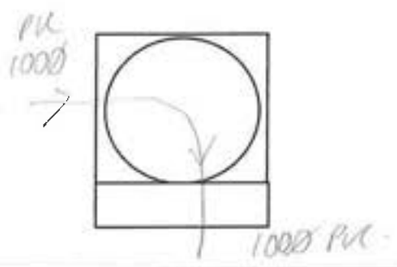
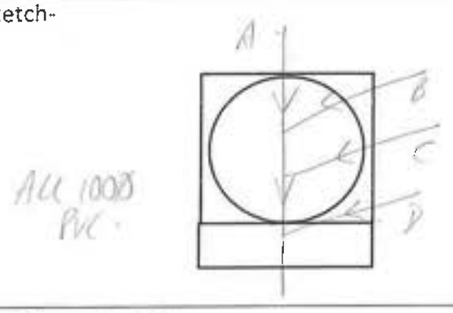
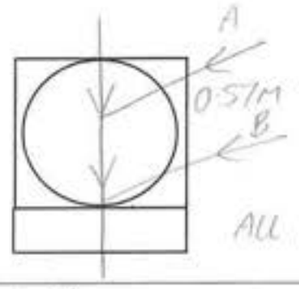
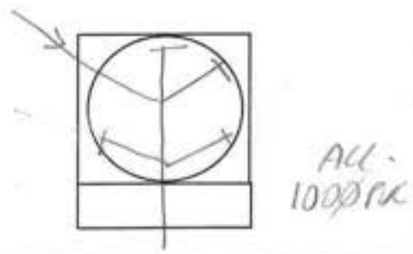
MICHAEL HOUSE SCHOOL
SKETCH 4 OF 4

AquaJet

Aqua-Jet Specialist Drainage Contractors Ltd
0800 0562080
Yard 21, Hilton Industrial Estate, Sutton Lane, Hilton, DE65 5FE
Tel- 0800 0562080 Fax- 01283 730444 Email- aquajetltd@aol.com

Manhole Information
Client:

Site: MICHAEL HOUSE SCHOOL

Reference: MH3	Reference: MH1
Duty: Foul/Surface/Combined/Other (detail in comments)	Duty: Foul/Surface/Combined/Other (detail in comments)
Sketch- 	Sketch- 
Depth: 0.92m	Depth: 0.57m
Shape: Rectangular/square/circular	Shape: Rectangular/square/circular
Material: BRICK	Material: BRICK
Chamber Size: L- 600 W- 500 D-	Chamber Size: L- 700 W- 450 D-
Observations/comments:	Observations/comments:
Reference: MH2	Reference: MH4
Duty: Foul/Surface/Combined/Other (detail in comments)	Duty: Foul/Surface/Combined/Other (detail in comments)
Sketch- 	Sketch- 
Depth: 0.62	Depth: 0.91
Shape: Rectangular/square/circular	Shape: Rectangular/square/circular
Material:	Material:
Chamber Size: L- 650 W- 500 D-	Chamber Size: L- W- D- 450Ø
Observations/comments: BENDING DEFECTIVE.	Observations/comments:

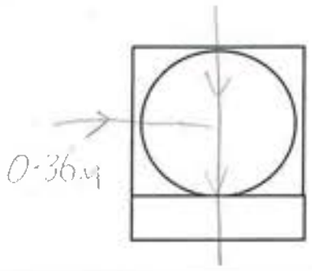
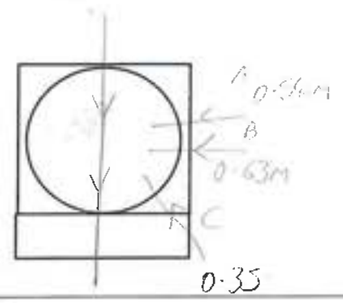
TO MH17

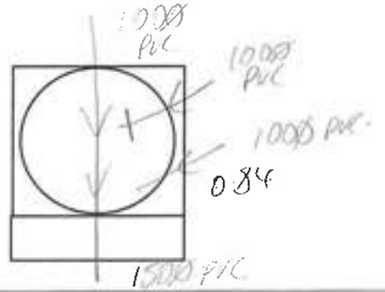
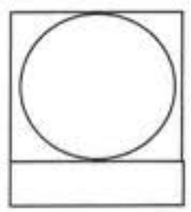


AquaJet
Aqua-Jet Specialist Drainage Contractors Ltd
0800 0562080
Yard 21, Hilton Industrial Estate, Sutton Lane, Hilton, DE65 5FE
Tel- 0800 0562080 Fax- 01283 730444 Email- aquajetltd@aol.com

Manhole Information
Client:

Site: MICHAEL HOUSE SCHOOL.

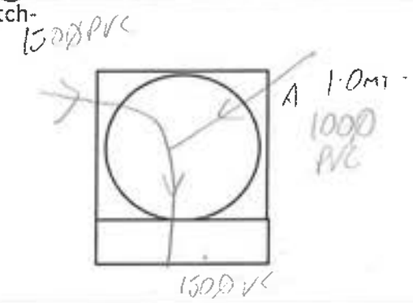
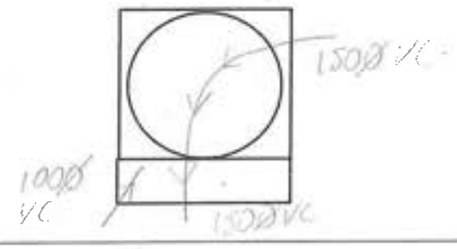
Reference: MH5	Reference: MH6
Duty: Foul/Surface/Combined/Other (detail in comments)	Duty: Foul/Surface/Combined/Other (detail in comments)
Sketch- 	Sketch- 
Depth: 0·43m	Depth: 0·77m
Shape: Rectangular/square/circular	Shape: Rectangular/square/circular
Material: BRICK	Material:
Chamber Size: L- 600 W- 470 D-	Chamber Size: L- 600 W- 350 D-
Observations/comments:	Observations/comments:

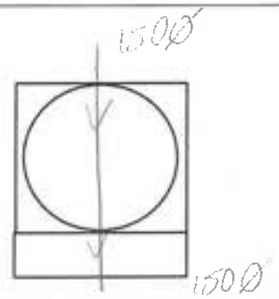
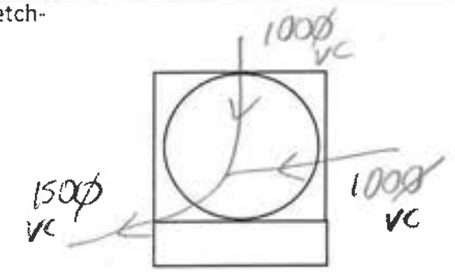
Reference: MH7	Reference: MH8
Duty: Foul/Surface/Combined/Other (detail in comments)	Duty: Foul/Surface/Combined/Other (detail in comments)
Sketch- 	Sketch- 
Depth: 0·86	Depth:
Shape: Rectangular/square/circular	Shape: Rectangular/square/circular
Material: BRICK	Material:
Chamber Size: L- 700 W- 500 D-	Chamber Size: L- W- D-
Observations/comments:	Observations/comments: BURIED

AquaJet
Aqua-Jet Specialist Drainage Contractors Ltd
0800 0562080
Yard 21, Hilton Industrial Estate, Sutton Lane, Hilton, DE65 5FE
Tel- 0800 0562080 Fax- 01283 730444 Email- aquajetltd@aol.com

Manhole Information
Client:

Site: MICHAEL HOUSE SCHOOL

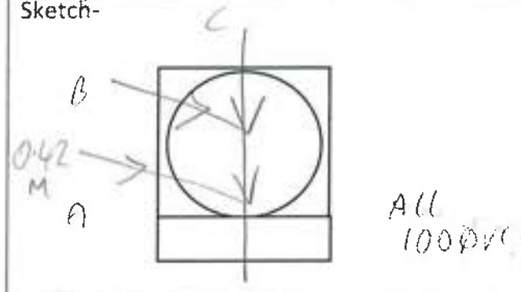
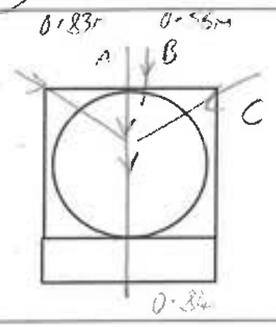
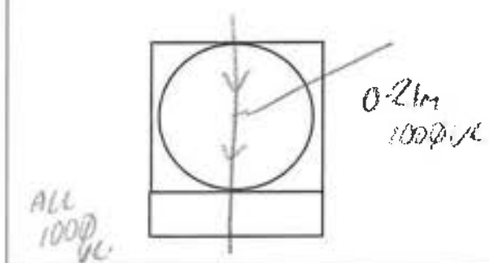
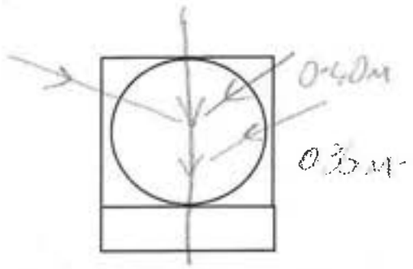
Reference: MH9	Reference: MH10
Duty: Foul/Surface/Combined/Other (detail in comments)	Duty: Foul/Surface/Combined/Other (detail in comments)
Sketch- 	Sketch- 
Depth: 1·05m.	Depth: 1·32m
Shape: Rectangular/square/circular	Shape: Rectangular/square/circular
Material: BRICK	Material: BRICK
Chamber Size: L- 650 W- 500 D-	Chamber Size: L- 800 W- 500 D-
Observations/comments: MISSING BRICKS UNDER COVER	Observations/comments: UNDER STEEL PLATE. COVER 110mm BELOW GROUND LEVEL. ROOT PRESENT IN MH

Reference: MH11	Reference: MH12
Duty: Foul/Surface/Combined/Other (detail in comments)	Duty: Foul/Surface/Combined/Other (detail in comments)
Sketch- 	Sketch- 
Depth: 1·67m	Depth: 0·95m
Shape: Rectangular/square/circular	Shape: Rectangular/square/circular
Material: BRICK	Material:
Chamber Size: L- 650 W- 500 D-	Chamber Size: L- 650 W- 520 D-
Observations/comments:	Observations/comments: MANHOLE FULL ROOTS

AquaJet
Aqua-Jet Specialist Drainage Contractors Ltd
0800 0562080
Yard 21, Hilton Industrial Estate, Sutton Lane, Hilton, DE65 5FE
Tel- 0800 0562080 Fax- 01283 730444 Email- aquajetltd@aol.com

Manhole Information
Client:

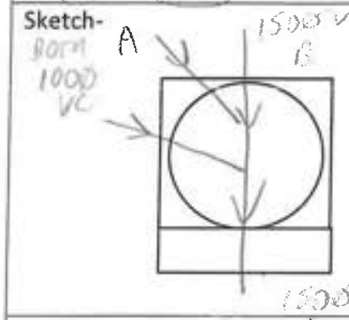
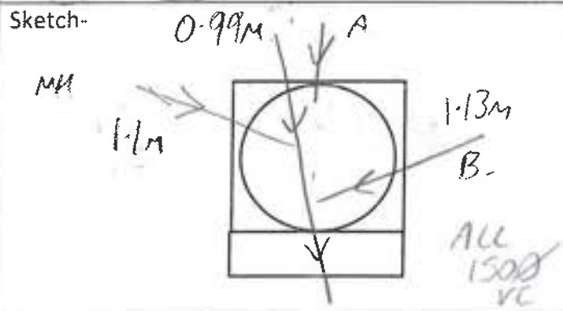
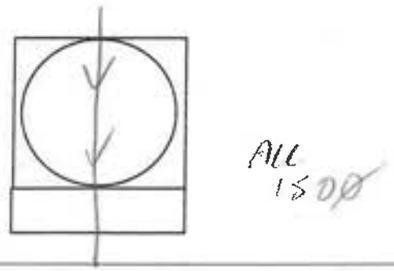
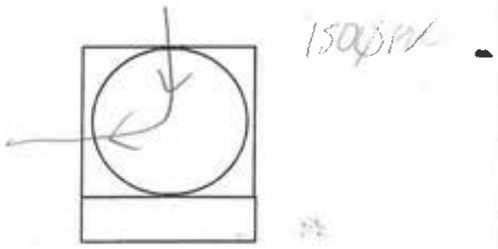
Site: MICHAEL HOUSE SCHOOL

Reference: MH13	Reference: MH14
Duty: Foul/Surface/Combined/Other (detail in comments)	Duty: Foul/Surface/Combined/Other (detail in comments)
Sketch- 	Sketch- 
Depth: 0·5M	Depth:
Shape: Rectangular/square/circular	Shape: Rectangular/square/circular
Material: BRICK	Material: BRICK
Chamber Size: L- 600 W- 450 D-	Chamber Size: L- 670 W- 450 D-
Observations/comments:	Observations/comments:
Reference: MH15	**Reference: MH16**
Duty: Foul/Surface/Combined/Other (detail in comments)	Duty: Foul/Surface/Combined/Other (detail in comments)
Sketch- 	Sketch- 
Depth: 0·37M	Depth: 0·45
Shape: Rectangular/square/circular	Shape: Rectangular/square/circular
Material: BRICK/CONCRETE	Material: BRICK
Chamber Size: L- 600 W- 450 D-	Chamber Size: L- 600 W- 450 D-
Observations/comments:	Observations/comments:

AquaJet
Aqua-Jet Specialist Drainage Contractors Ltd
0800 0562080
Yard 21, Hilton Industrial Estate, Sutton Lane, Hilton, DE65 5FE
Tel- 0800 0562080 Fax- 01283 730444 Email- aquajetltd@aol.com

Manhole Information
Client:

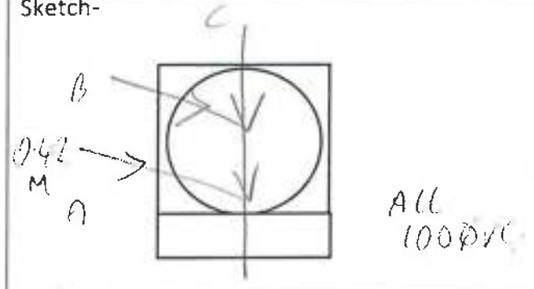
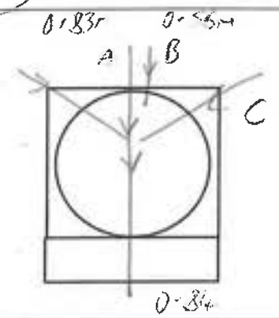
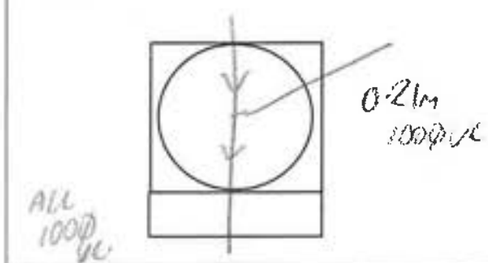
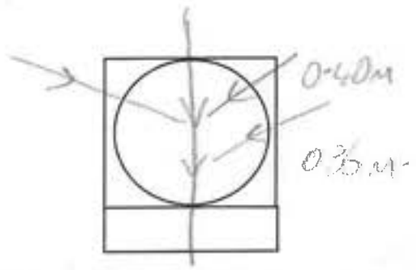
Site: MICHAEL HOUSE SCHOOL

Reference: MH17	Reference: MH18
Duty: Foul/Surface/Combined/Other (detail in comments)	Duty: Foul/Surface/Combined/Other (detail in comments)
Sketch- 	Sketch- 
Depth: 1·2M CL (GL 1·35M)	Depth: 1·26M
Shape: Rectangular/square/circular	Shape: Rectangular/square/circular
Material: BRICK	Material: BRICK
Chamber Size: L- 600 W- 450 D-	Chamber Size: L- 700 W- 600 D-
Observations/comments:	Observations/comments:
Reference: MH18A	**Reference: MH19 — O/S CATCHES**
Duty: Foul/Surface/Combined/Other (detail in comments)	Duty: Foul/Surface/Combined/Other (detail in comments)
Sketch- 	Sketch- 
Depth: 1·4M	Depth: 0·54M
Shape: Rectangular/square/circular	Shape: Rectangular/square/circular
Material: BRICK	Material: BRICK/CONCRETE
Chamber Size: L- 550 W- 220/350 D-	Chamber Size: L- 650 W- 400 D-
Observations/comments:	Observations/comments: FOUL ?

AquaJet
Aqua-Jet Specialist Drainage Contractors Ltd
0800 0562080
Yard 21, Hilton Industrial Estate, Sutton Lane, Hilton, DE65 5FE
Tel- 0800 0562080 Fax- 01283 730444 Email- aquajetltd@aol.com

Manhole Information
Client:

Site: MICHAEL HOUSE SCHOOL

Reference: MH13	Reference: MH14
Duty: Foul/Surface/Combined/Other (detail in comments)	Duty: Foul/Surface/Combined/Other (detail in comments)
Sketch- 	Sketch- 
Depth: 0·5M	Depth:
Shape: Rectangular/square/circular	Shape: Rectangular/square/circular
Material: BRICK	Material: BRICK
Chamber Size: L- 600 W- 450 D-	Chamber Size: L- 670 W- 450 D-
Observations/comments:	Observations/comments:
Reference: MH15	**Reference: MH16**
Duty: Foul/Surface/Combined/Other (detail in comments)	Duty: Foul/Surface/Combined/Other (detail in comments)
Sketch- 	Sketch- 
Depth: 0·37M	Depth: 0·45
Shape: Rectangular/square/circular	Shape: Rectangular/square/circular
Material: BRICK/RENDER	Material: BRICK
Chamber Size: L- 600 W- 450 D-	Chamber Size: L- 600 W- 450 D-
Observations/comments:	Observations/comments:

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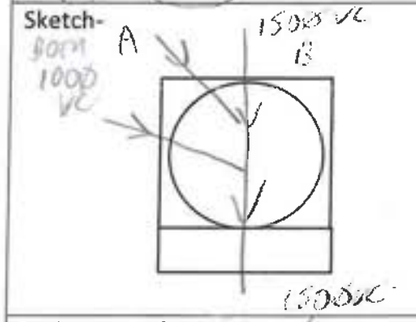
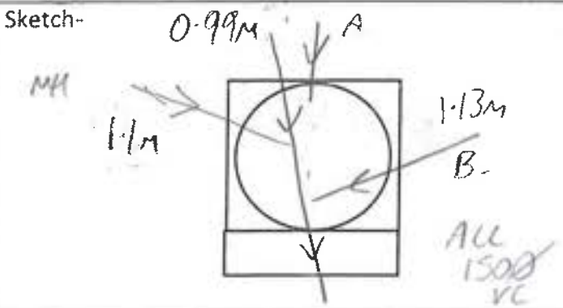
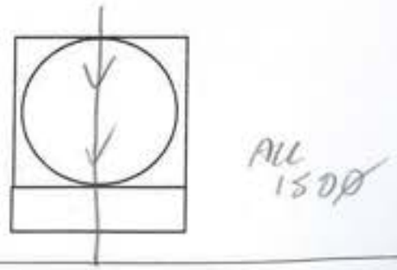
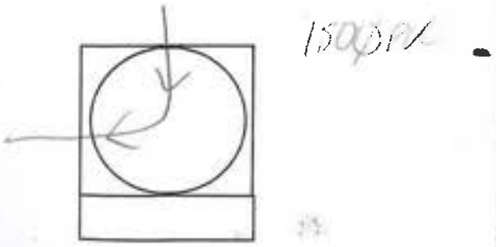
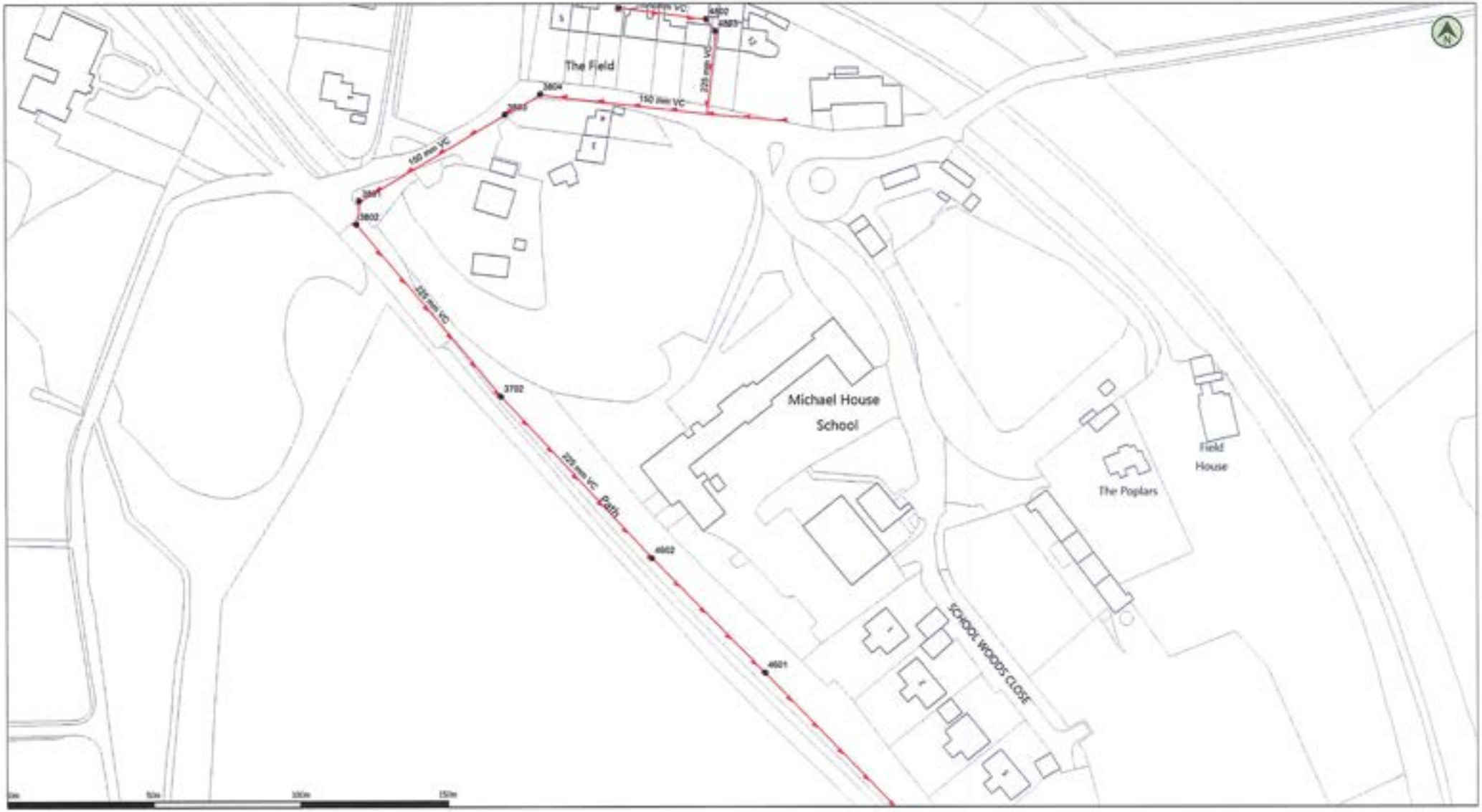
Tel- 0800 0562080 Fax- 01283 730444 Email- aquajetltd@aol.com

Manhole Information
Client:

Site: MICHAEL HOUSE SCHOOL

Reference: MH17	Reference: MH18
Duty: Foul/Surface/Combined/Other (detail in comments)	Duty: Foul/Surface/Combined/Other (detail in comments)
Sketch- 	Sketch- 
Depth: 1·2m CL (GL 1·35M)	Depth: 1·26M
Shape: Rectangular/square/circular	Shape: Rectangular/square/circular
Material: BRICK	Material: BRICK
Chamber Size: L- 600 W- 450 D-	Chamber Size: L- 700 W- 600 D-
Observations/comments:	Observations/comments:
Reference: MH13A	**Reference: MH19 — OS MANHOLE**
Duty: Foul/Surface/Combined/Other (detail in comments)	Duty: Foul/Surface/Combined/Other (detail in comments)
Sketch- 	Sketch- 
Depth: 1·4M	Depth: 0·54M
Shape: Rectangular/square/circular	Shape: Rectangular/square/circular
Material: BRICK	Material: BRICK/RENDER
Chamber Size: L- 850 W- 220/350 D-	Chamber Size: L- 650 W- 400 - D-
Observations/comments:	Observations/comments: FOUL ?

Appendix C



(c) Crown copyright and database rights 2021 Ordnance Survey 100031673

Date: 16/07/21

Scale: 1:1250

Map Centre: 444429,344742

Data updated: 14/07/21

Our Ref: 600671 - 2

Wastewater Plan A3

Do not scale off this Map. This plan and any information supplied with it is furnished as a general guide, is only valid at the date of issue and no warranty as to its correctness is given or implied. In particular this plan and any information shown on it must not be relied upon in the event of any development or works (including but not limited to excavations) in the vicinity of SEVERN TRENT WATER assets or for the purposes of determining the suitability of a point of connection to the sewerage or distribution systems. On 1 October 2011 most private sewers and private lateral drains in Severn Trent Water's sewerage area, which were connected to a public sewer as at 1 July 2011, Transferred to the ownership of Severn Trent Water and became public sewers and public lateral drains. A further transfer takes place on 1 October 2012. Private pumping stations, which form part of these sewers or lateral drains, will transfer to ownership of Severn Trent Water on or before 1 October 2015. Severn Trent Water does not cassess complete records of these assets. These assets may not be displayed on the map. Reproduction by permission of Ordnance Survey on behalf of HMSO. © Crown Copyright and database right 2004. All rights reserved. Ordnance Survey licence number: 100031673. Document users other than SEVERN TRENT WATER business users are advised that this document is provided for reference purpose only and is subject to copyright, therefore, no further copies should be made from it.

Public Foul Gravity/Lateral Drain
Public Combined Gravity/Lateral Drain
Public Surface Water Gravity/Lateral Drain
Pressure Foul
Pressure Combined
Pressure Surface Water
Highway Drain
Overflow Pipe
Disposal Pipe
Culverted Water Course
Pumping Station
Filling
Manhole Foul
Manhole Surface
Abandoned Pipe
Surface Water systems are normally at ground
Private sewers are obscured or ingnored

mickconway22@btinternet.com

Michael house school

SEVERN TRENT

Appendix D



Notes:-

For guidance only. Do not scale off this drawing

1:10 - 0 100mm 200mm 300mm 400mm 500mm 600mm 700mm 800mm
1:100- 0 1m 2m 3m 4m 5m 6m 7m 8m
1:20 - 0 400mm 800mm 1200 1600
1:50 - 0 1m 2m 3m 4m

Existing Services Legend:-

- ENERGIS
- TRANSCO
- Water Mains
- Foul Sewer
- Surface Water Sewer
- Combined Sewer
- NEDL
- NEDL - Two cables running parallel
- NEDL - Three cables running parallel
- NEDL - Four cables running parallel
- NEDL - Five cables running parallel
- British Telecom
- Virgin Media (formerly NTL)
- Virgin Media (formerly NTL) - Two ducts running parallel
- Virgin Media (formerly NTL) - 4no. ducts running parallel (2
- Street lighting cable
- Street lighting cable - 2no. cables
- Street lighting cable - 3no. cables
- Highway drain

FOR CONSTRUCTION

REV.	DATE	AMENDMENT	BY

CLIENT

PROJECT

Michael Heanor House
Derby

DRAWING TITLE

Topographical Survey

Levels related to OS using GPS equipment

SCALE 1:500 | SHEET SIZE A1

Michael W Conway
110 Melbourne Road
Ibstock
Leicestershire
LE67 6NN

07967718075
mickconway22@btinternet.com

DRAWN	MWC	DRAWING NO.	Rev.
DATE	NOV21	7919	0

Appendix E

HR Wallingford
Working with water

Greenfield runoff estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:

Site name: michael house school

Site location: Shipley

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site coordinates

Latitude: 52.99806° N

Longitude: 1.33883° W

Reference:

Date: 2021-09-11 09:14

Methodology	IH124

Site characteristics

Total site area (ha)	1.37

Methodology

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type

	Default	Edited
SOIL type	4	4
HOST class	---	---
SPR/SPRHOST	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm)	700	700
Hydrological region	4	4
Growth curve factor: 1 year	0.83	0.83
Growth curve factor: 30 year	2	2
Growth curve factor: 100 year	2.57	2.57

Notes:

(1) Is Q_{BAR} < 2.0 l/s/ha?

(2) Are flow rates < 5.0 l/s?

(3) Is SPR/SPRHOST ≤ 0.3?

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	6.61	6.61
1 in 1 year (l/s)	5.49	5.49
1 in 30 years (l/s)	13.23	13.23
1 in 100 years (l/s)	17	17

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at http://uksuds.com/terms-and-conditions.htm. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CIRIA, Hydrosolutions or any other organisation for use of this data in the design or operation of any drainage scheme.

Appendix F

HR Wallingford
Working with water

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	mick conway
Site name:	MICHEAL HOUSE SCHOOL
Site location:	SHIPLEY

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	52.99795° N
Longitude:	1.33924° W
Reference:	2500825759
Date:	Sep 11 2021 10:02

Site characteristics

Total site area (ha):	1.37
Significant public open space (ha):	0
Area positively drained (ha):	1.37
Impermeable area (ha):	0.82
Percentage of drained area that is impermeable (%):	60
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	100
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	1.37
Net impermable area for storage volume design (ha):	0.9
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
SPR:	0.47	0.47

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	63
Rainfall 100 yrs 12 hrs:	--	83.16
FEH / FSR conversion factor:	1.08	1.08
SAAR (mm):	700	700
M5-60 Rainfall Depth (mm):	20	20
'r' Ratio M5-60/M5-2 day:	0.4	0.4
Hydological region:	4	4
Growth curve factor 1 year:	0.83	0.83
Growth curve factor 10 year:	1.49	1.49
Growth curve factor 30 year:	2	2
Growth curve factor 100 years:	2.57	2.57
Q_{BAR} for total site area (l/s):	6.61	6.61
Q_{BAR} for net site area (l/s):	6.61	6.61

Design criteria

Climate change allowance factor:	1.4
Urban creep allowance factor:	1.1
Volume control approach	Use long term storage
Interception rainfall depth (mm):	5
Minimum flow rate (l/s):	2

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	5.5	5.5
1 in 30 years (l/s):	13.2	13.2
1 in 100 year (l/s):	17	17

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m³):	645	645
Long term storage 1/100 years (m³):	8	8
Total storage 1/100 years (m³):	652	652

This report was produced using the storage estimation tool developed by HRWallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at http://uksuds.com/terms-and-conditions.htm. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Appendix G

84.1m

Nutbrook Cottage

448

447

446

SITE AREA
1.37 Ha
3.4 ACRES

Hogg's Pond

Sluice

Michael House School

Field House

The Poplars

Tank

SCHOOL WOODS CLOSE

1

2

4

5

ST COMBINED SEWER MH 3702

Existing connection to STW Combined Sewer MH3703

ST COMBINED SEWER MH 4602

Existing connection to STW Combined Sewer

ST COMBINED SEWER MH4601

Assumed line of combined sewer

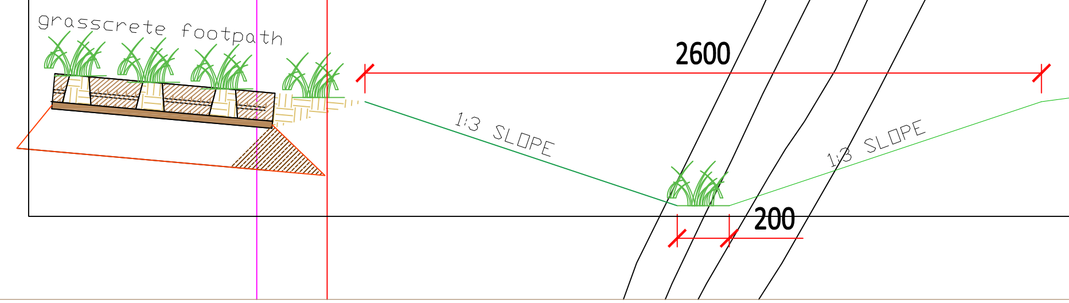
Swales

Porous Paving

Linear Storage

Rainwater Harvesting

INDICATIVE SWALE CROSS SECTION DETAIL



Notes:-

For guidance only. Do not scale off this drawing

1:10 - 0	100mm	200mm	300mm	400mm	500mm	600mm	700mm	800mm				
1:100- 0	1m	2m	3m	4m	5m	6m	7m	8m				
1:20 - 0	400mm		800mm		1200			1600				
1:50 - 0	1m		2m		3m			4m				

GENERAL NOTES:

1. DO NOT SCALE from this drawing. If in doubt ASK.
2. This drawings is to be read in conjunction with ALL RELEVANT Architect's, Engineer's and Specialist's drawings and specifications.
3. Should there be any discrepancy between details indicated on this drawing and those indicated on other drawings, the Engineer must be notified immediate in writing.
4. The contractor shall check all tie-ins for line and level with existing before commencing any works. Should any discrepancy or errors be found the contractor must report to and notify the Engineer immediately in writing.
5. Until technical approval has been obtained from the relevant Statutory Authorities all drawings issued are "For Approval" or "Preliminary" respectively and NOT for construction. Any site work carried out by the contractor prior to technical approval being granted are carried out entirely at the contractor's risk.
6. The depiction of any service apparatus on this drawing has been obtained from third party sources and may not be accurate or complete. At no time does the inferred position(s) on the drawings absolve the contractor from taking all necessary steps to locate service plant in accordance with relevant Authority's suggested methods. Michael W Conway will accept no liability in respect of any losses or damage caused in-respect of such apparatus, however caused.
7. The contractor is responsible for ensuring that all works are to the satisfaction of the Engineer, and shall be deemed to have included for any necessary testing within his rates.
8. It is the responsibility of the contractor to execute the works at all times in strict accordance with the requirements of the 1974 Health and Safety at Work Act, and the 1994 Construction, Design and Management (CDM) Regulations. The contractor will be deemed to have allowed for full compliance with the same within his rates, including full liaison with the Planning Supervisor.
9. The contractor will be responsible for providing all necessary dewatering and trench support to execute the works in a satisfactory manner and shall be deemed to have included for the same within his rates.
10. Technical approval for Public / Adoptable sewers to be procured through a Section 104 of the Water Industry Act 1991.
11. Public / adoptable sewers to be in accordance with "Sewers for Adoption" 6th Edition, the relevant British/European and Severn Trent Water's Standards / Requirements / Addendums and Kite Marked.
12. Sewers are to be constructed in accordance with the W.S.A publication "Sewers for Adoption" 6th Edition and common water company addendum and Severn Trent Water addendum.
13. Positions of all existing sewers to be established before construction commences and details reported to Regional Engineer. Data for existing pipework has been gathered from various sources and requires verifying before commencement of works.
14. ALL pipe connections to existing sewerage infrastructure are to be checked for line, level and diameter prior to commencing works, as no guarantee of accuracy or completeness of data can made on information made available by third parties and other sources.
15. The construction of the new roads shall be in accordance with the Leicestershire County Council Highways, Transportation and Development Specification (6C's HTD) and the Department of Transport, Specification for Highway Works.
16. All pavement construction materials placed within 450mm of finished surface levels shall be non-frost susceptible.
17. The contractor shall carry out insitu CBR tests to establish the capping/sub-base requirements prior to commencing

FOR APPROVAL

Rev	By	Chkd	Apprvd	Date	Description

Client

Red Four (Henor) Ltd

Michael W Conway
110 Melbourne Road
Ibstock
Leics
LE67 6NN
Tel01530
mobile 07967 718075
Email:
mickconway22@btinternet.com

Project

Michael Heanor House
Derby

Drawing

Drainage Stratergy Plan

Drawn by: MWC Date: May 21

Approved by: Approved by: Date: Date:

Drawing No. E 21/11/011

Revision:

Drawing Scale: 1:500 @ A1

Appendix H

Michael House School

Management Company SuDS Maintenance Schedule

A programme of Regular and occasional maintenance for each SuDS facility to be adhered to is set out below:

TABLE 11.6 Operation and maintenance requirements for RWH systems

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspection of the tank for debris and sediment build-up, inlets/outlets/withdrawal devices, overflow areas, pumps, filters	Annually (and following poor performance)
	Cleaning of tank, inlets, outlets, gutters, withdrawal devices and roof drain filters of silts and other debris	Annually (and following poor performance)
Occasional maintenance	Cleaning and/or replacement of any filters	Three monthly (or as required)
Remedial actions	Repair of overflow erosion damage or damage to tank	As required
	Pump repairs	As required

TABLE 13.1 Operation and maintenance requirements for soakaways

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

TABLE 20.15 Operation and maintenance requirements for pervious pavements

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

INLETS, OUTLETS, CONTROLS & INSPECTION CHAMBERS	
Regular Maintenance	**Frequency**
Inlets, outlets and surface control structures Inspect surface structures removing obstructions and silt as necessary. **Check there is no physical damage. Strim vegetation 1m min. surround to structures and keep hard aprons free**	**Monthly**
Inspection chambers and below ground control	
Remove cover and inspect ensuring water is flowing freely and that the exit	**Annually**
Occasional Maintenance	
Check topsoil levels are 20mm above edges of baskets and chambers to **avoid mower damage**	**As necessary**
Remedial work	**Frequency**
Unpack stone in basket features and unblock or repair and repack stone as	**As required**

TABLE 15.1 Operation and maintenance requirements for filter strips

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the 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 filter strip surface to identify evidence of erosion, poor vegetation growth, compaction, ponding, sedimentation and contamination (eg oils)	Monthly (at start, then half yearly)
	Check flow spreader and filter strip surface for even gradients	Monthly (at start, then half yearly)
	Inspect gravel flow spreader upstream of filter strip for clogging	Monthly (at start, then half yearly)
	Inspect silt accumulation rates and establish appropriate removal frequencies	Monthly (at start, then 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% of the filter strip area.
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Maintenance Plans and schedules should be developed during the design phase. Specific maintenance needs of the filter strip should be monitored, and maintenance schedules adjusted to suit requirements.

► Further detail on the preparation of maintenance specifications and schedules of work is given in **Chapter 32.**

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.

► Generic health and safety guidance is presented in **Chapter 36.**

The above maintenance schedules are from ciria SuDS Manual