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Proposed SEN School
Kestrel Way
Luton
Bedfordshire

Flood Risk Assessment and Drainage Strategy

Revision B: December 2023
R-FRA-25910-01-B

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Revision	Date	Description	Prepared	Reviewed
0	22nd June 2023	First Issue	Nathan Reed	Katherine Rose
A	21st December 2023	Updated to suit the latest drainage strategy	Nathan Reed	Katherine Rose
B	22nd December 2023	Minor amendment following client comment	Katherine Rose	Katherine Rose

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1.0 Introduction

1.1 Background

1.1.1 This report is a Flood Risk Assessment and Drainage Strategy which has been prepared by JPP Consulting Limited on behalf of Luton Borough Council for a SEN School. The benefit of this report is to our instructing Client.

1.1.2 The proposed SEN School is located at Kestrel Way, Luton, as shown in Figure 1.1 below and enclosed in Appendix A. Luton is located south-east of Milton Keynes and north of Watford. The National Grid Reference for the site is E504330 N224140.

Figure 1.1 Site Location Plan
Source: OpenStreetMap - 01/06/2023

1.2 Objectives

1.2.1 The objective of this report is to advise interested parties regarding the potential risk of flooding and the management of surface water run-off arising from the proposals.

1.2.2 This report has been prepared to support a detailed planning application.

1.3 Reference documents

1.3.1 This report has been prepared with reference to the following publications:-

Ministry of Housing, Communities and Local Government (March 2012, updated July 2021), National Planning Policy Framework
Ministry of Housing, Communities and Local Government (March 2014, updated August 2021), Planning Practice Guidance 'Flood Risk and Coastal Change'
Department for Environment, Food and Rural Affairs (March 2015), Non-statutory technical standards for sustainable drainage systems
Environment Agency (September 2013), Climate Change Allowances for Planners: Guidance to support the National Planning Policy Framework
Environment Agency (October 2013), Delivering benefits through evidence: Rainfall runoff management for developments
HM Government (2010), The Building Regulations (2010), Drainage and Waste Disposal, Approved Document H, The NBS, Newcastle Upon Tyne
Wilson, Bray, Cooper (2004), Sustainable drainage systems: Hydraulic, structural and water quality advise, C609, CIRIA, London
Woods-Ballard et al (2015), The SUDS Manual, C753, CIRIA, London
CIRIA Report C624 Development and flood risk
National SUDS Working Group (2004), Interim Code of Practice for Sustainable Drainage Systems,
Institute of Hydrology (1999), Flood Estimation Handbook, Institute of Hydrology, Wallingford
BS EN 752:2008 Drain and sewer systems outside buildings. Hydraulic design and environmental considerations
BS 8533:2011 Assessing and managing flood risk in development – Code of Practice
CIRIA Report C635 Designing for exceedance in urban drainage – good practice
Luton Level 1 SFRA Update (February 2013)

2.0 Description and history of the site and development proposals

2.1 Location and description of the site

2.1.1 The proposed SEN School is located at Kestrel Way, Luton, as shown in Figure 1.1 above and enclosed in Appendix A. The site is bound by Kestrel Way to the northern boundary and existing residential dwellings to the eastern, southern and western boundaries.

2.2 History of the site

2.2.1 The site is currently used for telecommunications. We are not aware of any previous development on the site.

2.2.2 Aerial imagery dating back to December 2002 shows that the site was comparable during this time, see Figure 2.1 below.

Figure 2.1 Aerial Imagery Dated December 2002
Obtained: Google Earth Pro - 01/06/2023

2.3 Proposed development

2.3.1 The proposed development will comprise a special education needs school. The proposed development layout is shown on the plan enclosed in Appendix A.

2.4 Site topography

2.4.1 Levels across the site are broadly flat.

2.5 Existing drainage infrastructure

2.5.1 Thames Water's asset plan is enclosed in Appendix B. The asset plan does not show any drainage infrastructure with the proposed development site location. The nearest adopted sewers are shown in Kestrel Way to the north of the site, where the asset plan identifies both surface water and foul drainage infrastructure.

2.6 Geology of the site and ground investigation data

2.6.1 Inspection of the geological maps show that the superficial deposits at the site are Glaciofluvial Deposits comprising Sand and gravel. The bedrock geology which underlies the site is Zig Zag Chalk Formation.

2.6.2 A Preliminary Investigation has been undertaken by Soiltechnics (report reference STU5850-R01 Rev A dated 2023). The report anticipates the following geology at the site:

Glaciofluvial Deposits – superficial, approximately 0-3m thick
Head – superficial, approximately 0-3m thick
ZigZag Chalk Formation – bedrock, approximately 35-50m thick

2.6.3 The report notes that *"local borehole records suggest groundwater may be present some 3-8m below the site although these are down gradient and closer to a watercourse and therefore groundwater may be deeper on site"*.

2.7 Development proposals and flood risk vulnerability

2.7.1 With reference to Table 2 of the Flood Risk and Coastal Change Planning Practice Guidance (PPG) to the National Planning Policy Framework (NPPF), the proposed SEN school would be classed as a More Vulnerable development.

An extract from Table 2 of the PPG for Flood Risk and Coastal Change is replicated below in Table 2.1 with the proposed development type highlighted.

Flood Risk Vulnerability Classification	
Vulnerability	Development Types
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 site 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.
Source: Planning Practice Guidance - 2014	

Table 2.1 Flood Risk Vulnerability Classification

3.0 Flood risk

3.1 Fluvial / Tidal flooding

3.1.1 An extract of the Environment Agency's Flood Map for Planning (Rivers and Sea) is provided below in Figure 3.1. The flood map was extracted from the GOV.UK website on the 1st June 2023. The approximate application site boundary is shown in red. The map indicates that the development site is located within Flood Zone 1 (Low Probability) and as such, the report considers the development to be in Flood Zone 1 and at a low risk of flooding from rivers or the sea.

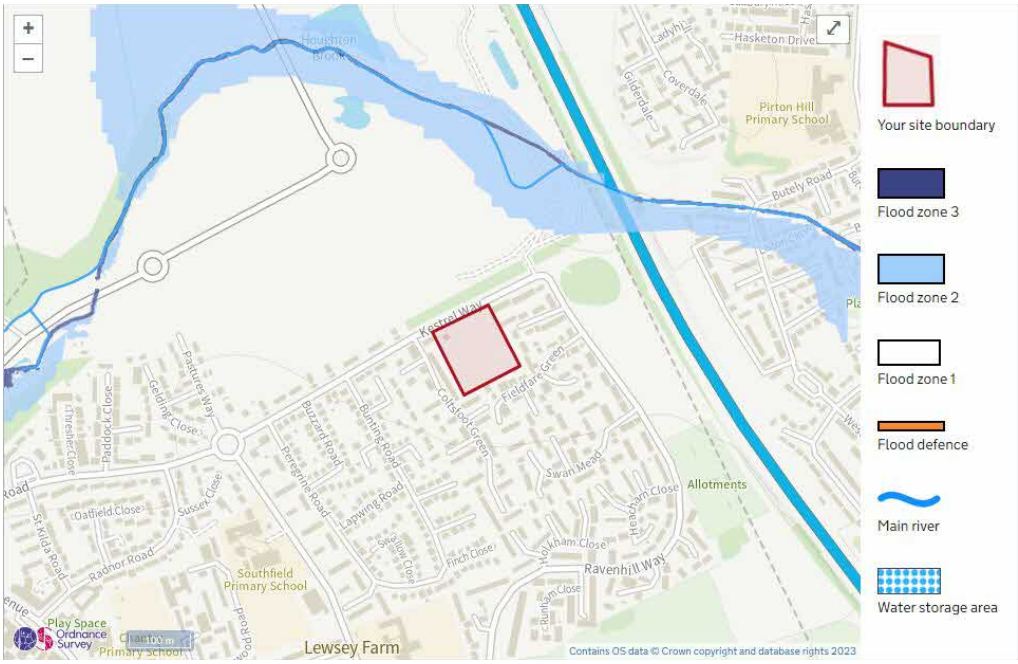


Figure 3.1 Flood Map for Planning (Rivers and Sea)
Source: GOV.UK website – 01/06/2023

3.1.2 Table 3.1 below is a copy of Table 1 from Planning Practice Guidance for 'Flood Risk and Coastal Change' to the National Planning Policy Framework which defines Flood Zones. The proposed development, which is located within Flood Zone 1, is defined as having a less than 1 in 1,000 annual probability of river or sea flooding in any year.

Flood Zone Definitions	
Flood Zone	**Definition**
Zone 1: Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding.
Zone 2: Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.
Zone 3a: High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.
Zone 3b: The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency.
Source: Planning Practice Guidance - 2014	

Table 3.1 Flood Zone Definitions

3.2 Flooding from surface water

3.2.1 An extract of the Environment Agency map 'Risk of Flooding from Surface Water' is provided below in Figure 3.2. The approximate application site boundary is shown in red. The site is shown to be located in an area of very low (less than 1 in 1000). Small areas along Kestrel Way to the north of the site are shown to be at low (1 in 100 to 1 in 1000) and medium (1 in 30 to 1 in 100) risk of surface water flooding in a given year.

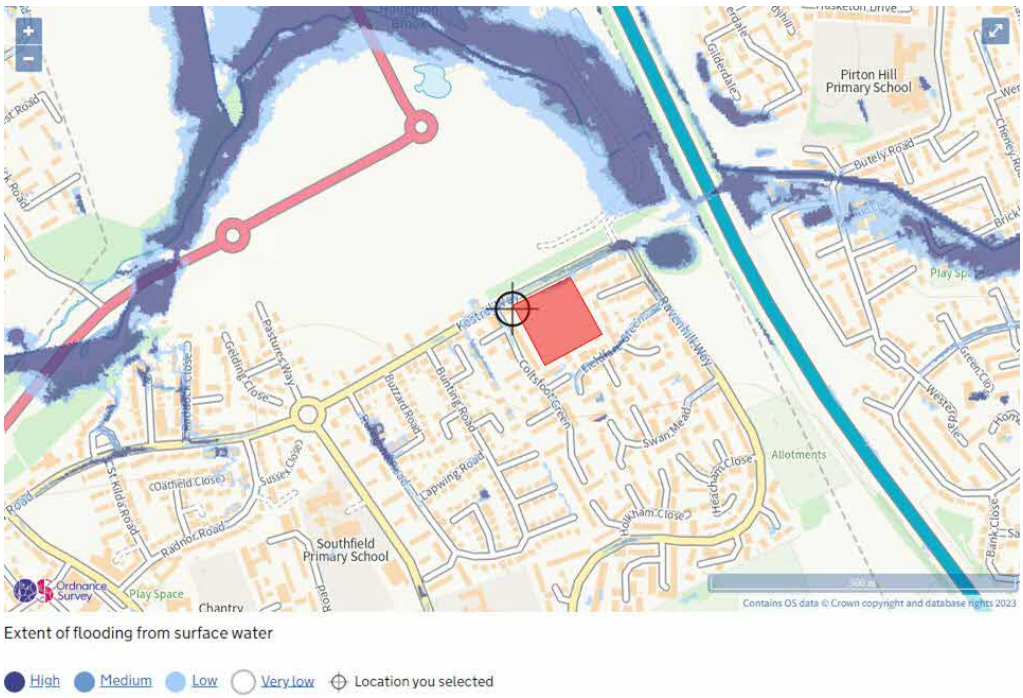


Figure 3.2 Risk of Flooding from Surface Water
Source: GOV.UK website - 01/06/2023

3.2.2 It should be noted that this map is generated using a broad methodology applied at the national scale. The model utilises generalised information on infiltration, sewerage infrastructure, rainfall events and catchment topography to route rainfall over a ground surface model. As such, the analysis does not take account of site-scale factors / characteristics that may exert an influence upon surface water flood depths and extents. The map therefore only provides a guide regarding the areas that may be vulnerable to this source of flooding.

3.3 Flooding from groundwater

3.3.1 The Luton Borough Council Level 1 SFRA Update has been reviewed with regards to flooding from groundwater. The report highlights that the area has extensive aquifers due to the underlying chalk, and that most of the watercourses are spring-fed. As such, the SFRA considers groundwater levels to be at or very close to the ground surface. There are only two records of groundwater flooding within the SFRA study area, which are not in close proximity to the proposed development site location.

3.3.2 Regarding groundwater, the Preliminary Investigation report by Soiltechnics notes that *"local borehole records suggest groundwater may be present some 3-8m below the site although these are down gradient and closer to a watercourse and therefore groundwater may be deeper on site"*.

3.3.3 The information available at the time of preparing this report, and the nature of the underlying geology, suggests that groundwater emergence at the surface is unlikely, such that groundwater flood risk does not constitute a constraint in this instance.

3.4 Flooding from sewers

3.4.1 We are not aware of any sewers located within the site application boundary. Thames Water's asset plan is enclosed in Appendix B. This identifies both foul and surface water sewers that run along Kestrel Way adjacent to the site.

3.4.2 The Luton Borough Council Level 1 SFRA has been reviewed with regards to flooding from sewers. It is noted *"considerable flooding has been experienced in areas of Luton. Most commonly as a result of an inadequate drainage system that has not been upgraded since the town saw rapid growth in the 1950's and 1960's"*. Based on the information available, the location of these sewer flooding events are not known.

3.4.3 We do not have any records of sewer flooding within the vicinity of the proposed development.

3.4.4 We therefore do not consider the risk of flooding from sewers to be a significant risk to the proposed development.

3.5 Flooding from reservoirs, canals and other artificial sources

3.5.1 We are not aware of any canals or artificial water sources that may result in flooding of this site.

3.5.2 The EA provides maps (https://flood-warning-information.service.gov.uk/long-term-flood-risk/) showing the area that may be affected by flooding as a result of a breach of a large, raised reservoir (i.e. capable of storing over 25,000 cubic metres of water above the natural level of any part of the surrounding land).

3.5.3 An extract of the Environment Agency map 'Risk of Flooding from Reservoirs' is provided below in Figure 3.3. It can be seen that the proposed development site, shown in red, is not at a risk of flooding from reservoirs.

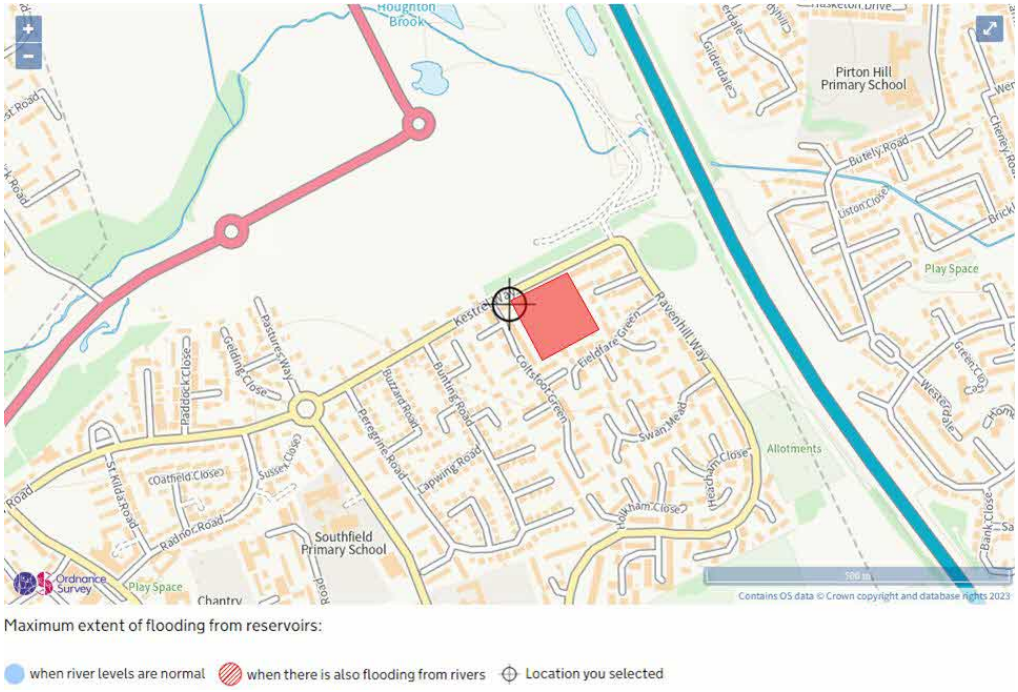


Figure 3.3 Risk of Flooding from Reservoirs
Source: GOV.UK website - 01/06/2023

3.5.4 It can therefore be concluded that the risk of flooding from reservoirs and other artificial sources is low.

3.6 Historic flooding

3.6.1 Historic flooding data has been collected from the GOV.UK website, published by the Environment Agency on the 26th May 2023. As demonstrated on Figure 3.4 below, there has been previous flooding incidents around the proposed development location, however there are no noted flooding incidents within the site boundary.

Figure 3.4 Historic Flood Map
Source: GOV.UK website - 02/06/2023

3.7 Flood risk vulnerability and flood zone compatibility

3.7.1 Based on the above assessment of the site being located within Flood Zone 1 and classified as a More Vulnerable development, and with reference to Table 3.2 below (Planning Practice Guidance for 'Flood Risk and Coastal Change' to the National Planning Policy Framework, Table 3), the proposed development of this site would be considered "appropriate". A copy of Table 3 is presented below highlighting the above.

Table 3 – Flood Risk Vulnerability and Flood Zone Compatibility

Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatibility	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception test required	✓	✓
Zone 3a	Exception test required	✓	X	Exception test required	✓
Zone 3b	Exception test required	✓	X	X	X
✓ = Development is appropriate			X = Development should not be permitted		

Source: Planning Practice Guidance - 2014

Table 3.2 Flood Risk Vulnerability and Flood Zone Compatibility

3.8 Flood compensation

3.8.1 Flood compensation measures will not be required for this site as it is located within Flood Zone 1.

3.9 Access and egress

3.9.1 Access and egress to and from this site in the event of flooding will be via the proposed development's access road which will allow students and employees of the development to move to higher ground.

4.0 Management of surface water

4.1 Current conditions

4.1.1 The site is currently open with no existing development, and is therefore considered a greenfield site with no existing drainage. Therefore, greenfield run-off calculations shall be used to derive the allowable run off rate from the site.

4.2 Surface water drainage outfalls

4.2.1 It is a requirement of The Building Regulations (2010), Drainage and Waste Disposal, Approved Document H, to dispose of surface water collected by a development in accordance with the following, listed in order of priority:-

1. Infiltration systems where ground condition permit
2. To watercourses
3. To sewers

4.2.2 Each of these is considered separately below:

4.2.3 Infiltration systems

4.2.3.1 The anticipated geology of the site is described in Section 2.6 above. For a worst-case assessment, it is assumed that infiltration techniques are not viable for managing surface water at the site.

4.2.4 Watercourses / Main River

4.2.4.1 There are no watercourses located within or adjacent to the boundary of the proposed development.

4.2.5 Sewers

4.2.5.1 The nearest surface water sewers are located in Kestral Way to the north of the site. It is proposed that surface water will connect to existing manhole (reference 3207), subject to S106 approval from Thames Water.

4.3 Surface water drainage strategy

4.3.1 The proposed drainage strategy will comprise a piped network in addition to permeable paving and filter drains. Where infiltration is not viable, tanked permeable paving will be used. Attenuation provided in a detention basin and offline cellular storage, sufficient to accommodate all storms up to and including the 1 in 100 year plus 40% climate change event.

4.3.2 Surface water will outfall to the Thames Water surface water sewer in Kestrel Way, with a connection to manhole 3207. A pre-development enquiry has been undertaken with Thames Water which confirms that they have capacity to accept surface water flows from the site at a maximum rate of 3.6 l/s. As such, surface water flows will be restricted to 3.6 l/s.

4.3.3 An indicative surface water layout plan is enclosed in Appendix C. The drawing shows the overarching strategy for managing surface water drainage at the site. This strategy will be developed further subject to receipt of a topographical survey.

4.4 SUDS assessment

4.4.1 We have considered the suitability of SUDS for use on the development site. The review is set out in below Table 4.1.

SUDS Assessment		
SUDS Technique	Suitability	Justification
Rain Water Harvesting	Maybe	Use will only mitigate a small proportion of the increase in volume of run-off created by the proposed development. Rainwater butts can be used to reduce potable water requirements.
Green Roofs	No	Permeable paving and online detention basin to be used.
Infiltration	No	Assumed not viable for a worst-case assessment.
Filter Strips / Filter Drains	Yes	Filter drains to be utilised.
Swales	No	Permeable paving and online detention basin to be used.
Bioretention Systems	No	Permeable paving and online detention basin to be used.
Trees	Yes	Landscaped areas will be included within the proposed site layout.
Pervious Pavements	Yes	Tanked permeable paving will be used for the interception of water and to provide a level of surface water treatment.
Attenuation Tanks	Yes	Attenuation will be provided within an online detention basin and geocellular storage.
Detention Basin	Yes	Surface water will be attenuated via an online detention basin, with a low flow channel and micropool provided for water quality purposes.
Ponds and Wetlands	No	Permeable paving and online detention basin to be used.
Trapped Drainage	No	A sufficient level of water treatment will be provided through the use of permeable paving and an online detention basin with low flow channel and micropool.

Table 4.1 SUDS Assessment

4.5 Water quality

4.5.1 Chapter 26 of The SuDS Manual 2015 (CIRIA 753) provides guidance on the methods that should be used to design SuDS to meet the water quality design criteria and good practice design standards. Based on the simple index approach, the pollution hazard indices for different land use classifications are listed in Table 26.2, Chapter 26 of the SuDS Manual. Table 4.2 below summarises the pollution hazard indices that are applicable for the proposed development.

Pollution Hazard Indices for Different Land Use Classifications				
Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-carbons
Commercial Roofs	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from roof)	0.05
Individual property driveways, residential car parks, low traffic roads (e.g. cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices) i.e. <300 movements	Low	0.5	0.4	0.4
Source: Table 26.2 of The SuDS Manual				

Table 4.2 Pollution Hazard Indices for Different Land Use Classifications

4.5.2 Surface water run-off from the development will pass through permeable paving, filter drains and a detention basin. The detention basin will be an online feature to include low flow channel and micropool, and is therefore considered to be a pond for the purposes of this water quality assessment.

4.5.3 Table 26.3 of The SuDS Manual shows the mitigation indices for a range of SuDS components for discharges to surface waters. An extract of this is provided in Table 4.3 below for the components relevant to the proposed development.

Indicative SuDS Mitigation Indices for Discharges to Surface Waters			
Type of SuDS Component	Mitigation Indices		
	TSS	Metals	Hydro-carbons
Filter drain	0.4	0.4	0.4
Permeable pavement	0.7	0.6	0.7
Pond	0.7	0.7	0.5
Source: Table 26.3 of The SuDS Manual			

Table 4.3 Indicative SuDS Mitigation Indices for Discharges to Surface Waters

4.5.4 As set out in The SuDS Manual, where two or more components are utilised, "a factor of 0.5 is used to account for the reduced performance of the secondary or tertiary components". This will therefore need to be considered where multiple SUDS components are proposed.

4.5.5 Based on the information and assessment set out above, the range of proposed SuDS features are considered to provide sufficient water treatment for the development proposals.

4.6 Surface water drainage design and management

4.6.1 Proposals are to design the surface water drainage system to accommodate storms up to the 1 in 100 year event plus an allowance of 40% for climate change. Table 4.4 below is a copy of Table 2 from the Environment Agency's guidance 'Flood risk assessments: climate change allowances' to support the National Planning Policy Framework, which defines the climate change allowances.

Peak Rainfall Intensity Allowance in Small and Urban Catchments			
Allowance	'2020s' (2015 to 2039)	'2050s' (2040 to 2069)	'2080s' (2070 to 2115)
Upper end	+10%	+20%	+40%
Central	+5%	+10%	+20%
Source: Environment Agency - 2016			

Table 4.4 Peak Rainfall Intensity Allowance in Small and Urban Catchments

4.7 Overland flows

4.7.1 Proposals are to design the surface water drainage to accommodate the 1 in 100 year storm event taking into account the predicted future effects of climate. Clearly there is a risk of this storm event being exceeded, albeit this risk is considered very low. In such an event the proposed drainage systems will become overwhelmed and overland flows could occur. Overland flows will be directed to follow the path that overland flows currently follow.

4.7.2 Predicted overland flow routes are shown on the plan enclosed in Appendix C.

5.0 Foul water drainage strategy

5.1 The proposed foul water will discharge to existing manhole 3202. The proposed foul water strategy is shown on the plan enclosed in Appendix C.

6.0 Maintenance

6.1 Surface water drainage maintenance

6.1.1 The drainage system will be designed to minimise maintenance requirements, however, a full maintenance scheme will be established for those elements not being offered for adoption. The various areas will be maintained as set out in Table 6.1 below.

Maintenance Areas – Surface Water	
Aspect	Maintainer
Private Drains	School
SUDS – Private	School

Table 6.1 Maintenance Areas – Surface Water

6.1.2 Additional operation and maintenance details of the various surface water drainage elements are set out on the plan enclosed in Appendix C.

6.2 Foul water drainage maintenance

6.2.1 The drainage system will be designed to minimise maintenance requirements, however, a full maintenance scheme will be established for those elements not being offered for adoption. The various areas will be maintained as set out in Table 6.2 below.

Maintenance Areas – Foul Water	
Aspect	Maintainer
Private Drains	School

Table 6.2 Maintenance Areas – Foul Water

7.0 Summary and conclusions

7.1 The proposed SEN School is located at Kestrel Way, Luton. The site is bound by Kestrel Way to the northern boundary and existing residential dwellings to the eastern, southern and western boundaries.

7.2 The proposed development comprises of a special education needs school.

7.3 The proposed development site location is located within Flood Zone 1 (Low Probability) for risk of flooding from rivers/sea. Furthermore, from the information available at the time of writing this report, flood risk from surface water, groundwater, sewers, reservoirs or other artificial sources is considered to be low.

7.4 The proposed drainage strategy will comprise a piped network in addition to permeable paving and filter drains. Where infiltration is not viable, tanked permeable paving will be used. Attenuation provided in a detention basin and offline cellular storage, sufficient to accommodate all storms up to and including the 1 in 100 year plus 40% climate change event.

7.5 Surface water will outfall to the Thames Water surface water sewer in Kestrel Way, with a connection to manhole 3207. A pre-development enquiry has been undertaken with Thames Water which confirms that they have capacity to accept surface water flows from the site at a maximum rate of 3.6 l/s. As such, surface water flows will be restricted to 3.6 l/s.

7.6 The proposed foul water will discharge to the Thames Water foul sewer network in Kestrel Way, with a connection to manhole 3202.

7.7 National, Regional and Local planning policy requires that:

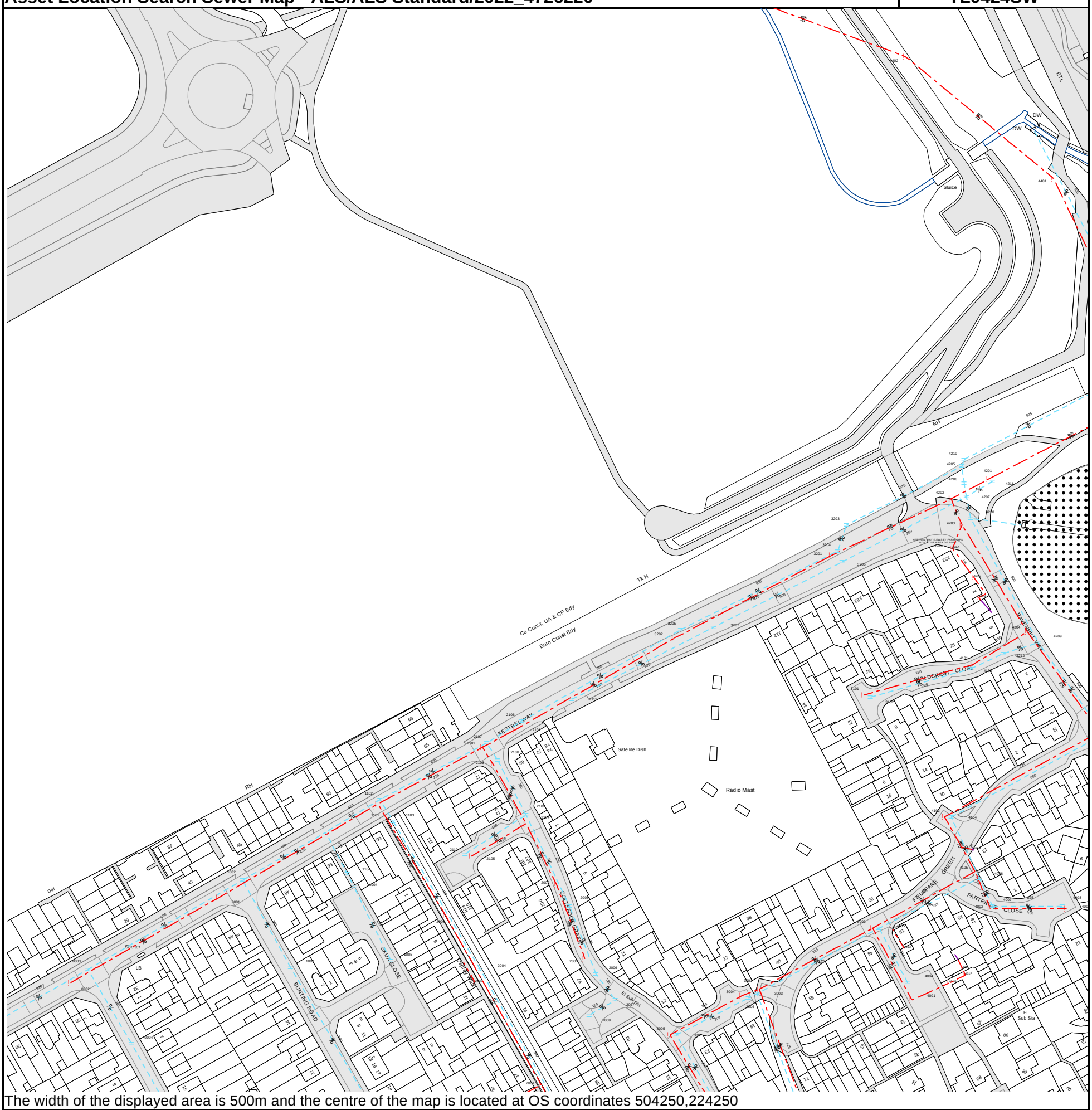
> Development is directed to sites at the lowest probability of flooding;
> Development accommodates the potential impacts of climate change;
> Development should not be permitted if it would be at an unacceptable risk of flooding or create an unacceptable risk elsewhere; and
> New development should facilitate safe access and exit during flood conditions.

7.8 The proposals for SEN School at Kestrel Way, Luton are therefore fully compliant with policy in respect of development and flood risk, such that flood risk considerations do not constitute a barrier to the granting of planning consent.

Appendix A
Proposed Site Plan
Revision P3

Appendix B
Thames Water Asset Plan

Asset Location Search Sewer Map - ALS/ALS Standard/2022_4726220 | **TL0424SW**



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 504250,224250

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
4402	119.706	117.526
4401	119.939	117.239
4001	127.62	126.47
401G	n/a	n/a
4004	127.38	126.18
401F	n/a	n/a
401E	n/a	n/a
401A	n/a	n/a
401B	n/a	n/a
4005	126.43	124.2
3002	126.43	123.73
4002	127.31	125.23
4003	127.4	125.46
4007	127.31	125.48
4008	127.37	125.63
4006	126.97	123.53
4105	126.91	123.01
411A	n/a	n/a
4104	125.69	123.15
4102	125.67	122.58
3102	123.1	121.74
3101	123.05	121.55
4103	122.86	121.54
4101	122.83	120.93
4212	122.94	121.4
4209	123.1	120.92
4204	122.88	120.39
421B	n/a	n/a
421C	n/a	n/a
3206	121.92	120.09
3204	122	119.42
421A	n/a	n/a
4203	121.19	119.13
3203	122.15	119.18
4208	121.07	118.27
4202	121	119.03
4207	121.04	117.96
4206	121.06	118.26
4211	120.78	119.01
4201	120.74	118.82
4205	121.33	118.43
4210	121.34	118.76
2001	130.14	127.32
3007	127.51	126.12
3005	127.51	125.46
2008	127.04	125.87
2007	126.88	125.7
3006	126.85	125.22
3004	126.83	124.63
3003	126.91	125.01
3001	126.87	124.55
201A	n/a	n/a
2006	126.49	125.28
2004	128.71	126.15
1005	128.32	126.48
2003	126.27	124.55
2009	128.36	125.67
2005	125.69	124.4
1004	127.82	125.59
2002	125.42	123.64
2105	125.69	124.23
2110	125.79	124.84
2104	124.78	123.13
1103	127.69	125.27
2109	124.77	123.46
1101	125.95	124.15
1102	125.91	124.2
2103	124.49	122.89
2108	124.49	122.87
2102	124.54	122.58
2107	124.51	122.6
2101	124.16	122.03
2106	124.1	121.94
2111	123.6	121.94
3202	122.86	120.71
3205	122.89	120.62
3207	122.72	121.01
3201	122.08	119.83
0004	130.81	129.04
0002	130.71	128.58
0003	130.37	128.5
1003	128.86	127.01
0001	128.45	127.05
1002	127.99	125.82
1104	127.28	125.49

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Appendix C

Drainage Strategy Plan

JPP Consulting drawing no. 25910-102A

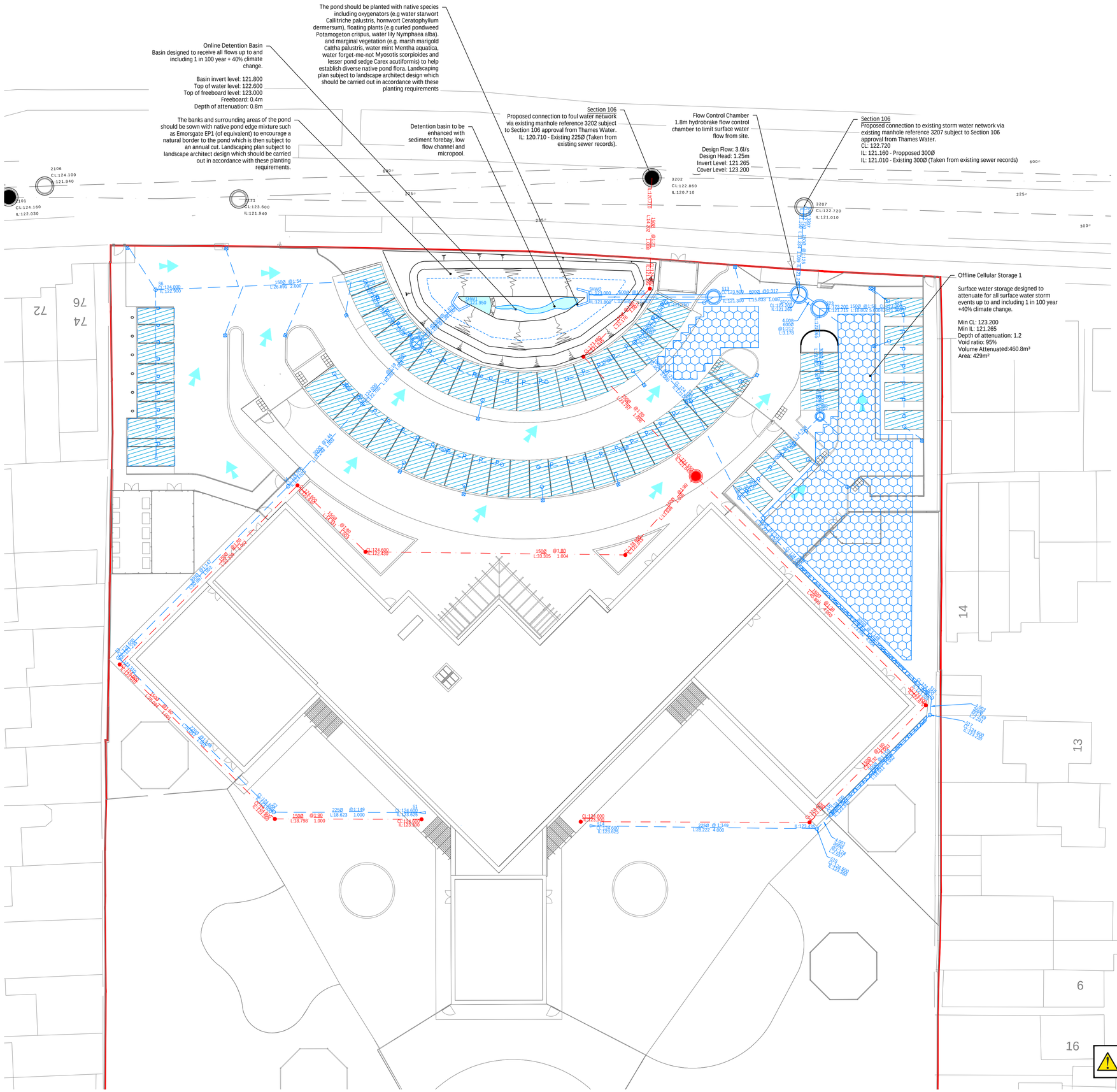


Table 1.0 - Detention basin operation & maintenance requirements

Maintenance Schedule	Required Action	Recommended Frequency
Regular maintenance	Litter and debris removal.	Monthly.
	Grass cutting - for spillways and access routes.	Monthly (during growing season) or as required
	Grass cutting - 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).
	Tidy all dead growth before start of growing season.	Annually.
	Remove sediments from inlets, outlet and forebay.	Annually. (or as required)
	Manage wetlands plants in outlet pool - where provided.	Annually.
Occasional maintenance	Re-seed area of poor vegetation growth.	Annually. (or as required)
	Prune and trim trees and remove cuttings.	2 years, (or as required)
	Remove sediments from forebay, when 50% full and from micropools if volume is reduced by >25%	3-10 years, (or as required)
Remedial actions	Repair of erosion or other damage by re-seeding or re-turfing.	As required.
	Realignment of rip-rap.	As required.
	Repair/rehabilitation of inlets, outlets and overflows.	As required.
	Re-level uneven surfaces and reinstate design levels.	As required.
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly/after large storms.
	Inspect banksides, structures and pipework, etc for evidence of physical damage.	Monthly/after large storms.
	Inspect inlets and facility surface for slit accumulation. Establish appropriate slit removal frequencies.	Half yearly
	Check penstocks and other mechanical devices.	Half yearly

Table 1.2 - Operation and maintenance requirements for permeable paving

Maintenance schedule	Required action	Record frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations.
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 50mm 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 10-15 years or as required
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 hours after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Surface Water Drainage Heirarchy	
Discharge to soakaway	Infiltration testing has been undertaken as part of Soiltechnics initial ground investigation report STU5850. Test results conclude that discharge by infiltration would be unfeasible.
Discharge to watercourse/ditch	No ditches are present within close vicinity of the site so discharging to a watercourse/ditch has been deemed unfeasible.
Discharge to a sewer	The proposed strategy is to outfall the surface water drainage into the existing Thames Water manhole 3207 subject to Section 106 approval. A pre-development enquiry has been undertaken and an agreed flow rate of 3.6 l/s has been agreed.

General Notes

This drawing is to be used in conjunction with all relevant drawings, specifications and details.

All dimensions are in metres unless noted otherwise.

Do not scale from this drawing.

Drawing Key

- Site boundary
- Existing foul water drainage (Taken from sewer records)
- Existing surface water drainage (Taken from sewer records)
- Proposed surface water drainage
- Indicative private trapped pot gully
- Proposed private headwall
- Proposed foul drainage
- Tanked Permeable paving
- Cellular storage crate
- Flood routing arrows
- Filter Drain
- Pond Area

Water Quality Management

Water quality management in accordance with document E26 of SUDs manual

Total SUDs mitigation index = mitigation index + 0.5 (mitigation index)

Network 1

Pollution hazard indices for different land use classifications 26.2	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro carbons
Commercial Roofs	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (e.g cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (e.g schools, offices) i.e <300 traffic movements/day	Low	0.5	0.4	0.4

Indicative SUDs mitigation indices for discharges to surface waters 26.3	Mitigation Indices		
Types of SUDs Components	Total Suspended Solids (TSS)	Metals	Hydro carbons
Pond	0.7	0.7	0.5
Permeable Paving	0.7	0.6	0.7
Filter Drain	0.4	0.4	0.4

Total SUDs mitigation index ≥ pollution hazard index therefore SUDs mitigation is appropriate as per in accordance with document E26 of SUDs manual

Table 1.3 - Operation and maintenance requirements for pipes, gullies and manholes

Maintenance schedule	Required action	Record frequency
Regular maintenance	Inspect and identify areas that are not operating correctly. If required, take remedial action	Monthly for first 3 months and then six monthly
	Debris removal from catchment surface (where may cause risk to performance)	Monthly
	Remove sediment from pre-treatment structure (e.g. gullies)	Annually or as required
	Cleaning/jetting of annually, or as required, pipes and manholes	As required

Rev A Updated drainage strategy — By EH Checked TL 14.12.2023

jpp
- Infrastructure Design
- Structural Engineering
- Development Planning
- Professional Advice
- Geotechnical & Environmental
- Surveying

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Project: New SEN School
Kestrel Way, Luton

Title: Drainage Strategy Plan

Scale at A1	Drawn by	Checked by	Date
1:250	EH	TL	June 2023

Status	Project ref	Drawing no.	Revision
FOR PLANNING	25910	102	A