Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2185	Asbestos	Asbestos	Polarised light microscopy
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

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SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING
2183

Final Report

Report No.:	21-22770-1
Initial Date of Issue:	11-Jul-2021
Client	Ground Engineering Limited
Client Address:	Newark Road Peterborough Cambridgeshire PE1 5UA
Contact(s):	Admin James Davies
Project	C15387 Begbroke Science Park, Kidlington
Quotation No.:	Q20-22175
Order No.:	C15387
No. of Samples:	2
Turnaround (Wkdays):	5
Date Approved:	11-Jul-2021
Approved By:	
Details:	Glynn Harvey, Technical Manager

Date Received:	02-Jul-2021
Date Instructed:	05-Jul-2021
Results Due:	09-Jul-2021

Results - Water

Project: C15387 Begbroke Science Park, Kidlington

Client: Ground Engineering Limited			**Chemtest Job No.:**		21-22770	21-22770
Quotation No.: Q20-22175			**Chemtest Sample ID.:**		1233378	1233379
			Client Sample ID.:		W1	W1
			Sample Location:		BH1	BH3
			Sample Type:		WATER	WATER
			Top Depth (m):		3.61	3.27
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
pH	U	1010		N/A	7.6	7.7
Boron (Dissolved)	U	1455	µg/l	10.0	2100	950
Sulphate	U	1220	mg/l	1.0	160	160
Cyanide (Free)	U	1300	mg/l	0.050	< 0.050	< 0.050
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050	< 0.050
Sulphide	U	1325	mg/l	0.050	< 0.050	< 0.050
Arsenic (Dissolved)	U	1455	µg/l	0.20	100	0.66
Cadmium (Dissolved)	U	1455	µg/l	0.11	5.4	< 0.11
Chromium (Dissolved)	U	1455	µg/l	0.50	200	< 0.50
Copper (Dissolved)	U	1455	µg/l	0.50	560	0.89
Mercury (Dissolved)	U	1455	µg/l	0.05	0.12	< 0.05
Nickel (Dissolved)	U	1455	µg/l	0.50	320	0.92
Lead (Dissolved)	U	1455	µg/l	0.50	410	< 0.50
Selenium (Dissolved)	U	1455	µg/l	0.50	180	3
Zinc (Dissolved)	U	1455	µg/l	2.5	820	< 2.5
Acenaphthene	N	1700	µg/l	0.010	< 0.010	< 0.010
Acenaphthylene	N	1700	µg/l	0.010	< 0.010	< 0.010
Anthracene	N	1700	µg/l	0.010	< 0.010	< 0.010
Benzo[a]anthracene	N	1700	µg/l	0.010	< 0.010	< 0.010
Benzo[a]pyrene	N	1700	µg/l	0.010	< 0.010	< 0.010
Benzo[b]fluoranthene	N	1700	µg/l	0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	N	1700	µg/l	0.010	< 0.010	< 0.010
Benzo[k]fluoranthene	N	1700	µg/l	0.010	< 0.010	< 0.010
Chrysene	N	1700	µg/l	0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	N	1700	µg/l	0.010	< 0.010	< 0.010
Fluoranthene	N	1700	µg/l	0.010	< 0.010	< 0.010
Fluorene	N	1700	µg/l	0.010	< 0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1700	µg/l	0.010	< 0.010	< 0.010
Naphthalene	N	1700	µg/l	0.010	< 0.010	< 0.010
Phenanthrene	N	1700	µg/l	0.010	< 0.010	< 0.010
Pyrene	N	1700	µg/l	0.010	< 0.010	< 0.010
Total Of 16 PAH's	N	1700	µg/l	0.20	< 0.20	< 0.20
Total Phenols	U	1920	mg/l	0.030	< 0.030	< 0.030
Total Hardness as CaCO3	U	1270	mg/l	15	60000	160
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10

Results - Water

Project: C15387 Begbroke Science Park, Kidlington

Client: Ground Engineering Limited			**Chemtest Job No.:**		21-22770	21-22770
Quotation No.: Q20-22175			**Chemtest Sample ID.:**		1233378	1233379
			Client Sample ID.:		W1	W1
			Sample Location:		BH1	BH3
			Sample Type:		WATER	WATER
			Top Depth (m):		3.61	3.27
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	< 10

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1270	Total Hardness of Waters	Total hardness	Calculation applied to calcium and magnesium results, expressed as mg l-1 CaCO3 equivalent.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1325	Sulphide in Waters	Sulphides	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using N,N–dimethyl-pphenylenediamine.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.

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customerservices@chemtest.com

Appendix 5

Classification of Aggressive Chemical Environment for Buried Concrete

TABLE C2 – AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) CLASSIFICATION FOR BROWNFIELD LOCATIONS[a]

Table C2 Aggressive Chemical Environment for Concrete (ACEC) classification for brownfield locations[a]

Sulfate and magnesium						Groundwater		ACEC
Design Sulfate Class for location	2:1 water/soil extract[b]		Groundwater		Total potential sulfate[c]	Static water	Mobile water	Class for location
1	2 (SO_4 mg/l)	3 (Mg mg/l)	4 (SO_4 mg/l)	5 (Mg mg/l)	6 (SO_4 %)	7 (pH)[d]	8 (pH)[d]	9
DS-1	< 500		< 400		< 0.24	≥ 2.5		AC-1s
							> 6.5[d]	AC-1
							5.5–6.5	AC-2z
							4.5–5.5	AC-3z
							2.5–4.5	AC-4z
DS-2	500–1500		400–1400		0.24–0.6	> 5.5		AC-1s
							> 6.5	AC-2
						2.5–5.5		AC-2s
							5.5–6.5	AC-3z
							4.5–5.5	AC-4z
							2.5–5.5	AC-5z
DS-3	1600–3000		1500–3000		0.7–1.2	> 5.5		AC-2s
							> 6.5	AC-3
						2.5–5.5		AC-3s
							5.5–6.5	AC-4
							2.5–5.5	AC-5
DS-4	3100–6000	≤ 1200	3100–6000	≤ 1000	1.3–2.4	> 5.5		AC-3s
							> 6.5	AC-4
						2.5–5.5		AC-4s
							2.5–6.5	AC-5
DS-4m	3100–6000	> 1200[e]	3100–6000	> 1000[e]	1.3–2.4	> 5.5		AC-3s
							> 6.5	AC-4m
						2.5–5.5		AC-4ms
							2.5–6.5	AC-5m
DS-5	> 6000	≤ 1200	> 6000	≤ 1000	> 2.4	> 5.5		AC-4s
						2.5–5.5	≥ 2.5	AC-5
DS-5m	> 6000	> 1200[e]	> 6000	> 1000[e]	> 2.4	> 5.5		AC-4ms
						2.5–5.5	≥ 2.5	AC-5m

Notes

a Brownfield locations are those sites, or parts of sites, that might contain chemical residues produced by or associated with industrial production (Section C5.1.3).

b The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered from previous Digests (Box C7).

c Applies only to locations where concrete will be exposed to sulfate ions (SO_4), which may result from the oxidation of sulfides such as pyrite, following ground disturbance (Appendix A1 and Box C8).

d An additional account is taken of hydrochloric and nitric acids by adjustment to sulfate content (Section C5.1.3).

e The limit on water-soluble magnesium does not apply to brackish groundwater (chloride content between 12 000 mg/l and 17 000 mg/l). This allows 'm' to be omitted from the relevant ACEC classification. Seawater (chloride content about 18 000 mg/l) and stronger brines are not covered by this table.

Explanation of suffix symbols to ACEC Class

- Suffix 's' indicates that the water has been classified as static.
- Concrete placed in ACEC Classes that include the suffix 'z' have primarily to resist acid conditions and may be made with any of the cements in Table D2 on page 42.
- Suffix 'm' relates to the higher levels of magnesium in Design Sulfate Classes 4 and 5.

APPENDIX 5
SUDS MANAGEMENT AND MAINTENANCE PLAN

TRANSPORT

BEGBROKE SCIENCE PARK
SUDS OPERATIONAL MANAGEMENT AND MAINTENANCE PLAN

Project name	**Begbroke Science Park**
Project no.	**1620011508**
Recipient	**Local Planning Authority (Cherwell District Council North Oxfordshire)**
Document Ref	**BBSP-RAMB-XX-XX-DN-C-000002**
Version	**P01**
Date	**17/12/2021**
Prepared by	**A Taleb**
Checked by	**L February**
Approved by	**L Sawyer**
Description	**Sustainable Urban Drainage Operational Management and Maintenance Plan**

CONTENTS

1.	**Introduction**	**2**
2.	**Surface Water Drainage Design Philosophy**	**2**
3.	**SuDS Analysis and Treatment Train**	**3**
4.	**Sustainable Drainage Systems (SuDS) – Normal Function**	**6**
5.	**Management and Maintenance**	**6**
6.	**End of Life Maintenance**	**10**

APPENDICES

Appendix 1
Surface Water Drainage Drawing

1. Introduction

This Design Note has been produced to provide guidance on the management and maintenance of the Sustainable Drainage Systems (SuDS) proposed for the Begbroke Science Park, Begbroke Hill, Begbroke, Kidlington OX5 1PF. Furthermore, the report has been written in support of discharging the planning condition 16 (Ref. 18/00803/OUT). The Design Note should be read in conjunction with the proposed surface water drainage layout drawings (BBSP-RAMB-ZZ-00-DR-C-000101 and BBSP-RAMB-ZZ-00-DR-C-000103).

Planning condition 16 reads as follows;

Development shall not begin until a surface water drainage scheme for the site or part if separate reserved matters are submitted, based on sustainable drainage principles and an assessment of the hydrological and hydro-geological context of the development, has been submitted to and approved in writing by the Local Planning Authority. The scheme shall subsequently be implemented in accordance with the approved details before the development is completed. The scheme shall also include:

a) Discharge Rates
b) Discharge Volumes
c) SUDS (Soakaways)
d) Maintenance and management of SUDS features (To include provision of a SuDS Management and Maintenance Plan)
e) Infiltration in accordance with BRE365 (To include infiltration testing; seasonal monitoring and recording of groundwater levels)
f) Detailed drainage layout with pipe numbers
g) Network drainage calculations
h) Phasing
i) Flood Flow Routing in exceedance conditions (To include provision of a flood exceedance route plan)

Reason - To ensure an acceptable drainage scheme is provided in relation to the proposed expansion and do ensure the proposals do not have a detrimental impact on the drainage systems currently in situ in the immediate locale.

The proposed drainage network is to be built to adoptable standards (but shall remain private), and a series of sustainable urban drainage features will convey surface water run-off from the development site for infiltration to ground.

2. Surface Water Drainage Design Philosophy

The surface water drainage strategy for the proposed development comprises infiltration to ground for surface water run-off generated by the proposed development including the Zone B – Academic Building, Zone C – Commercial Building, and the associated surface car park area. Surface water run-off is collected via several SuDS features (raingardens, permeable/porous paving and dry infiltration basin) from where run-off is conveyed via piped networks to nearby infiltration tanks. Infiltration tanks which may cause a point discharge are located greater than 5.0m from building foundations.

The proposed surface water management strategy has been developed in parallel with the Architectural and Landscaping Architects proposals. In producing this strategy, a feasibility assessment of viable

SuDS measures was undertaken to ensure that surface water is appropriately managed given the existing site constraints.

The principles of the strategy are as follows:

- **Raingardens** to collect surface water run-off from roof and external hardstanding areas prior to conveyance to a nearby geocellular tank for infiltration to ground.
- Footpath and parking bay areas will be laid with p**ermeable / porous pavements** (lined for attenuation and unlined for infiltration) and a series of perforated pipes surrounded by gravel. This system will provide the required treatment for the small flows entering the positive drainage system. Treatment measures to be confirmed sufficient in accordance with Ciria SuDS Manual (Chapter 26) at detailed design stage.
- Surface water run-off from external traffic areas conveyed via a linear drainage channel to an adjacent **filter drain** surrounded by gravel with a permeable membrane underneath. This system will provide the required treatment for the small flows entering the positive drainage system. Treatment measures to be confirmed sufficient in accordance with Ciria SuDS Manual (Chapter 26) at detailed design stage.
- The proposed surface water run-off from the development site is conveyed to the geocellular structures via the SuDS features noted above to provide **infiltration** to ground.
- **Petrol interceptors** are proposed to provide further pollution treatment for surface water run-off from services and delivery access areas.

The proposed surface water drainage strategy drawings are included in Appendix 1.

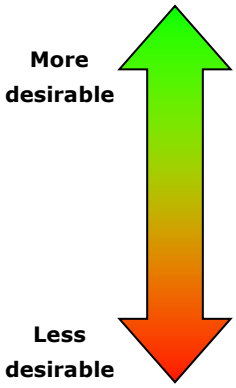
3. SuDS Analysis and Treatment Train

Good practice emphasises the need to ensure surface water run-off is managed close to its source. It highlights that developers should aim to achieve greenfield run-off from their site through the use of sustainable drainage techniques. This can also be aided by encouraging the retention of soft landscaping as opposed to hard, less permeable surfaces.

In line with the Lead Local Flood Authority guidance, SuDS features are used to achieve a betterment on the brownfield rates for the development site. The proposed surface water drainage strategy is for infiltration on site.

The following hierarchy for managing surface water applies:

- Water Reuse
- Living Roofs
- Basins and Ponds
- Infiltration Devices
- Permeable Surfaces
- Tank Systems



The surface water drainage strategy considers the SuDS hierarchy in developing the water management proposals and includes infiltration and permeable surfacing within the scheme. The surface water management features, water re-use, basins and ponds, were considered during the design development and discounted for the following reasons;

- Due to the compact nature of the development, water re-use was not considered feasible.
- There is limited opportunity within the landscaped areas for the provision of open SuDS features. Filter drains are proposed to provide treatment for run-off from impermeable areas before discharging to the infiltration drainage system.

Water pollution has been taken into account and methods of treatment chosen against criteria outlined in the Ciria SuDS Manual. Treatment measures are to be confirmed sufficient in accordance with Ciria SuDS Manual (Chapter 26) at detailed design stage. An outline using extracts from the document to allocate suitable pollution indices for the proposed land use is provided below:

1. Define pollution hazard indices, presented in Table 26.2 of the Ciria SuDS Manual:

TABLE 26.2 Pollution hazard indices for different land use classifications

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 commercial/ industrial 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 (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg 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[1]	High	0.8[2]	0.8[2]	0.9[2]

Notes

1 Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).

2 These should only be used if considered appropriate as part of a detailed risk assessment – required for all these land use types (Table 4.3). When dealing with high hazard sites, the environmental regulator should first be consulted for pre-permitting advice. This will help determine the most appropriate approach to the development of a design solution.

Table 3.3. Pollution Hazard Indices

Extract from the Ciria SuDS Manual, Chapter 26

The pollution hazard for the site is low to medium. The previously described sustainable drainage systems are proposed to mitigate pollution discharging to the surface water system. Each sustainable drainage feature has associated pollution mitigation indices, as shown in the below table, reproduced from CIRIA C753 Table 26.3):

2. Determine SuDS Pollution Mitigation Indices

TABLE 26.4 Indicative SuDS mitigation indices for discharges to groundwater

Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates[1]	TSS	Metals	Hydrocarbons
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.6[4]	0.5	0.6
A soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.4	0.4
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.8[4]	0.8	0.8
Proprietary treatment systems[5, 6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

Notes

1 All designs must include a minimum of 1 m unsaturated depth of aquifer material between the infiltration surface and the maximum likely groundwater level (as required in infiltration design – Chapter 25).

2 For example as recommended in Sniffer (2008a and 2008b), Scott Wilson (2010) or other appropriate guidance.

3 Alternative depths may be considered where it can be demonstrated that the combination of the proposed depth and soil characteristics will provide equivalent protection to the underlying groundwater – see note 1.

4 If significant volumes of sediment are allowed to enter an infiltration system, there will be a high risk of rapid clogging and subsequent system failure.

5 See Chapter 14 for approaches to demonstrate product performance. Note: a British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: **www.britishwater.co.uk/Publications/codes-of-practise.aspx**

6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution, where there is a requirement to retrofit treatment. WAT-RM-08 (SEPA, 2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

Table 3.4. Pollution Mitigation Indices for Discharges to Ground Waters

Extract from the Ciria SuDS Manual, Chapter 26

The applicable indices following the methodology set out the Ciria SuDS Manual is highlighted with a red box.

As per CIRIA C753, a sufficient SuDS mitigation index should be provided to eliminate pollutants across all pollutant categories. For the majority of the drained area on site, which is roof, footpath and delivery zone this requirement is satisfied by the mitigation indices of all of the SuDS proposed for the development. It is proposed that all run-off will pass through at least one of the SuDS.

4. Sustainable Drainage Systems (SuDS) – Normal Function

SuDS generally mimic the natural drainage patterns of an undeveloped (greenfield) site, where surface water run-off should have as many opportunities as possible to soak into the ground, improving water quality and controlling outfall rates from the development. This reduces the impact and risk of flooding on downstream developments alongside providing additional benefits such as pollution control, increasing biodiversity and providing water-based amenity.

At the point of infiltration, it is intended for all surface water to have been treated using at least one method of water treatment with the final function via below ground infiltration tanks.

The SuDS features proposed for the development site will provide;

- A platform to capture surface water,
- A medium to attenuate, filter and treat surface water, and
- A means of conveying surface water.

5. Management and Maintenance

The final maintenance strategy for the specific SuDS features proposed at the development site will be dependent upon the specific products used within the installation of the features and therefore subject to Manufacturer's guidance.

The maintenance regime for SuDS features present on site can be divided into three categories:

1. Regular maintenance;
2. Occasional tasks, and
3. Remedial works

The frequency of regular maintenance will usually be monthly, the occasional tasks and remedial works should be conducted as required.

It is proposed that the Building Management team will be responsible for the maintenance of the proposed SuDS features. The table below describes the typical maintenance and management requirements of the proposed SuDS elements to the surface water drainage strategy in line with CIRIA C753: The SuDS Manual.

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 2.1. Maintenance Requirements of Drainage Components (Soakaways)

Extract from the Ciria SuDS Manual, Chapter 13

TABLE 16.1 Operation and maintenance requirements for filter drains

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

Table 2.2. Maintenance Requirements of Drainage Components (Filter Drains)

Extract from the Ciria SuDS Manual, Chapter 16

TABLE 18.3 Operation and maintenance requirements for bioretention systems

Maintenance schedule	Required action	Typical frequency
Regular inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly
Regular maintenance	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
Occasional maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
Remedial actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

Table 2.3. Maintenance Requirements of Drainage Components (Bioretention Systems - Raingardens)

Extract from the Ciria SuDS Manual, Chapter 18

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

Table 2.4. Maintenance Requirements of Drainage Components (Pervious Pavements)

Extract from the Ciria SuDS Manual, Chapter 20

In addition to the items listed above, the table below provides further guidance on type of operational and maintenance requirements that may be appropriate for the drainage features not included in the tables provided above.

Table 2.5: Drainage Maintenance Strategy

Drainage Feature	Regular Maintenance	Occasional/Remedial Maintenance	Monitoring
Drainage channels/Gullies	Inspections will include gratings; covers including their locking bolts; sumps and sump buckets; exposed concrete surround and adjacent surfacing. Check for accumulation of debris and silt and cleaned as necessary	Channel cleaning will be by flushing with water or high pressure jetting (no boiling water or cleaning agent will be used). All silt buckets and sumps will be cleaned out replaced back into the units ensuring they are correctly fitted.	Inspect every 4 months or after large storm.

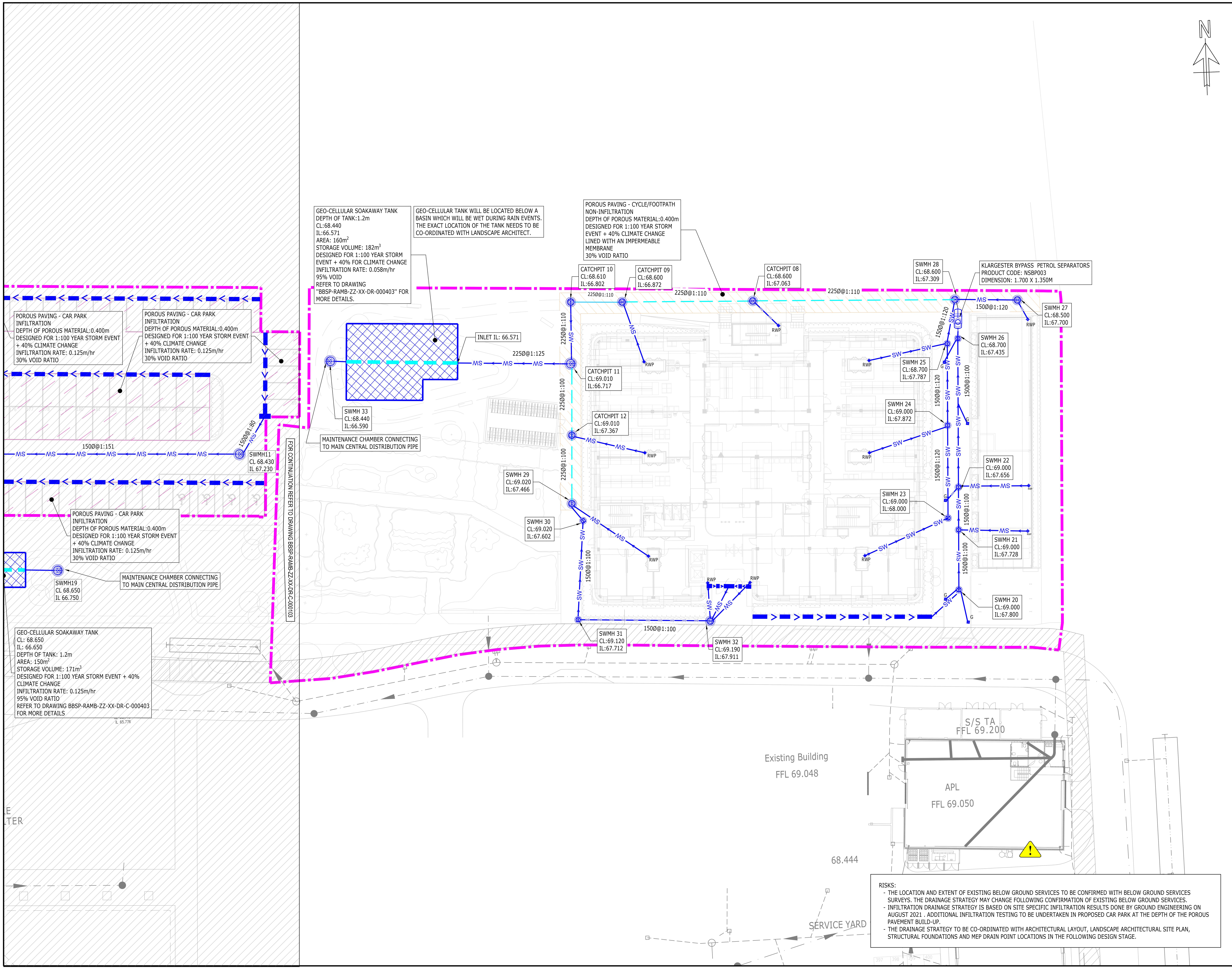
Drainage Feature	Regular Maintenance	Occasional/Remedial Maintenance	Monitoring
Catchpit Manholes/Inspection Chambers	Gratings, frames and all associated locking parts to be checked for damage. Exposed concrete and adjacent surfacing to be checked for cracking and general damage. Check condition of inlet and outlet pipes, flow controls, baffles and isolation structures Check for accumulation of debris and silt and cleaned as necessary. Covers and frames to be checked for damage. Exposed concrete and adjacent surfacing to be checked for cracking and general damage. Check condition of inlet and outlet pipes, flow controls, baffles and isolation structures	All channel surfaces and joints will be checked and repaired as necessary. Repair/rehabilitation of inlets, outlet, overflows and vents, as required. Clean as necessary. All manhole and inspection chamber covers and frames to be replaced as necessary. Repair exposed concrete and surfacing as necessary Repair/rehabilitation of inlets, outlet, overflows and vents, as required.	Inspect every 6 months or after large storm.
Proprietary treatment system	Remove litter and debris and inspect for sediment, oil and grease accumulation; six monthly Change the filter media; as recommended by manufacturer Remove sediment, oil, grease and floatables; as necessary – indicated by system inspections or immediately following significant spill	Replace malfunctioning parts or structures; as required	Inspect for evidence of poor operation; six monthly Inspect filter media and establish appropriate replacement frequencies; six monthly Inspect sediment accumulation rates and establish appropriate removal frequencies; monthly during the first half year of operation, then every six months

6. End of Life Maintenance

As part of their normal function many SuDS features are intended to act as a repository for potential pollutants such as sediment, hydrocarbons and heavy metals, thus improving the water quality of run-off. Certain pollutants, such as hydrocarbons, can be broken down via biodegradation. However, other pollutants, namely the particulate or sediment type, such as metals, remain trapped within elements of the sustainable drainage feature.

Current evidence does not conclude to what extent pollution entrapment within SuDS will occur or whether this can lead to the site becoming contaminated and therefore hazardous to human well-being. Furthermore, it is not yet known if certain sustainable drainage systems (or elements of them) will be classified as hazardous waste at the time of their disposal. For these reasons, it is proposed that at end-life, all SuDS are disposed of in accordance with the relevant rules, regulations and available guidance at the time. If required, at redevelopment stage, consultation with the Environment Agency should be sought and testing of materials and ground should be carried out.

APPENDIX 1
SURFACE WATER DRAINAGE DRAWING



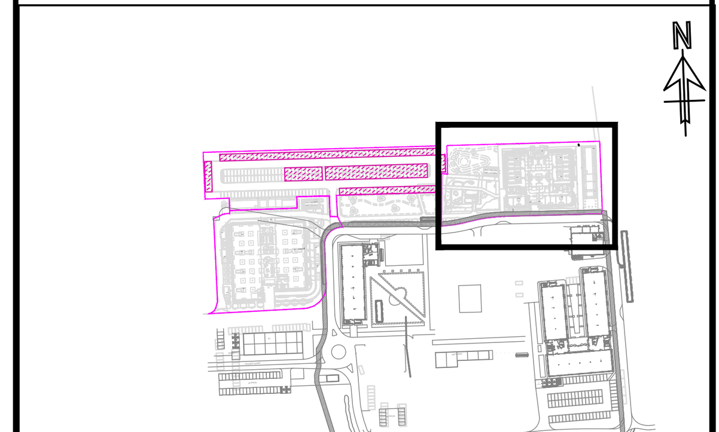
RISKS:
- THE LOCATION AND EXTENT OF EXISTING BELOW GROUND SERVICES TO BE CONFIRMED WITH BELOW GROUND SERVICES SURVEYS. THE DRAINAGE STRATEGY MAY CHANGE FOLLOWING CONFIRMATION OF EXISTING BELOW GROUND SERVICES.
- INFILTRATION DRAINAGE STRATEGY IS BASED ON SITE SPECIFIC INFILTRATION RESULTS DONE BY GROUND ENGINEERING ON AUGUST 2021 . ADDITIONAL INFILTRATION TESTING TO BE UNDERTAKEN IN PROPOSED CAR PARK AT THE DEPTH OF THE POROUS PAVEMENT BUILD-UP.
- THE DRAINAGE STRATEGY TO BE CO-ORDINATED WITH ARCHITECTURAL LAYOUT, LANDSCAPE ARCHITECTURAL SITE PLAN, STRUCTURAL FOUNDATIONS AND MEP DRAIN POINT LOCATIONS IN THE FOLLOWING DESIGN STAGE.

Notes

1. THIS DRAWING IS NOT TO BE SCALED.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL, STRUCTURAL AND M&E DRAWINGS.
3. THIS IS NOT AN INSTALLATION DRAWING NOR A CO-ORDINATION DRAWING.
4. INDICATIVE BELOW GROUND DRAINAGE STRATEGY SUBJECT TO FURTHER DESIGN DEVELOPMENT AND COORDINATION.
5. THIS DRAWING IS BASED ON
   - FIRA LP2264-FIRA-MP-ST-P-LA-WS 0001 'WIP' LANDSCAPE DRAWING RECEIVED ON 18.08.2021.
   - BBSP-NBBJ-ZZ-XX-DR-A-511010-511011 ARCHITECT DRAWINGS RECEIVED ON 24-08-2021.
   - HISTORIC SITE INFO RECEIVED ON 22.03.2021.
6. FOR DRAINAGE DETAILS REFER TO DRAWINGS "BSP-RAMB-CP-XX-DR-C-000410-413
   FOR PAVEMENT DETAILS REFER TO DRAWINGS BSP-RAMB-CP-XX-DR-C-000510 AND 551 .

KEY:

- SITE BOUNDARY
- SURFACE WATER DRAIN
- DRAINAGE CHANNEL
- PERFORATED PIPE
- SURFACE WATER MANHOLE/PPIC
- THRESHOLD CHANNEL DRAIN
- ROAD GULLY
- RWP
- OIL SEPARATOR
- SDS GEOLIGHT SOAKAWAY TANK, OR SIMILAR APPROVED
- PERMEABLE LINED PAVING



KEY PLAN

Rev	Description	Date	By / Chk	App
P02	STAGE 3 ISSUE	10.09 2021	AT LF	LS
P01	STAGE 2 ISSUE	28.05 2021	AT JS	LS

STAGE 3

BEGBROOKE SCIENCE PARK ACADEMIC BUILDING

RAMBOLL
tel 020 7631 5291 london@ramboll.co.uk
www.ramboll.co.uk

ZONE B
INDICATIVE SURFACE WATER DRAINAGE LAYOUT

Project No:	Scale (@A1):	Drawn:	Date:
1620011508	1:250	MES	MAY 2021

Drawing No:	Rev:
BBSP-RAMB-ZZ-00-DR-C-000101	P02

10/09/2021 16:20:01

Notes

1. THIS DRAWING IS NOT TO BE SCALED.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL, STRUCTURAL AND M&E DRAWINGS.
3. THIS IS NOT AN INSTALLATION DRAWING NOR A CO-ORDINATION DRAWING.
4. INDICATIVE BELOW GROUND DRAINAGE STRATEGY SUBJECT TO FURTHER DESIGN DEVELOPMENT AND COORDINATION.
5. THIS DRAWING IS BASED ON
   - LP2264-FJRA-MP-ST-P-LA-WS RECEIVED 02.09.2021.
   - LANDSCAPE DRAWING RECEIVED ON 25.08.2021.
   - BBSP-NBBJ-ZZ-XX-DR-A-511010-511011
   - BBSP-NBBJ-AB-00-DR-A-201010
   - BBSP-NBBJ-CB-00-DR-A-201000
   - ARCHITECT DRAWINGS RECEIVED ON 02-09-2021.
   - HISTORIC SITE INFO RECEIVED ON 22.03.2021.
6. FOR DRAINAGE DETAILS REFER TO DRAWINGS "BSP-RAMB-CP-XX-DR-C-000410-413 FOR PAVEMENT DETAILS REFER TO DRAWINGS BSP-RAMB-CP-XX-DR-C-000510 AND 551 .

KEY:

- SITE BOUNDARY
- SURFACE WATER DRAIN
- DRAINAGE CHANNEL
- PERFORATED PIPE
- SURFACE WATER MANHOLE/PPIC
- THRESHOLD CHANNEL DRAIN
- ROAD GULLY
- RODDING EYE
- RWP
- OUTFALL/SUMP
- OIL SEPARATOR
- SDS GEOLIGHT SOAKAWAY TANK, OR SIMILAR APPROVED
- PERMEABLE UNLINED PAVING
- PERMEABLE LINED PAVING
- FILTER DRAIN

KEY PLAN

Rev	Description	Date	By / Chk	App
P02	STAGE 3 ISSUE	10.09 2021	AT LF	LS
P01	STAGE 2 ISSUE	28.05 2021	AT JS	LS

STAGE 3

BEGBROOKE SCIENCE PARK COMMERCIAL BUILDING AND SURFACE CAR PARK

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tel 020 7631 5291 london@ramboll.co.uk
www.ramboll.co.uk

ZONE C INDICATIVE SURFACE WATER DRAINAGE LAYOUT

Project No:	Scale (@A1):	Drawn:	Date:
1620011508	1:250	MES	MAY 2021

Drawing No: BBSP-RAMB-ZC-XX-DR-C-000103 Rev: P02

RISKS:
- THE LOCATION AND EXTENT OF EXISTING BELOW GROUND SERVICES TO BE CONFIRMED WITH BELOW GROUND SERVICES SURVEYS. THE DRAINAGE STRATEGY MAY CHANGE FOLLOWING CONFIRMATION OF EXISTING BELOW GROUND SERVICES.
- INFILTRATION DRAINAGE STRATEGY IS BASED ON SITE SPECIFIC INFILTRATION RESULTS DONE BY GROUND ENGINEERING ON AUGUST 2021 . ADDITIONAL INFILTRATION TESTING TO BE UNDERTAKEN IN PROPOSED CAR PARK AT THE DEPTH OF THE POROUS PAVEMENT BUILD-UP.
- THE DRAINAGE STRATEGY TO BE CO-ORDINATED WITH ARCHITECTURAL LAYOUT, LANDSCAPE ARCHITECTURAL SITE PLAN, STRUCTURAL FOUNDATIONS AND MEP DRAIN POINT LOCATIONS IN THE FOLLOWING DESIGN STAGE.

GEO-CELLULAR SOAKAWAY TANK
CL:68.600
IL:66.105
DEPTH OF TANK: 1.2m
AREA: 195m²
STORAGE VOLUME: 223m³
DESIGNED FOR 1:100 YEAR STORM EVENT + 40% CLIMATE CHANGE
INFILTRATION RATE: 0.125m/hr
95% VOID RATIO
REFER TO DRAWING BBSP-RAMB-ZZ-XX-DR-C-000403 FOR MORE DETAILS

KLARGESTER FULL RETENTION PETROL SEPARATORS
PRODUCT CODE: NSFA100
DIMENSION: 6.200M X 2.820M

SWMH03 CL 68.620 IL 66.315
SWMH02 CL 68.400 IL 66.688
SWMH06 CL 68.420 IL 66.895
SWMH01 CL 68.350 IL 67.150
SWMH04 CL 68.670 IL 66.220
SWMH05 CL 68.700 IL 66.254
SWMH17 CL 68.330 IL 66.486
SWMH18 CL 68.600 IL 66.200
SWMH08 CL 68.500 IL 66.776
SWMH10 CL 68.470 IL 67.005
SWMH11 CL 68.430 IL 67.230

OUTLET IL:66.128
INLET IL:66.178
INLET IL:66.105
MAIN DISTRIBUTION PIPE
MAINTENANCE CHAMBER CONNECTING TO MAIN CENTRAL DISTRIBUTION PIPE

POROUS PAVING - CAR PARK
NON-INFILTRATION
DEPTH OF POROUS MATERIAL:0.400m
DESIGNED FOR 1:100 YEAR STORM EVENT + 40% CLIMATE CHANGE
LINED WITH AN IMPERMEABLE MEMBRANE

POROUS PAVING - CAR PARK
INFILTRATION
DEPTH OF POROUS MATERIAL:0.400m
DESIGNED FOR 1:100 YEAR STORM EVENT + 40% CLIMATE CHANGE
INFILTRATION RATE: 0.125m/hr
30% VOID RATIO

150Ø@1:117 · 225Ø@1:151 · 150Ø@1:151 · 100Ø@1:200 · 150Ø@1:80 · 150Ø@1:40

CATCHPIT 01 CL 68.860 IL 67.293
CATCHPIT 02 CL 68.800 IL 68.000
CATCHPIT 03 CL 68.800 IL 67.838
CATCHPIT 04 CL 68.800 IL 68.804
CATCHPIT 05 CL 68.800 IL 67.744
CATCHPIT 06 CL 68.800 IL 67.703
CATCHPIT 07 CL 68.800 IL 67.651
RE 01 CL 68.430 IL 67.630
SWMH09 CL 69.000 IL 67.800
SWMH16 CL 68.650 IL 66.750
INLET IL:66.730
SWMH19 CL 68.650 IL 66.750

225Ø@1:90 · 150Ø@1:83 · 150Ø@1:61

SWMH 12 CL:68.740 IL:67.726
SWMH 13 CL:68.750 IL:67.433
SWMH 14 CL:69.000 IL:67.192
SWMH 15 CL:69.000 IL:66.874
SWMH 42 CL:69.110 IL:67.910
SWMH 43 CL:68.865 IL:67.656
SWMH 40 CL:68.900 IL:67.330
SWMH 41 CL:69.000 IL:67.232

FILTER DRAIN
NON-INFILTRATION
DEPTH: 0.8m
LINED WITH AN IMPERMEABLE MEMBRANE

KLARGESTER BYPASS PETROL SEPARATORS
PRODUCT CODE: NSBP003
DIMENSION: 1.700 X 1.350M

GEO-CELLULAR SOAKAWAY TANK
CL: 68.650
IL: 66.650
DEPTH OF TANK: 1.2m
AREA: 150m²
STORAGE VOLUME: 171m³
DESIGNED FOR 1:100 YEAR STORM EVENT + 40% CLIMATE CHANGE
INFILTRATION RATE: 0.125m/hr
95% VOID RATIO
REFER TO DRAWING BBSP-RAMB-ZZ-XX-DR-C-000403 FOR MORE DETAILS

POROUS PAVING - CAR PARK
NON-INFILTRATION
DEPTH OF POROUS MATERIAL:0.400m
DESIGNED FOR 1:100 YEAR STORM EVENT + 40% CLIMATE CHANGE
LINED WITH AN IMPERMEABLE MEMBRANE
30% VOID RATIO

SWMH 34 CL:68.770 IL:67.460
CATCHPIT 13 CL:68.770 IL:67.367
CATCHPIT 14 CL:68.750 IL:67.299
SWMH 35 CL:68.800 IL:67.111
SWMH 36 CL:68.650 IL:66.803
CATCHPIT 15 CL:68.650 IL:66.761
SWMH 37 CL:68.750 IL:67.400
CATCHPIT 16 CL:68.750 IL:66.664
INLET IL: 66.900
INLET IL: 66.967

150Ø@1:50 · 225Ø@1:50 · 150Ø@1:80 · 150Ø@1:100

CATCHPIT 21 CL:68.740 IL:67.491
CATCHPIT 20 CL:68.740 IL:67.540
SWMH 39 CL:68.740 IL:67.300
SWMH 38 CL:68.740 IL:67.162
CATCHPIT 19 CL:68.740 IL:67.640
CATCHPIT 18 CL:68.640 IL:67.535
CATCHPIT 17 CL:68.410 IL:66.935
SWMH 42 CL:68.500 IL:66.560

GEO-CELLULAR SOAKAWAY TANK
CL:68.500m
IL: 66.533m
DEPTH OF TANK:1m
TOP OF THE TANK: 67.533m
COVER ON TOP OF THE TANK : 0.967m
AREA: 60m²
STORAGE VOLUME:57m³
DESIGNED FOR 1:100 YEAR STORM EVENT + 40% FOR CLIMATE CHANGE
INFILTRATION RATE: 0.245m/hr
95% VOID
REFER TO DRAWING "BBSP-RAMB-ZZ-XX-DR-000403" FOR MORE DETAILS.

THE EXACT LOCATION OF THE TANK NEEDS TO BE CO-ORDINATED WITH LANDSCAPE ARCHITECT.

10/09/2021 14:41:38