

BOKLOK

LAND TO THE SOUTH OF LITTLEHAMPTON ACADEMY

Drainage Strategy and Water Quality Management Part 1

DOC: LTH-AKSW-XX-XX-RP-C-00002

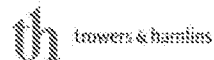
March 2021



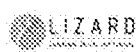
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Land South of Littlehampton Academy

Drainage Strategy and Water Quality Management Report

Prepared for
BoKlok UK

March 2021

Job №: S208134

Report: LTH-AKSW-XX-XX-RP-C-00002

Seacourt Tower West Way Oxford OX2 0JJ

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Revision	Amendments	Prepared By	Checked	Date
P01	Preliminary issue	GT	GT	12.02.21
P02	Further Site Investigation included	GT	CR	26.02.21
P03	Minor Amendments	CR	GT	08.03.21

1.0 Introduction

AKS Ward have been commissioned by BoKlok UK to undertake a Drainage Strategy and Water Quality Management report to support the erection of 80 houses and 32 apartments with their associated car parking and hard and soft landscaping areas, within the site boundary south of Littlehampton Academy at Fitzalan Road, Littlehampton, West Sussex BN17 6FE.

2.0 Development Site Details

The site is located at grid reference TQ 03316 02621 and is bounded by residential housing to the east, Littlehampton Academy to the north, Rosemead Park and residential housing to the south and Fitzalan Road to the west.

The site lies in Flood Zone 1 (low risk of fluvial flooding. Refer to the AKSWard Flood Risk Assessment for more detailed information about the evaluation of the flood risk.

The site is predominantly a brownfield site (former school site) with a total area of approximately 2.37 Ha and includes the remains of the school site with an impermeable area of approximately 2,350m².

The plans of the development are contained within Appendix A.

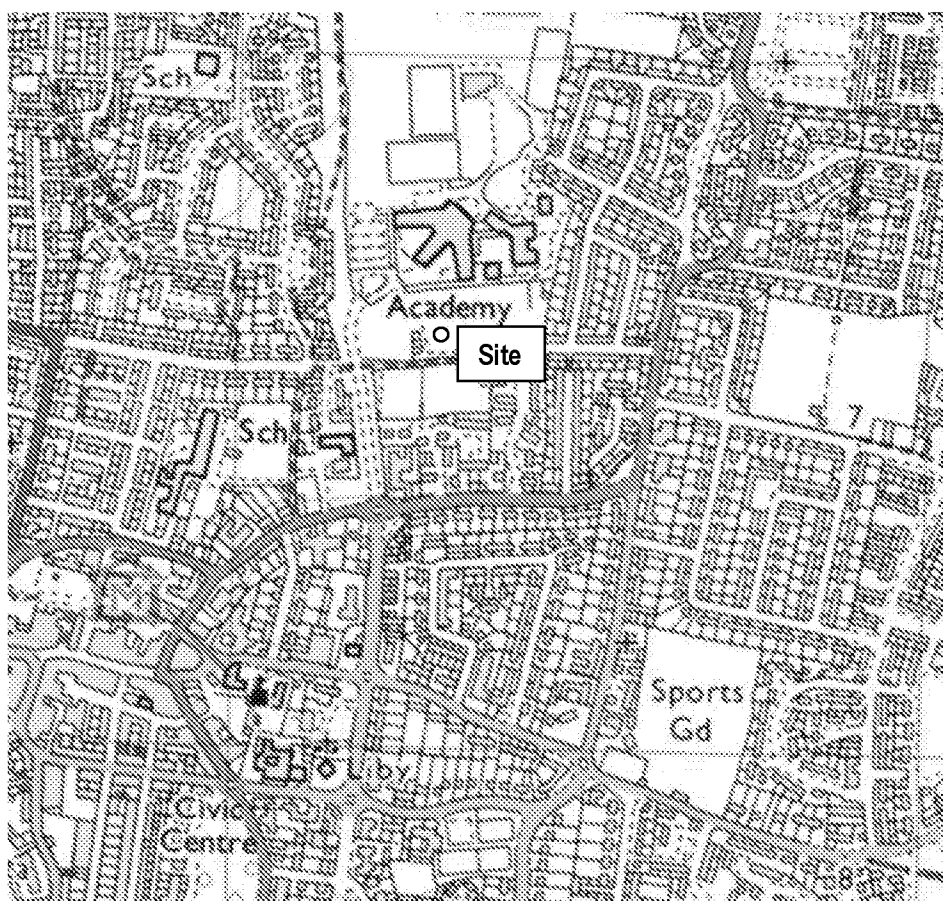


Figure 1 – Ordnance Survey Mapping – Source: Bing Maps

3.0 Site Drainage Strategy

3.1 Existing Surface Water

The application site is classified as an existing Brownfield site with some impermeable areas.

Site investigation reports have confirmed that the site is underlain with made ground from the previous school including large stockpiles of made ground over predominantly clay terrace deposits over a structureless chalk.

Infiltration tests have been carried out and determined that the terrace deposits are not viable for infiltration of surface water. Ground water levels have been recorded at 4.30m BGL within the upper layers of the chalk therefore a 1m freeboard to the groundwater level cannot be achieved on this site.

Table 3.1 Summary of Borehole Results

Depth From (m)	Depth To (m)	Soil Type	Description
0.0	0.30 / 0.40	TOPSOIL	Light brown to light orangish brown locally reworked slightly gravelly silty clayey TOPSOIL. Gravel is fine to sized rounded flint and occasional brick, chalk, mortar and concrete.
0.0	0.35 / 0.50	MADE GROUND (non-stockpile areas)	Light brown to orangish brown sandy gravelly clayey MADE GROUND. Gravel of brick, concrete, asphalt, sub angular to sub rounded flint. Wire noted in TP1. Black ashy gravelly fill noted in TP2, possible remnant blacktop surface. TP1-TP3, TP5, WS1A-C, WS2-WS5
0.0	0.75-2.0	MADE GROUND (Stockpile areas)	Grass over light brown to brown sandy clayey slightly gravelly MADE GROUND. Gravel of rounded to sub rounded, sub angular flint, chalk coarse brick and concrete, occasional whole brick. TP6 refused on a concrete obstruction at 0.70 m. A length of electrical cable in TP8 at 0.50 m. A layer of rotted wood chippings in TP10 at 0.70-0.75 m TP4, TP6-TP12
0.75/1.60	1.50/2.50	MADE GROUND (Stockpile areas)	Soft dark brown greyish to dark grey slightly gravelly clay MADE GROUND. Slight organic odour (peat or burnt organics). Gravel of rounded to sub-rounded flint. Occasional fine to medium brick gravel. Rare woven plastic membrane or plastic netting, plastic tile fragment and rubber seals noted. TP10-TP12
0.25/0.5	1.1/3.0	CLAY	Stiff to firm brown becoming orangish brown CLAY and pale brown becoming orange brown gravelly sandy CLAY occasionally mottled orange. Gravel is fine to coarse sub angular to sub rounded flint. Sand is fine to medium grained.
1.1/1.8	2.35/4.10	SAND	Medium dense orange brown to orange or yellowish orange slightly clayey gravelly SAND. Sand is fine to coarse grained. Gravel is fine to coarse sub rounded to sub angular flint.
2.4/2.7	4.10/6.0	CHALK	Soft off white mottled pale orange gravelly SILT or silty GRAVEL (structureless CHALK HEAD) WS2-WS5

Greenfield Runoff rates for the site has been calculated using ICP SUDS:

1 in 1 year return period: 2.9 l/s

(QBAR): **3.5 l/s**

1 in 30 years return period 7.8 l/s

1 in 100 years return period 11.0 l/s

Greenfield calculations provided by MicroDrainage can be found in Appendix B.

A topographical survey and extract from the site investigation report is included in Appendix F.

3.2 Proposed Surface Water

The proposed surface system will be designed to agree with the National Standards for Sustainable Drainage.

The total area of the site is 2.37ha and the impermeable area is 1.335ha. The proposed re-development will result in a net increase of impermeable area based on the current site conditions. The original use of the site as a school development would have drained a similar impermeable area.

The proposed surface water disposal has reviewed the SuDS hierarchy and given the relative impermeable nature of the clay material above the chalk and the relatively high groundwater level within the chalk there is no opportunity to dispose of surface water into the ground. The LLFA have been contacted regarding the ground water levels and suitability for infiltration, the LLFA have confirmed that no disposal into the groundwater would be permitted. The possibility of utilising a partial infiltration from the porous paving with an overflow into the surface water system was reviewed but is not viable as Southern Water will not accept partial infiltration discharging into their system.

There are no watercourses local to the site to allow surface water disposal.

There are no surface water sewers local to the site to allow surface water disposal.

The only option to dispose of surface water is to connect via a flow control to the existing combined sewer system, a capacity check has been submitted to Southern Water.

Proposed drainage layout is in Appendix A.

The Greenfield runoff (QBAR) of the developable area (1.335ha) of the site is 3.5l/s. The proposed drainage strategy will utilise one outfall and will incorporate flow control systems (e.g. Hydrobrake or similar) to restrict flows to 2 litres/sec into the Southern Water sewer system which is less than greenfield runoff rate to minimise the impact on the sewer system.

Permeable Pavement

A tanked permeable paving system is proposed for the car parking areas. These are designed to attenuate runoff from paved areas. Attenuated flows from the permeable paving will be discharged into gravity drainage system.

The proposed permeable paving area will drain all the private parking and hardstanding areas. All the adopted road system will be drained via a traditional gully system in accordance with the Highway Authority requirements.

Green Roofs

The proposed development is not suitable for green roofs given the traditional pitched roofs for the houses. The use of plant limit the use of green roof on the apartments.

Rainwater Recycling

Water butts will be fitted to all properties to enable rainwater to be recycled for garden watering

Open drainage Features

Bioretention areas with a gravel trench/ perforated collection pipe are designed to convey, treat and attenuate surface water runoff. A linear bioretention system is proposed to collect the runoff from the private road system to provide additional water treatment and attenuation, prior discharging to the surface water system.

Geo-cellular Storage

A geo-cellular storage tanks are proposed to attenuate the surface water for all storm events. Flows from the geo-cellular tanks will be discharged to the public sewer via a piped network.

AquaCells Prime from Wavin (or similar) are proposed for the construction of the attenuation tank. The dimensions of the AquaCells are 1m length, 0.5m width and 0.4m height. Maintenance access will be provided with the use of AquaCell Plus-R or similar system to allow maintenance access through the tanks.

Other SuDS features were not reasonably practicable to be used on the site, due to the site constraints and ground conditions. The number of SuDS that are proposed on this development will ensure that surface water has been appropriately treated to ensure the quality of discharges are in accordance with best practice (SuDS Manual, C753). In addition, the types of SuDS that are proposed will provide more than adequate water quality, manage water quantity and significantly enhance amenity.

Refer to drainage drawings and MicroDrainage calculations in Appendix C and D respectively.

3.3 Runoff Destination

A geo-environmental report shows the ground conditions confirming infiltration as being an unsuitable method of disposal and high ground water levels within the chalk material and impermeable strata above the chalk.

Surface water drainage from the new buildings and paved areas will be attenuated using permeable paving, attenuation tanks and open features and discharged via flow control device into the public sewer system.

3.4 Peak Flow Control

Flow rates off site will be restricted using a Hydrobrake or a similar control system to the minimum possible flow rate which is less than greenfield runoff rates (QBAR) prior discharging to the watercourse.

Peak flow rates from the proposed development for each storm:

1 in 1 year return period (100% AEP):	1.2 l/s
1 in 30 years return period (3.3% AEP):	1.4 l/s
1 in 100 years return period (1% AEP):	1.6 l/s
1 in 100 years return period (1% AEP) plus 40% climate change:	1.9 l/s

3.5 Volume control

The volumes required to attenuate the surface water runoff generated by the Proposed Development taking into account the proposed discharge rates from the site can be seen in the drainage strategy drawings in Appendix C. Full Microdrainage calculations for the proposed drainage strategy are provided in the drainage calculation pack in Appendix D.

3.6 Flood risk within the development

The system is designed in accordance with CIRIA SuDS manual with no flooding in all storms up to the 100-year storm with no flooding in the 1% AEP plus 40% climate change critical storm event.

3.7 Exceedance Events

In storm events exceeding the designed storm events above the 1% AEP plus 40% climate change the flow of water would run towards the north east of the development via the proposed road layout, this flow path is as per current conditions, as shown in the drainage drawings in Appendix C.

3.8 Structural integrity and construction

Surface system will be designed and constructed using approved materials in line with Building Regulation's and current British Standards appropriate for the location and proposed use.

3.9 Maintenance and operation

The drainage system will be CCTV surveyed on completion to ensure that the system is fully operational and maintenance schedules provided in the O&M manual for the owner to maintain the drainage pipework, permeable paving, bioretention areas, flow controls and attenuation tanks.

The adopted highway drainage will be maintained by the local Highway Authority, and the adopted sewer system will be maintained by Southern Water.

The private car parking areas and porous hardstanding areas have been designed with collector pipes within the porous sub-base will access chambers at either end to allow the system to be cleaned. A maintenance schedule for the porous paving has been included in Appendix E.

The cellular tanks have been located with adequate access to clean and inspect the tank in line with the maintenance schedule in Appendix E.

Maintenance schedules have been provided in Appendix E for the SuDS. The owner of the site will be responsible for maintaining the private SuDS on site. The adoptable Highway and attenuation will be maintained by the Local Highway Authority, and the public sewers maintained by Southern Water.

3.10 Existing and Proposed Foul Water

The existing foul drainage from the demolished school would have discharged into the public foul sewer running along the southern boundary.

Proposed foul water drainage from the development will be collected via gravity and discharged into a new public foul sewer offered for S104 adoption which will discharge into the public foul sewer to the south of the site via S106 connections to the Southern Water sewer.

4.0 Water Quality Management

The surface system will be designed, in order to not affect the water quality of the receiving watercourse.

CIRIA SuDS Manual 2015 Chapter 26 assigns pollution hazard indices for different land use types and SuDS mitigation index for every SuDS component depending on where the discharge is, surface or ground water.

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.3 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	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	High	0.9 ^a	0.8 ^a	0.9 ^a

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface water

Type of SuDS component	Mitigation indices ^a		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ^a	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.6	0.6	0.6
Permeable pavement	0.7	0.6	0.7
Detention basin	0.6	0.5	0.6
Pond ^a	0.7 ^a	0.7	0.5
Wetland	0.8 ^a	0.8	0.8
Proprietary treatment systems ^{a,b}	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 in the contributing drainage area		

CIRIA SuDS Manual states that 'To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index that equals or exceeds the pollution hazard index'

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

Pollution hazard indices for land use are as follows:

Roof (Residential):	TSS 0.2	Metals 0.2	Hydrocarbons 0.05
Car park:	TSS 0.7	Metals 0.6	Hydrocarbons 0.7

SuDS mitigation indices are determined by the type of SuDS utilised on site. The proposals for this site are permeable paving and swales, therefore the following indices have been used:

Permeable Paving	TSS 0.7	Metals 0.6	Hydrocarbons 0.7
Bio retention	TSS 0.8	Metals 0.8	Hydrocarbons 0.8

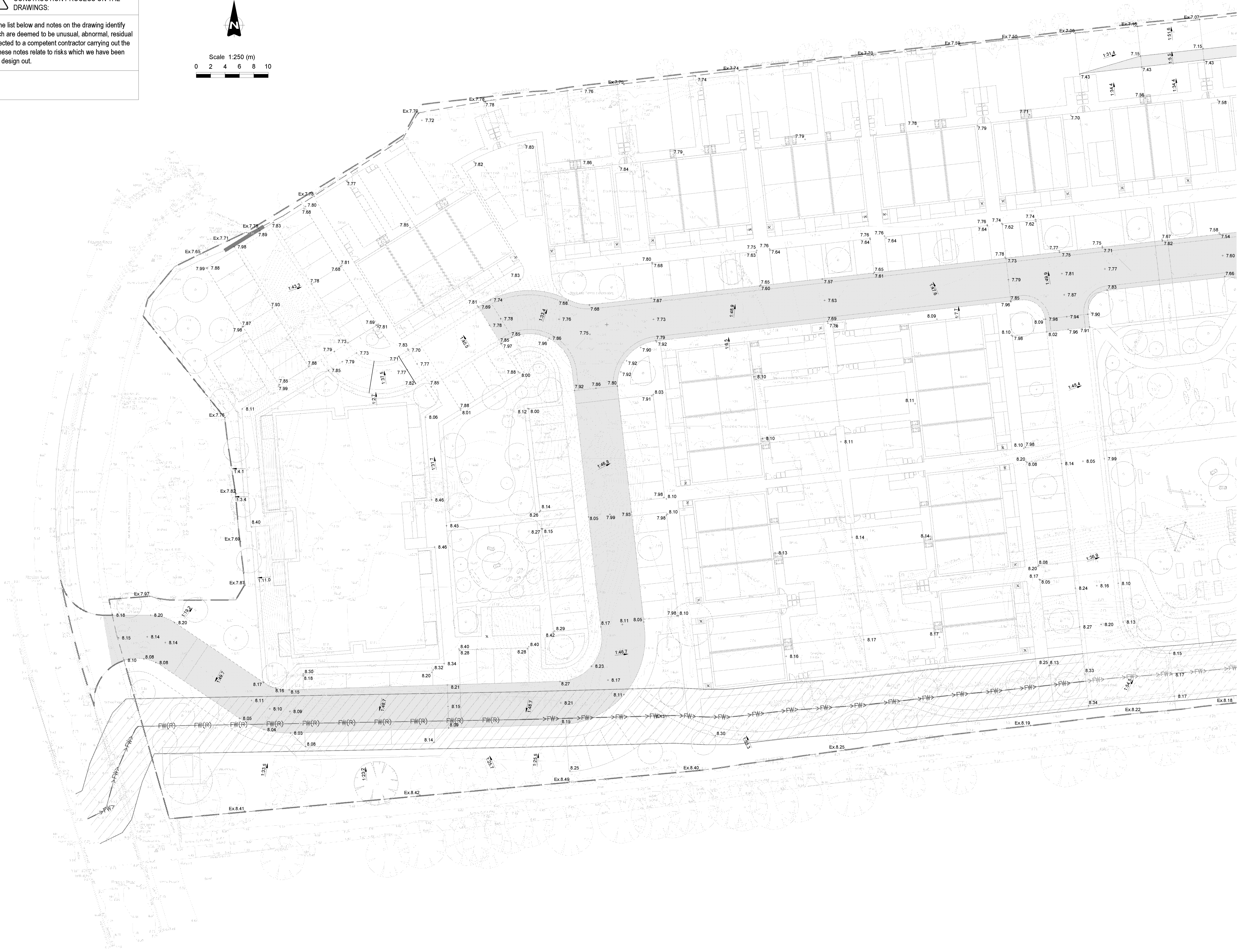
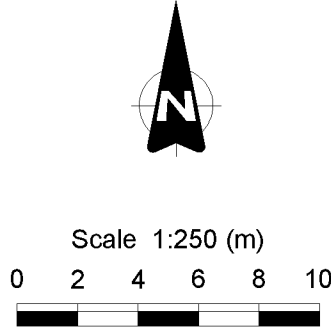
Catchpit manholes and chambers will be installed upstream and downstream of the surface water network providing additional treatment for the surface water drained from the impermeable areas, which will improve the water quality further.

Appendix A

Proposed Masterplan

IDENTIFIES RISKS DURING THE CONSTRUCTION PROCESS ON THE DRAWINGS:

NOTE: The list below and notes on the drawing identify risks which are deemed to be unusual, abnormal, residual or unexpected to a competent contractor carrying out the works. These notes relate to risks which we have been unable to design out.



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GENERAL NOTES

1. All setting out to be in accordance with the Architects drawings. Any discrepancies between the Engineers and the Architects drawings to be referred to the Architect before proceeding. Dimensions must not be scaled.

KEY

- 8.05

Ex 7.51
- Proposed retaining wall

Proposed Level

Existing Level

Area designated as Public Road

Area designated as Private Road

Proposed bank in the back gardens

P04	Updated for planning	RG	GT	08.03.21
P03	Issue for planning	RG	GT	02.03.21
P02	Levels updated	RG	GT	23.02.21
P01	Issue for information	RG	GT	10.02.21

Rev.	Amendment	Dim	Chkd	Date
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Dwg Status	PRELIMINARY	Suitability	S1
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Client **Boklok**

Project **Land South of Littlehampton Academy**

Title **Proposed Levels Sheet 01**

Reviewed Scheme	GT	Date	10.02.21
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Reviewed Final		Date	
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Scales at A1	1:250	Project No.	S208134
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Project Ref.	Originator	Zone	Level	Type	Rate	Dwg No.	Rev.
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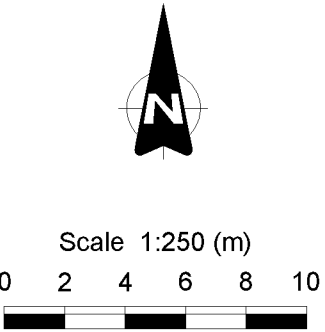
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1. All setting out to be in accordance with the Architects drawings. Any discrepancies between the Engineers and the Architects drawings to be referred to the Architect before proceeding. Dimensions must not be scaled.



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Existing Level

Area designated as Public Road

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P01	Issue for information	RG	GT	10.02.21

Rev.	Amendment	Dm	Chkd	Date
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Dwg Status	PRELIMINARY	Suitability	S1
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☐ Southampton
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Client **Boklok**

Project **Land South of Littlehampton Academy**

Title **Proposed Levels Sheet 02**

Reviewed Scheme	GT	Date	10.02.21
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Reviewed Final		Date	
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Scales at A1	1:250	Project No.	S208134
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Project Ref.	Originator	Zone	Level	Type	Rate	Dwg No.	Rev.
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LLA AKSW XX XX DR C 9221 - P04

Appendix B

Existing Greenfield Runoff Rates & Site Investigation

AKSWard Ltd		Page 1
Seacourt Tower West Way Oxford OX2 0JJ	S208134 Land South of Littlehampton Greenfield Runoff Rates	
Date 8/2/2021 File	Designed by Georgios Roinas Checked by Graham Taylor	
Micro Drainage		Source Control 2020.1

ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 711 Urban 0.000
Area (ha) 1.335 Soil 0.350 Region Number Region 7

Results 1/s

QBAR Rural 3.5
QBAR Urban 3.5

Q100 years 11.0

Q1 year 2.9
Q30 years 7.8
Q100 years 11.0

Katherine Child

BoKlok Housing Ltd
Maple Cross House
Denham Way,
Maple Cross,
Rickmansworth,
WD3 9SW

23rd February 2021

Our ref RB/21/LP2466soakage

Dear Katherine,

Re: Land West of Elmgrove Road, Littlehampton, BN17 6LT

1. Introduction

Further to our site investigation report, ref. LP2265 dated July 2020 to which the reader is referred, LEAP has been instructed by Katherine Child of BoKlok Housing Ltd in a meeting dated 16th February 2021 to update the findings of the report with specific regard to the feasibility of a sustainable drainage system (SUDS) at the above site.

Subsequent to the Phase II investigation in Summer 2020, a number of additional studies have been undertaken which have been used to further inform the recommendations made herein. These are as follows, with relevant information from each appended to this letter report:

- Addendum letter report for CBR testing by LEAP 8th September 2020, ref MW/20/LP2265.
- Additional boreholes and monitoring, Wilson Bailey, dated January 2021, ref I5734
- Additional test pitting for detailed made ground and superficial soil classification by LEAP, February 2021.

2. Phase II Investigation findings

As part of the Phase II investigations in Summer 2020, a total of 17 trial holes were excavated across the site, comprising 12No. machine excavated test pits to depths up to 3m bgl, and 5No. windowless sampler boreholes to depths up to 6m bgl. The locations of the holes were specified by the client, with some flexibility to take account of existing stockpiles and services on site. As such, coverage was biased towards the central, northern and eastern portions of the site.

The ground conditions (outside of stockpile areas) were summarised as follows:

Depth From (m)	Depth To (m)	Soil Type	Description
0.0	0.30 / 0.40	TOPSOIL	Light brown to light orangish brown locally reworked slightly gravelly silty clayey TOPSOIL Gravel is fine to sized rounded flint and occasional brick, chalk, mortar and concrete.
0.0	0.25 / 0.50	MADE GROUND (non-stockpile areas)	Light brown to orangish brown sandy gravelly clayey MADE GROUND. Gravels of brick, concrete, asphalt, sub angular to sub rounded flint. Wire noted in TPI. Black ashy gravelly fill noted in TP2, possible remnant blacktop surface. TPI-TP3, TP5, WS1A-C, WS2-WS5
0.25/0.5	1.1/3.0	CLAY	Stiff to firm brown becoming orangish brown CLAY and pale brown becoming orange brown gravelly sandy CLAY occasionally mottled orange. Gravel is fine to coarse sub angular to sub rounded flint. Sand is fine to medium grained.
1.1/1.8	2.35/4.10	SAND	Medium dense orange brown to orange or yellowish orange slightly clayey gravelly SAND. Sand is fine to coarse grained. Gravel is fine to coarse sub rounded to sub angular flint.
2.4/2.7	4.10/>6.0	CHALK	Soft off white mottled pale orange gravelly SILT or silty GRAVEL (structureless CHALK HEAD) WS2-WS5
4.10/5.00	>6.0	CHALK	Off white low density CHALK recovered as silty chalk gravel. Gravel is fine to coarse low to medium density chalk and occasional coarse flint. WS3 and WS4

In general, the topsoil and made ground was found to be underlain everywhere by a mantle of firm to stiff orange brown CLAY becoming sandy and gravelly with depth. The CLAY was underlain by a clayey gravelly SAND from depths of around 1-2m, itself underlain by chalk from around 4-5m bgl. Groundwater was encountered as a strike in the chalk in WS3 at 5m bgl, with levels recorded between 5.3m and 5.4m bgl in monitoring visits in June and July (all other shallower wells being dry during drilling and monitoring). The clays were classified as being of low to intermediate plasticity.

A single soakage test was carried out in TPI (centre south of site) at a test depth of 1.4m to 2m below ground level which was entirely within the sands. The test was not compliant with BRE 365 (in that it failed to drain to 75% empty within the test time) and returned a relatively poor rate of soakage ($3.88 \times 10^{-6} \text{m/s}$).

The report concluded that, although improved rates may be achievable in the chalk at depth, the sands were not considered suitable for effective soakaway drainage. Furthermore, noting the depth to groundwater and risk of solution features the use of deeper drainage would be limited by the requirement for regulatory approval and the need to keep drainage structures at least 20m distant from proposed or existing buildings.

3. Recent Investigations

Subsequent to the phase II investigation, further test pits and boreholes have been excavated on site, and the locations and results of these are attached to this letter. In summary, the findings corroborate those of the Phase II investigation. The near surface soils have been assessed much more extensively, in a series of 36 test pits see Fig I attached. The soils encountered were found to conform to the previous findings, with the exception of some areas of locally deeper made ground (up to 2.15m bgl) – possibly related to removal of old foundations. The made ground in the majority of locations was found to be underlain by clay as before.

2 No. boreholes were drilled by Wilson Bailey to depths of 5-6m, with groundwater monitoring installations to the base of the boreholes. At the time of writing, five monitoring visits have been carried out since December 2020 to include three LEAP wells (WS2-4) and the two deeper wells (BH7&8), with standing water levels identified at depths of around 4.3 to 5.8m below ground level in the deeper wells. The locations of the monitoring wells, borehole logs and results of the monitoring are attached to this letter.

4. Recommendations for soakaway drainage

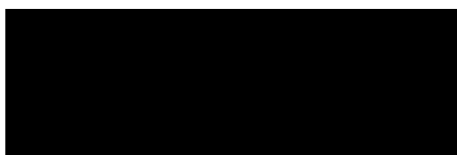
In order to provide an unsaturated zone, the groundwater monitoring to date suggests that it would be necessary to limit the depth of any soakaways to a maximum of around 3 to 3.5m below ground level. This would mean that, depending on the final location, they would predominantly discharge into the sands. These soils have been shown in the Phase II investigation to provide poor soakage rates. Furthermore, given the potential for the presence of solution features on site, as previously indicated, soakaways would need to be kept remote from structures, which would severely limit their extent and frequency.

The confirmed presence of made ground and clay soils across the site, typically to depths of around 1.5m, locally deeper, precludes the use of SUDs systems such as permeable paving due to the excessive depths required to consistently penetrate permeable strata.

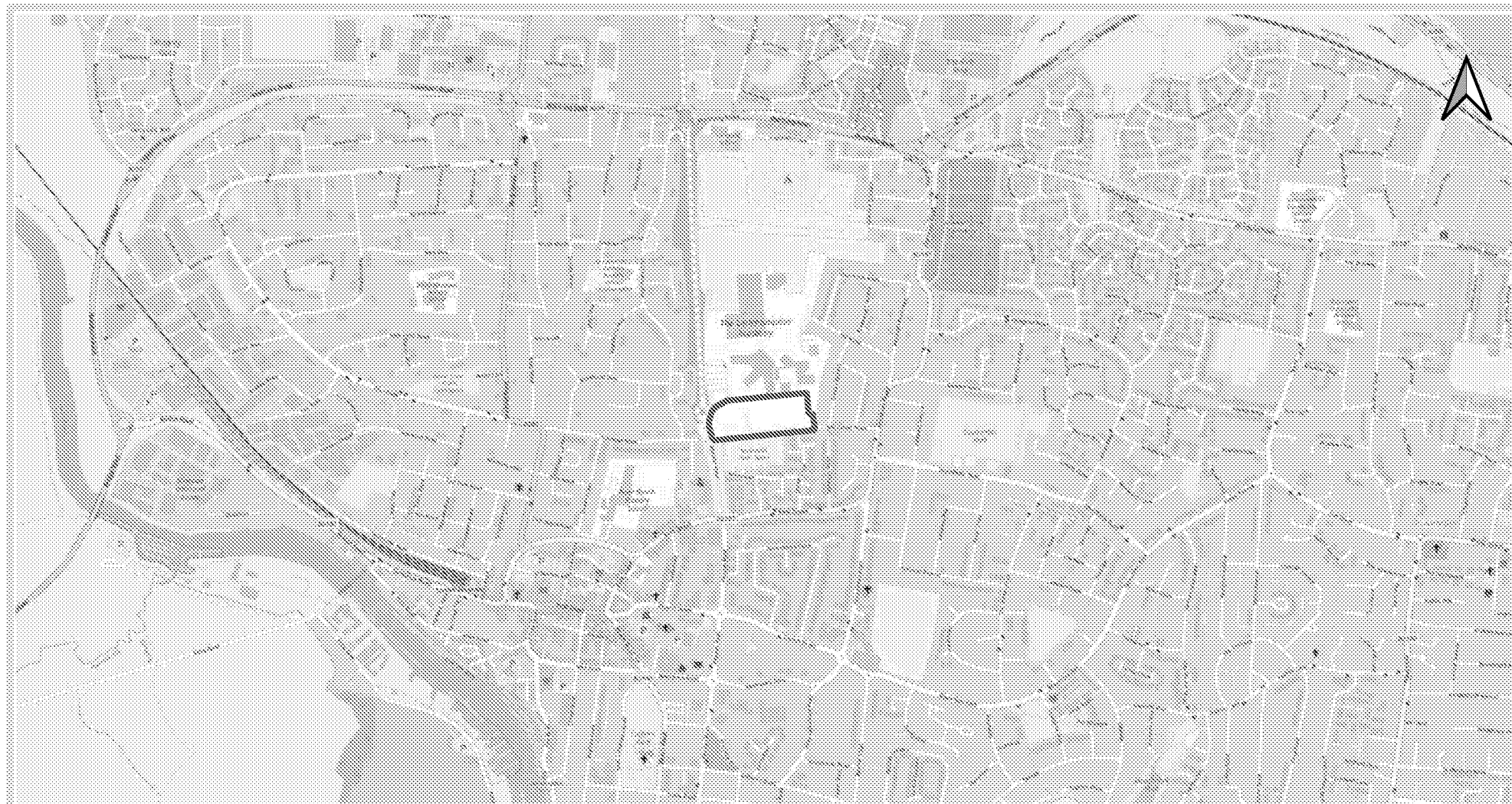
Therefore, as per the previous recommendations in the Phase II report, if the requirement for an unsaturated zone is maintained, it is concluded that the site is not suitable for soakaway drainage and allowance should be made for surface water to be piped off site.

Please do not hesitate to contact the undersigned if you need any further clarification.

Yours faithfully,



Richard Brinkworth BEng CEng MICE



Basemap: © OpenStreetMapcontributors

 Site boundary



Client: BoKlok Housing Ltd

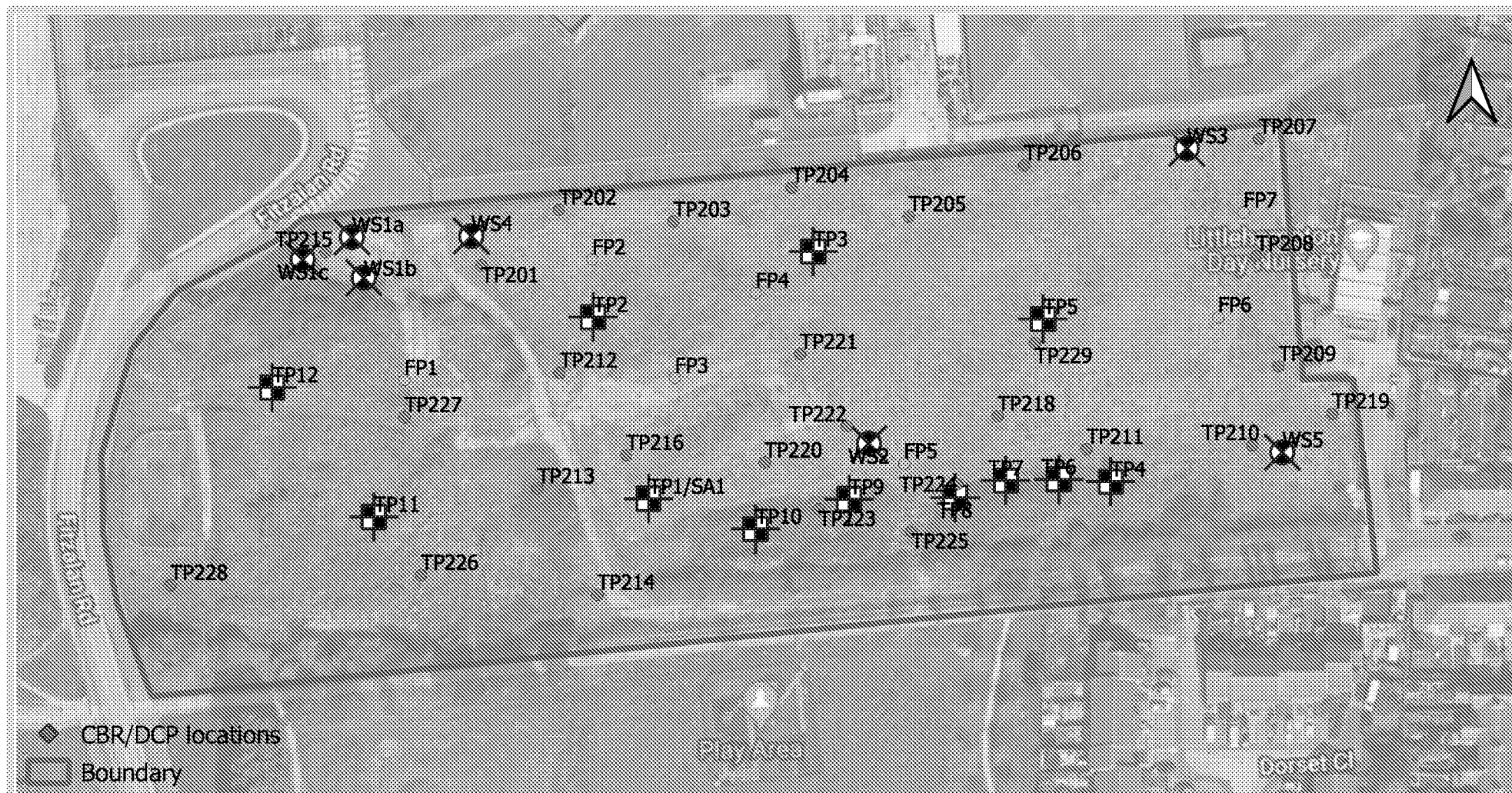
Title: Site Location Plan

Project ID: LP2466

Project: Land off Elmgrove Road, Littlehampton

Date: 03/02/21

Figure No. 1



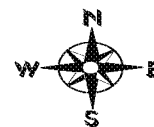
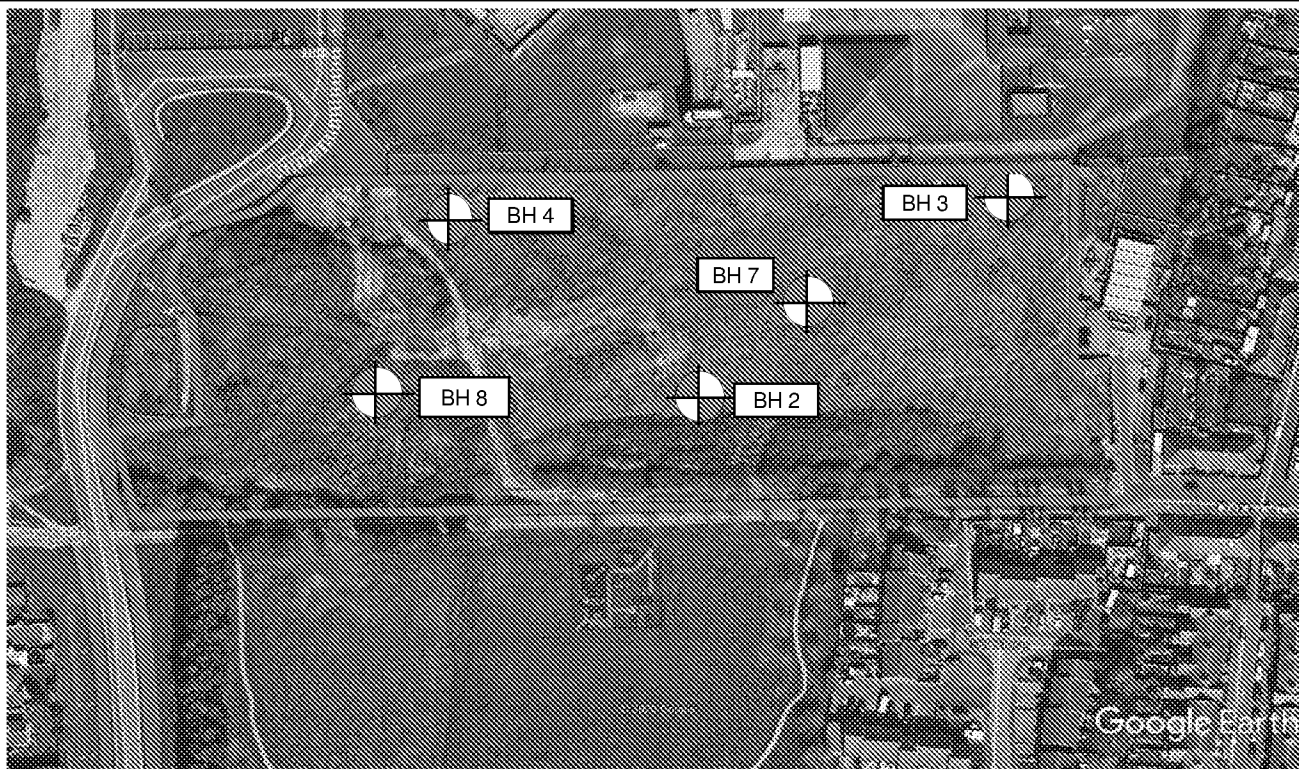
Note 1: Exploratory holes have been positioned by handheld GPS survey and should therefore only be taken as approximate
 Note 2: Exploratory holes shown are not to scale
 Note 3: Elevations not shown



Client:	BoKlok Housing Ltd	Title:	SI Locations	Project ID:	LP2466
Project:	Land off Elmgrove Road, Littlehampton	Date:	15/02/21	Figure No.	02

Site BoKlok Littlehampton Development site, Littlehampton

Client BoKlok Housing Ltd



	Boreholes installed previously by others			New boreholes installed by Wilson Bailey	
	BH 2	BH 3	BH 4	BH 7	BH 8
21 December 2020	dry at 3m	4.35	dry at 3m	--	--
08 January 2021	dry at 3m	4.30	dry at 3m	--	--
18 January 2021	dry at 3m	4.40	dry at 3m	4.80	5.84
01 February 2021	dry at 3m	4.41	dry at 3m	4.78	5.84
16 February 2021	dry at 3m	4.40	dry at 3m	4.76	5.83
depth to groudwater in metres below ground level					

 WILSON BAILEY GEOTECHNICAL & ENVIROMENTAL						Site Former Littlehampton Academy site		Number BH-07	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD) 9.50		Client BokLok Housing Limited		Job Number 15734	
		Location 503331 E 102638 N		Dates 08/01/2021-01/02/2021		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.20-0.30	EBH7-1	0.00	1,1/2,2,2,2	<					

 WILSON BAILEY GEOTECHNICAL & ENVIROMENTAL						Site Former Littlehampton Academy site		Number BH-08	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD) 10.00		Client BokLok Housing Limited		Job Number 15734	
		Location 503246 E 102598 N		Dates 08/01/2021-01/02/2021		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.05-0.15	EBH08-			9.85	(0.15)	MADE GROUND: Dark brown organic slightly sandy CLAY (topsoil) with abundant rootlets and rare fine gravel.			
0.20-0.40	DBH08-				(1.15)	MADE GROUND: Dark orange-brown sandy gravelly CLAY. sand is orange-brown, medium to coarse. Gravel is flint, brick, concrete and asphalt fragments. exhibits some brown staining in the more clay rich areas.			
1.00-1.45	SPT(C) N=10	0.00	1,1/2,2,3,3	8.70	1.30	Orange-brown slightly gravelly sandy CLAY. sand is medium, gravel is fine to coarse sub angular to sub rounded flints and chalk.			
1.10-1.20	EBH08-				(1.40)				
1.70-1.80	DBH08-	0.00	1,2/3,2,2,3	7.30	2.70	Stiff light orange-brown slightly sandy slightly gravelly CLAY.			
2.00-2.45	SPT(C) N=10				(1.60)				
2.80-2.90	DBH08-	0.00	3,3/5,5,6,7		4.30	Light orange-brown sandy CLAY with rare chalk gravel.			
3.00-3.45	SPT(C) N=23				(0.90)				
4.00-4.45	SPT(C) N=22	0.00	5,4/6,5,5,6	5.70	4.30	Structureless cream CHALK consisting of chalk gravel in a marly chalk matrix.			
4.60-4.70	DBH08-				(0.80)				
5.00-5.45	SPT(C) N=36	0.00	3,4/9,10,8,9	4.80	5.20	Complete at 6.00m			
5.60-6.00	DBH08-								
6.00-6.45	SPT(C) N=32	0.00	7,5/8,9,8,7	4.00	6.00				
Remarks Groundwater not encountered during drilling. Groundwater monitoring standpipe installed with a response one from 1.50 m to 5.00 m below ground level.							Scale (approx) 1:50	Logged By	
							Figure No. 15734.BH-08		

Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA Trial Pit Log Trialpit No FP4 Sheet 1 of 1							
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring		Project No. LP2466		Co-ords: - Level:		Date 11/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH				Dimensions (m): Depth 1.40		Scale 1:25 Logged KT	
Client: BoKlok Housing Ltd.							

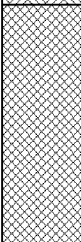
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20			Grass over brown silty slightly sandy slightly clayey TOPSOIL with frequent rootlets.	
							Reddish brown clayey slightly sandy slightly gravelly MADE GROUND. Gravel is fine to cobble-sized brick, fine to coarse sub-rounded concrete, and fine to medium sub-angular to angular flint.	1
				1.10			Firm reddish brown slightly sandy CLAY.	
				1.40			Hand Pen at 1.2m = 150kPa	
			N=15				End of pit at 1.40 m	2
								3
								4
								5

Remarks: Trial pit remained dry and stable.	
Stability: Stable	

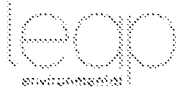
Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA				Trial Pit Log				Trialpit No FP5 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 10/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 2.10		Scale 1:25	
Client: BoKlok Housing Ltd.								Logged KT	

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.05	ES	N=14	0.60	1.70	2.10	Brown silty sandy gravelly slightly clayey MADE GROUND. Gravel is fine to cobble-sized brick and occasional medium clinker.	1
	0.50	ES					Firm reddish brown slightly sandy CLAY	
	1.10	D					Possible horizontal shear surface at 1.2m	
							Medium dense reddish brown gravelly SAND. Gravel is fine to cobble-sized angular to sub-rounded flint.	2
							End of pit at 2.10 m	3
								4
								5

Remarks: Trial pit remained dry and stable.	
Stability: Stable	

 Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA				Trial Pit Log				Trialpit No FP6 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 11/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 1.75		Scale 1:25 Logged KT	
Client: BoKlok Housing Ltd.									
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				0.10		 Grass over brown silty clayey TOPSOIL with rootlets.			
					 Brown clayey gravelly slightly sandy MADE GROUND. Gravel is fine to cobble-sized brick, fine to cobble-sized sub-rounded to sub-angular concrete, rare coarse angular slate fragments, and rare plastic tape. <u>Boulder-sized brick wall fragment present within made ground</u>				
				0.90		 Firm reddish brown slightly sandy CLAY. <u>Hand Pen at 1m = 180kPa</u>			
				1.10		 Medium dense reddish brown coarse SAND.			
				1.75		End of pit at 1.75 m			
Remarks: Trial pit remained dry and stable.									
Stability: Stable									



 Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA Tel: 01323 816518				Trial Pit Log				Trialpit No FP7 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 11/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 1.90		Scale 1:25	
Client: BoKlok Housing Ltd.								Logged KT	

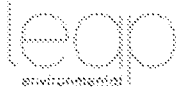
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.10			Grass over dark brown silty sandy slightly clayey TOPSOIL with rootlets.	
	0.40	ES					Brown clayey slightly sandy slightly gravelly MADE GROUND. Gravel is medium to cobble-sized brick, occasional fine to medium sub-rounded blacktop, and fine to coarse sub-rounded to angular flint.	
				0.73			Medium dense reddish brown medium to coarse slightly gravelly SAND. Gravel is fine sub-rounded to angular flint.	1
				1.70			Medium dense reddish brown gravelly coarse SAND. Gravel is fine to coarse rounded to angular flint.	
				1.90		End of pit at 1.90 m		2
								3
								4
								5

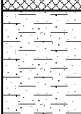
Remarks: Trial pit remained dry and stable.		
Stability: Stable		

Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA 				Trial Pit Log				Trialpit No TP201 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 10/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 1.05		Scale 1:25	
Client: BoKlok Housing Ltd.								Logged KT	

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.05	ES	N=15				Grass over brown sandy silty slightly clayey MADE GROUND. Gravel is fine to cobble-sized brick, fine to coarse sub-rounded concrete and fine to coarse angular to sub-angular flint.	
	0.30	ES		0.60				
	1.05	ES		1.05			Hand Pen at 1.05m = 120kPa End of pit at 1.05 m	
								2
								3
								4
								5

Remarks: Trial pit remained dry and stable.		
Stability: Stable		

 Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA				Trial Pit Log				Trialpit No TP202 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 10/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m):		Scale 1:25	
Client: BoKlok Housing Ltd.						Depth 0.80		Logged KT	

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.10	ES	N=11	0.15			Grass over dark brown sandy silty TOPSOIL with rootlets
	0.30	ES		0.40			Brown sandy clayey slightly gravelly MADE GROUND. Gravel is fine to cobble-sized brick, rare fine angular flint, and rare fine sub-rounded chalk.
							Stiff reddish brown slightly sandy CLAY.
				0.80			Hand Pen at 0.8m = 250kPa End of pit at 0.80 m

1

2

3

4

5

Remarks: Trial pit remained dry and stable.							
Stability: Stable							



Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA				Trial Pit Log				Trialpit No TP203 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 10/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 1.10		Scale 1:25	
Client: BoKlok Housing Ltd.								Logged ADC	

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES	N=21	0.20			Grass over orange brown reworked sandy clayey TOPSOIL with brick and blacktop	1
	0.40	ES					Brown REWORKED silty clay with occasional brick	
				0.60			Orange brown clayey slightly gravelly SAND. Gravel is occasional fine to medium rounded flint.	
				1.10		End of pit at 1.10 m		2
								3
								4
								5

Remarks: Trial pit remained dry and stable.	
Stability: Stable	

Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA				Trial Pit Log				Trialpit No TP204 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 10/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 1.00		Scale 1:25	
Client: BoKlok Housing Ltd.								Logged KT	

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.15	ES		0.10			Grass over brown silty slightly clayey TOPSOIL.	
				0.18			BLACKTOP	
	0.30	ES		0.27			Brown silty clayey gravelly MADE GROUND. Gravel is fine to medium sub-rounded brick, fine to coarse sub-rounded concrete, and fine to medium sub-angular flint.	
	0.40	ES					Firm reddish brown slightly sandy CLAY.	
			N=10	1.00			Hand Pen at 1m = 145kPa	1
							End of pit at 1.00 m	2
								3
								4
								5

Remarks: Trial pit remained dry and stable.

Stability: Stable

Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA				Trial Pit Log				Trialpit No TP206 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 10/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 1.10		Scale 1:25 Logged KT	
Client: BoKlok Housing Ltd.									

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.05	ES	N=15	0.15		Grass over brown silty sandy slightly gravelly slightly clayey TOPSOIL with rootlets. Gravel is fine sub-rounded to rounded flint. Brown sandy clayey gravelly MADE GROUND. Gravel is fine to cobble-sized bricks, and fine to coarse sub-rounded to angular flint. Shingle comprising medium sub-angular to angular flint present from 0.3 to 0.45m on northern side of pit Firm reddish brown slightly sandy CLAY.	1
	0.30	ES		0.45			2
				1.10			3
							4
							5

Remarks: Trial pit remained dry and stable.

Stability: Stable

Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA 				Trial Pit Log				Trialpit No TP208 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 11/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 0.90		Scale 1:25 Logged KT	
Client: BoKlok Housing Ltd.									

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.15		Grass over dark brown sandy clayey slightly gravelly TOPSOIL with rootlets. Gravel is fine to medium sub-rounded to angular flint.	Brown clayey slightly sandy gravelly MADE GROUND. Gravel is fine to cobble-sized sub-rounded concrete, fine to cobble-sized sub-rounded to angular brick, occasional ceramic pipe fragments. <i>Boulder of concrete present within made ground.</i>	
	0.30	ES						
	0.50	ES						
				0.80		Medium dense reddish brown coarse SAND.		
				0.90		End of pit at 0.90 m		

Remarks: Trial pit remained dry and stable.

Stability: Stable

Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH41 4XA				Trial Pit Log				Trialpit No TP209 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 10/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 0.80		Scale 1:25	
Client: BoKlok Housing Ltd.								Logged KT	

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.05	ES	N=13	0.10			Grass over brown silty sandy slightly clayey TOPSOIL with rootlets. Reddish brown slightly sandy clayey slightly gravelly MADE GROUND. Gravel is fine to cobble-sized brick, fine to cobble-sized concrete, and fine to coarse sub-rounded to angular flint. <i>Boulder of concrete present within made ground.</i> Firm reddish brown slightly sandy gravelly CLAY. <i>Clay becomes sandier with depth</i> <i>Hand Pen at 0.8m = 140kPa</i> End of pit at 0.80 m	1
	0.40	ES		0.60			2	
				0.80			3	
							4	
						5		

Remarks: Trial pit remained dry and stable.

Stability: Stable

Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA 				Trial Pit Log				Trialpit No TP210 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 11/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 0.80		Scale 1:25	
Client: BoKlok Housing Ltd.								Logged KT	
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.10	ES	N=17	0.15			Grass over dark brown silty sandy slightly clayey TOPSOIL with occasional rootlets.		
	0.30	ES				Reddish brown clayey slightly sandy slightly gravelly MADE GROUND. Gravel is rare ceramic pipe fragments, and occasional medium to coarse sub-angular to sub-rounded flint.			
				0.60			Stiff reddish brown slightly sandy CLAY.		
				0.80			Hand Pen at 0.8m = 240kPa End of pit at 0.80 m		
Remarks: Trial pit remained dry and stable.									
Stability: Stable									

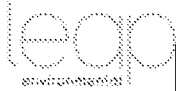
Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH41 1XA				Trial Pit Log				Trialpit No TP212 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 11/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 0.75		Scale 1:25	
Client: BoKlok Housing Ltd.								Logged KT	

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.05	ES		0.10 0.60 0.75			Grass over brown silty clayey TOPSOIL with rootlets
	0.30	ES					Brown sandy gravelly clayey MADE GROUND. Gravel is fine to cobble-sized brick, fine to coarse sub-angular to angular flint, and fine to medium sub-rounded concrete.
							Stiff reddish brown slightly sandy CLAY.
							Hand Pen at 0.75m = 260kPa End of pit at 0.75 m

Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1YA www.leapenvironmental.com				Trial Pit Log				Trialpit No TP213 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 12/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 0.85		Scale 1:25	
Client: BoKlok Housing Ltd.								Logged KT	

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.05	ES	N=15				Brown silty sandy slightly gravelly MADE GROUND. Gravel is fine to coarse sub-rounded to sub-angular brick, and fine to medium sub-angular to angular flint.	1
	0.30	ES						
				0.65			Firm reddish brown sandy CLAY.	2
				0.85			Hand Pen at 0.85m = 160kPa End of pit at 0.85 m	
							4	
								5

Remarks: Trial pit remained dry and stable.		
Stability: Stable		

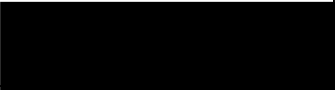
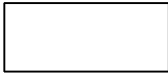
 Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA .com				Trial Pit Log			Trialpit No TP214 Sheet 1 of 1		
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 11/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 0.75		Scale 1:25 Logged KT	
Client: BoKlok Housing Ltd.									

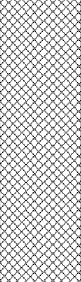
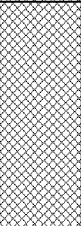
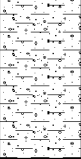
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.05	ES	N=11	0.20			Grass over dark brown silty sandy slightly clayey TOPSOIL with frequent roots and rootlets	1
	0.30	ES		0.35			Brown clayey slightly gravelly MADE GROUND. Gravel is rare fine sub-angular brick and rare fine angular flint	
							Stiff reddish brown slightly sandy CLAY.	
	0.75	ES		0.75			Hand Pen at 0.75m = 210kPa End of pit at 0.75 m	
								2
								3
								4
								5

Remarks: Trial pit remained dry and stable.



Stability: Stable

 Leap Environmental Ltd The Atrium, Curtis Road 		Trial Pit Log		Trialpit No TP218 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring		Project No. LP2466		Co-ords: - Level:	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH		Dimensions (m): Depth 2.70		Date 12/02/2021	
Client: BoKlok Housing Ltd.				Scale 1:25 Logged KT	

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.10	ES					Brown gravelly sandy silty MADE GROUND. Gravel is fine to cobble-sized sub-rounded to sub-angular bricks, fine to cobble-sized sub-rounded to sub-angular concrete, and fine to coarse angular to sub-rounded flint. <i>Rootlets present in made ground within top 0.1m</i>
	0.30	ES					
	1.50	ES		1.40			Reddish brown clayey slightly sandy gravelly MADE GROUND with frequent dark grey staining. Gravel is fine to medium sub-rounded to sub-angular brick, fine to coarse sub-rounded to angular flint, rare glass fragments, and rare plastic sheeting. <i>Fast seepage at 1.4m on northeast side of pit with minor collapse</i>
				2.15			
				2.70			Firm reddish brown mottled greenish brown very sandy slightly gravelly CLAY. Sand is coarse. Gravel is rare fine sub-angular flint. <i>Hand Pen at 2.6m = 140kPa</i>
End of pit at 2.70 m							

Remarks: Minor seepage was encountered at 1.4m on north east corner of pit, causing localised collapse within made ground. Water filled pit to 2.65m in 5 minutes.

Stability:



Leap Environmental Ltd The Atrium, Curtis Road 				Trial Pit Log				Trialpit No TP219 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 11/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 0.80		Scale 1:25 Logged KT	
Client: BoKlok Housing Ltd.									

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.05	ES	N=17	0.07			Grass over brown silty sandy slightly clayey TOPSOIL with rootlets.	
	0.30	ES					Brown clayey sandy slightly gravelly MADE GROUND. Gravel is fine to coarse blacktop fragments, fine to cobble-sized sub-rounded to angular brick, and fine to coarse sub-rounded to sub-angular flint.	
				0.64			Firm reddish brown very sandy CLAY.	
				0.80			Hand Pen at 0.8m = 100kPa End of pit at 0.80 m	

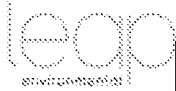
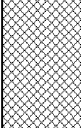
Remarks: Trial pit remained dry and stable.

Stability: Stable

Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH41 1YA				Trial Pit Log				Trialpit No TP220 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 11/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 1.00		Scale 1:25	
Client: BoKlok Housing Ltd.								Logged KT	

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES	N=14	0.10			Grass over brown silty sandy slightly clayey TOPSOIL with rootlets.	1
	0.30	ES					Brown sandy silty gravelly MADE GROUND. Gravel is fine to cobble-sized brick, fine to cobble-sized sub-rounded to angular flint, with occasional wood and glass fragments.	
				0.80				Stiff reddish brown slightly sandy CLAY.
				1.00		<i>Hand Pen at 1m = 250kPa</i> <i>End of pit at 1.00 m</i>		3
								4
								5

Remarks: Trial pit remained dry and stable.		
Stability: Stable		

 Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA				Trial Pit Log				Trialpit No TP222 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 11/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 1.00		Scale 1:25 Logged KT	
Client: BoKlok Housing Ltd.									
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.05	ES	N=13	0.10		 Grass over brown silty sandy slightly clayey TOPSOIL with rootlets.  Brown sandy clayey gravelly MADE GROUND. Gravel is fine to cobble-sized brick, coarse to cobble-sized blacktop fragments, medium to cobble sized concrete, and medium to coarse sub-rounded to angular flint. <u>Boulder of concrete present within made ground.</u>  Firm reddish brown slightly sandy CLAY. <u>Hand Pen at 1m = 150kPa</u> End of pit at 1.00 m			
	0.45	ES		0.80					
				1.00					
Remarks: Trial pit remained dry and stable.									
Stability: Stable									

Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA 				Trial Pit Log				Trialpit No TP223 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 10/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 2.30		Scale 1:25 Logged KT	
Client: BoKlok Housing Ltd.									

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES	N=15	0.10		 	Grass over brown silty slightly sandy TOPSOIL with abundant roots. Brown sandy silty gravelly slightly clayey MADE GROUND. Gravel is fine to coarse sub-angular brick, fine to medium angular flint, and occasional medium sub-rounded clinker. Firm reddish brown sandy CLAY.	
	0.60	ES		0.30				
	1.00	D		1.70				
	2.30	D		2.30				
							Medium dense reddish brown mottled greenish grey medium to coarse-grained SAND.	
							End of pit at 2.30 m	

Remarks: Trial pit remained dry and stable.

Stability: Stable

Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH41YA				Trial Pit Log				Trialpit No TP224 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 10/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 2.20		Scale 1:25	
Client: BoKlok Housing Ltd.								Logged ADC	

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES	N=24	0.70			Grass over brown silty clayey MADE GROUND with fragments of brick and pipe and darkly stained pockets with a slight odour noted.	1
	0.40	ES					Firm orangish brown sandy clay	
	1.00	D						
	2.20	D		2.20			Medium dense orange slightly silty slightly gravelly clayey SAND. Gravel is medium to coarse rounded flint.	2
							End of pit at 2.20 m	3
								4
								5

Remarks: Trial pit remained dry and stable.

Stability: Stable

Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA				Trial Pit Log				Trialpit No TP225 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 12/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 0.95		Scale 1:25	
Client: BoKlok Housing Ltd.								Logged KT	

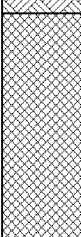
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.10	ES	N=14				Grass over brown sandy clayey slightly gravelly MADE GROUND. Gravel is rare fine to cobble-sized brick, medium sub-rounded concrete, and fine to coarse sub-angular to sub-rounded flint.		
	0.45	ES		0.40				Weathered BLACKTOP	
				0.50				Firm reddish brown sandy CLAY.	
				0.95			Hand Pen at 0.95m = 165kPa End of pit at 0.95 m	1 2 3 4 5	

Remarks: Trial pit remained dry and stable.	
Stability: Stable	

Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA				Trial Pit Log				Trialpit No TP226 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 10/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 2.50		Scale 1:25	
Client: BoKlok Housing Ltd.								Logged KT	

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES	N=13	0.10		Grass over dark brown silty sandy slightly clayey TOPSOIL with abundant rootlets. Brown silty slightly sandy slightly gravelly clayey MADE GROUND. Gravel is rare fine to coarse sub-rounded brick and rare fine to medium sub-rounded flint.	1	
	0.50	ES		0.45				Firm reddish brown slightly sandy CLAY with rare rootlets.
	1.10	D		1.50		Stiff reddish brown mottled greenish brown slightly sandy CLAY		
	2.00	D				Clay becomes sandier with depth		
	2.50	D		2.50		Hand Pen at 2.5m = 270kPa End of pit at 2.50 m		3
								4
								5

Remarks: Trial pit remained dry and stable.		
Stability: Stable		

 Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA				Trial Pit Log				Trialpit No TP228 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 10/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 6AH						Dimensions (m): Depth 2.30		Scale 1:25 Logged ADC	
Client: BoKlok Housing Ltd.									
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.15	ES	N=13	0.05		 Grass over brown clayey sandy TOPSOIL Brown REWORKED CLAY with fragments of wood, brick, and concrete.			
	0.35	ES							
	1.20	D		0.80					
	2.20	D		2.00		Medium dense orange brown very clayey SAND	2		
				2.30		End of pit at 2.30 m	3		
Remarks: Trial pit remained dry and stable.									
Stability: Stable									
									

ARUN DISTRICT COUNCIL LU/116/21/PL

Appendix C

Proposed Drainage Strategy

IDENTIFIES RISKS DURING THE CONSTRUCTION PROCESS ON THE DRAWINGS:

NOTE: The list below and notes on the drawing identify risks which are deemed to be unusual, abnormal, residual or unexpected to a competent contractor carrying out the works. These notes relate to risks which we have been unable to design out.

High Groundwater Level deems infiltration to the Chalk Layer not viable.
The site is classified as a Moderate risk of UXO.
Outfalls and design for the adopted surface water sewer network, the private sewer network and of the foul network are subject to negotiations with West Sussex Highways Agency and Southern Water.
A 525mm diameter Southern Water Foul Sewer is crossing the site.

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Do NOT scale from this drawing. AKSWard takes no responsibility for errors during photographic reproduction or printing. Any discrepancy's are to be reported to the engineer immediately.

GENERAL NOTES

1. All setting out to be in accordance with the Architects drawings. Any discrepancies between the Engineers and the Architects drawings to be referred to the Architect before proceeding. Dimensions must not be scaled.
2. All drainage to be installed in accordance with relevant Building Regulations documents and Current Services for Adoption where applicable.
3. Connections to Public sewers to be agreed and inspected by Water Authority.
4. Invert level, size and cover levels to existing manholes and sewers to be checked prior to any construction. Any discrepancies to be reported immediately.
5. Invert to base of soil stack bends to be 450mm below lowest branch connection for up to 3 storeys buildings. For buildings up to 5 storeys the invert to base of soil stack bends should be not less than 750mm.
6. All RWP and Foul Water drain point setting out is to be confirmed by Architect.
7. All RWP & SVP sizes & setting out by Architect / M&E Engineer. All below ground connections to match above ground outlet size, Min 100/110mm diameter.
8. Foul drains to project 100mm above finished floor level.
9. All internal Manholes and Inspection Chambers to have double sealed recessed covers to suit floor finishes by Architect.
10. All external covers in footpaths and roads in non tarmac areas to have recessed trays to suit the paving material.
11. Refer to drainage specification for pipe materials.
12. All pipework to be 100/110Ø UNO. Refer to note 7 connection sizes.
13. All foul and surface water drainage stacks to have above ground rodding access, refer to above ground drainage layout by others.
14. This drawing has been produced in colour and should be reproduced in colour for clarity.
15. A CCTV Survey and report in WINCAN format for all new drainage will be required before the 'As Built' drawings will be issued.

Key

Gully

Storm Rodding Point

Storm Polypropylene Inspection Chamber

Storm Concrete Manhole

Foul Polypropylene Inspection Chamber

Foul Concrete Manhole

New Private Foul Water Sewer

New Private Surface Water Sewer

New Highway Surface Water Sewer

New Adoptable Foul Water Sewer

Concrete Surround

New Surface Water Sewer, Perforated Pipe

Perforated pipe system

Area designated as Public Road

Area designated as Private Road

Proposed Permeable Paving (Tanked Sub-base)

Proposed Rain Garden

Existing Drainage

Existing Manholes

Existing Public Foul Water Sewer

Existing Surface Water Sewer

P03	Updated for planning	RG	GT	08.03.21
P02	Issue for planning	RG	GT	03.03.21
P01	Issue for information	RG	GR	05.02.21
Rev.	Amendment	Dm	Chkd	Date

Dwg Status: **PRELIMINARY** Suitability: **S1**

AKSWard

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e-mail: oxford@aksward.com
web: www.aksward.com

Client: **Boklok**

Project: **Land South of Littlehampton Academy**

Title: **Draft Drainage Layout Sheet 01**

Reviewed Scheme: CR Date: 05.02.21

Reviewed Final: Date:

Scales at A1: 1:250 Project No: **S208134**

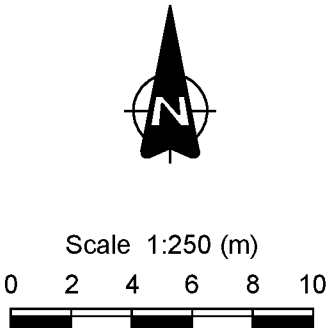
Project Ref. Originator Zone Level Type Role Drg No. Rev.

LLA AKSW XX XX DR C 9201 - P03

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A 525mm diameter Southern Water Foul Sewer is crossing the site.



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- Connections to Public sewers to be agreed and inspected by Water Authority.
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Key

- Gully
- Storm Rodding Point
- Storm Polypropylene Inspection Chamber
- Storm Concrete Manhole
- Foul Polypropylene Inspection Chamber
- Foul Concrete Manhole
- New Private Foul Water Sewer
- New Private Surface Water Sewer
- New Highway Surface Water Sewer
- New Adoptable Foul Water Sewer
- Concrete Surround
- New Surface Water Sewer, Perforated Pipe
- Perforated pipe system
- Area designated as Public Road
- Area designated as Private Road
- Proposed Permeable Paving (Tanked Sub-base)
- Proposed Rain Garden
- Existing Drainage
- Existing Manholes
- Existing Public Foul Water Sewer
- Existing Surface Water Sewer

P03	Updated for planning	RG	GT	08.03.21
P02	Issue for planning	RG	GT	03.03.21
P01	Issue for information	RG	GR	05.02.21
Rev.	Amendment	Dm	Chkd	Date

Dwg Status

PRELIMINARY

Suitability

S1

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Client

Boklok

Project

Land South of Littlehampton Academy

Title

Draft Drainage Layout Sheet 02

Reviewed Scheme

CR

Date

05.02.21

Reviewed Final

Date

Scales at A1

1:250

Project No.

S208134

Project Ref.

Originator

Zone

Level

Type

Rate

Dwg No.

Rev.

LLA AKSW XX XX DR C 9202 - P03

