

Dylan May

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United Kingdom



10th March 2021

Our ref. KT/21/LP2466v2

Re: LP2466 Elmgrove Road Additional Investigation and Testing

Dear Dylan,

1 Introduction

Leap Environmental Ltd (hereafter referred to as **LEAP**) has been appointed by BoKlok Housing Ltd to undertake an additional investigation and testing of the ground at land off Elmgrove Road, Littlehampton, BN17 6AH.

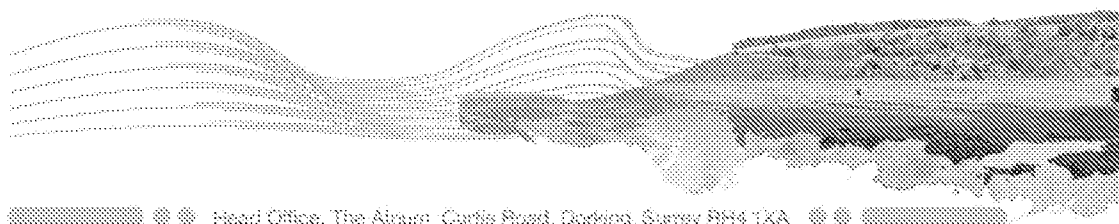
The proposed development comprises 80 No. modular residential dwellings and an apartment block consisting of 32 No. residential units. Residential houses include private rear gardens and there are two areas of public open space, one adjacent to the apartments (POS1) and one in the centre of the site (POS2). The development layout is shown in drawing ref LTH-ECE-ZZ-ZZ-SK-A-SL-5000 Rev P09, Appendix B.

We understand that as part of the groundworks phase the existing stockpiles will be removed from site, and a site wide soil strip to 0.20 m below existing ground level will be undertaken to formation level.

The purposes of the investigation are to:

- Ascertain the vertical and lateral extent of PAH contamination previously identified in the soils, in particular to assess areas of PAH contamination at formation level following the site wide strip to 0.20 m;
- Undertake further ground gas monitoring and provide an updated gas risk assessment;
- Assess whether any foundations from the previous onsite structures remain within the ground;
- Confirm the geotechnical properties of the ground in the vicinity of the stockpiles;
- Further assess the bearing capacity of the underlying soils.

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The site comprises an approximately rectangular shaped plot of land located to the west of Elmgrove Road and to the south of the Littlehampton Academy. The site covers an area of approximately 2.56Ha.

A concrete surfaced access road is present along the eastern half of the southern boundary. A line of trees to the south of the road were in the process of being removed at the time of this phase of investigation.

A large stockpile ~100 m long by ~25 m wide and ~2.0 m high, is present north of, and parallel to, the access road. The stockpile is covered by scrub vegetation and high grass. 6No. trial pits were undertaken into the northern side of this stockpile during LEAP's previous investigation, revealing the composition in the excavated areas to be made ground comprising slightly sandy clayey gravel. The gravel included flint, chalk, brick, and concrete, with rare tile and plastic fragments.

The western quadrant of the site is predominantly occupied by a large stockpile that is also covered by grass and scrub vegetation. The approximate dimensions of the western stockpile are ~83 m long by ~55 m wide and ~3.50 m high in places. 2No. trial pits were undertaken into this stockpile during LEAP's previous investigation. Ground conditions in the excavated areas comprised varying mixtures of clay, sand, and gravel. The gravel comprised flint, brick, and concrete, with rare asphalt, wood, tile, rubber seals, and plastic fragments. Organic odours were noted occasionally.

There is an area of open land ~20 m wide west of the western stockpile. Along the western fence line there was an area of low-lying ground ~350m² in area, which is understood to be a drainage structure for Fitzalan Road to the west with borehole soakaways in the base. This was dry at the time of the walkover and the base and sides were covered with semi-mature trees, grass and scrub vegetation. An asphalt covered track was observed adjacent to the east of the western stockpile, aligned north to south and connects the southern access road to a small area of asphalt covered hardstanding in the northwest.

The remainder of the site is a largely level, but not flat, scrub covered open field. There is a slight downwards incline from west to east and south to north (excluding the stockpiles). Locally there are smaller mounds of grass covered brick and concrete rubble in the central section of the site, and low-level demolition waste (brick, concrete, asphalt gravel) is visible at surface in many areas.

The site is bounded by the Littlehampton Academy to the north, a children's nursery to the east, an area of public open space (Rosemead Park) to the south, and additional residential properties to the southeast. Fitzalan Road bounds the site to the west beyond which are residential properties.

2 Summary of Previous Investigation Findings

The subject site has been the subject of previous investigations by LEAP. The reader is referred to these earlier reports which should be read in conjunction with this report.

- 'Phase I Desk Study Site Reconnaissance & Phase II Site Investigation Report' at Land West of Elmgrove Road, Littlehampton, for BoKlok Housing Ltd. dated July 2020 (ref: LP2265) by LEAP.
- 'CBR Test Report' at Land West of Elmgrove Road, Littlehampton, for BoKlok Housing Ltd. dated September 2020 (ref: MW/20/LP2265) by LEAP.

In addition, an intrusive investigation was undertaken on site by Wilson Bailey Geotechnical and Environmental between 8th January and 1st February 2021. Two borehole logs have been provided to LEAP by the client (BH07 and BH08). The locations of these are included in the plan in Figure 2, Appendix B, and the logs are shown in Appendix D.

2.1 LEAP Investigation Findings

The Phase I and II investigation took place in June and July 2020. This comprised a desk study, walkover, and intrusive investigation.

It was found that the site has a history of use as a primary and secondary school, which was demolished around 2013. It is currently undeveloped, and partly occupied by the two large stockpiles, as described above.

The intrusive investigation included 12 No. trial pits, and 7 No. windowless sampler boreholes. A BRE365 soakage test was undertaken in one of the trial pits located centrally. The investigation was followed by geotechnical and geoenvironmental laboratory testing of selected soil samples, as well as 2 No. gas monitoring visits.

SPT 'N' values of 8 – 28 were recorded within the clays, and 6 – 37 within the sands. Unconfined compressive strength values of 130 – 580kPa were obtained using a hand penetrometer. Based on this, an allowable bearing capacity of 85kPa was recommended for shallow foundations on the firm clays below about 1m, increasing to 125kPa on the underlying sands, subject to confirmatory probing.

A BRE DG365 soakage test was undertaken in TPI between 1.4 and 2mBGL, which achieved a soakage rate of 3.88E-06 m/s. Based on this, the superficial deposits underlying the site were deemed unsuitable for conventional soakaway drainage. The site soakage is discussed in further detail in an addendum Soakage Letter report by LEAP, dated 24th February 2021.

Made ground, excluding the stockpiles, was encountered across the site to between 0.25 and 0.5mBGL. Contamination testing identified that the shallow made ground soils across the site were impacted by the polycyclic aromatic hydrocarbons (PAH) in particular benzo(a)pyrene. The deepest exceedance was encountered at 0.3m. It was thought likely that removal of old

blacktop surfacing (tarmacadam) during the demolition works of the school had caused mixing of PAHs contaminated fines into near surface soils. Concentrations above generic assessment criteria for a residential development with gardens were recorded in 7 No. locations across most of the site, and 1 No. location within the southern stockpile. It was provisionally recommended that the made ground in garden and soft landscaped areas be removed to 600mm or to natural ground, and that allowance should be made for further excavation of localised areas of deeper contaminated soils. It was also recommended that further confirmatory investigations take place beneath the stockpiles once they are removed.

Slightly elevated carbon dioxide was recorded during the 2 No. gas monitoring visits. Further gas monitoring was recommended due to the high sensitivity of the proposed end use.

3 Geology

The site is mapped as being underlain by River Terrace Deposits over Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation and Portsdown Chalk Formation (Undifferentiated) (hereafter referred to as Upper Chalk).

3.1 Drift (River Terrace Deposits)

These sedimentary deposits are fluvial in origin. They are detrital, ranging from coarse- to fine-grained and form beds and lenses of deposits reflecting the channels, floodplains and levees of a river or estuary.

3.2 Solid (White Chalk)

These sedimentary rocks are shallow-marine in origin. They are biogenic and detrital, generally comprising carbonate material (coccoliths), forming distinctive beds of chalk.

4 Fieldwork

4.1 Methodology

LEAP has carried out a supplementary intrusive investigation, onsite monitoring and laboratory analysis to fulfil the objectives of this investigation. The investigations included the following tasks:

- 35 No. 0.4 – 2.7m deep machine excavated trial pits;
- *In-situ* geotechnical testing including Perth Penetrometer Tests in the trial pits;
- Laboratory testing on soil samples including 60 No. PAH tests; and
- 4 No. additional rounds of gas monitoring in existing wells.

To date two ground gas monitoring visits have been completed as part of this investigation on the 15th and 26th of February 2021 respectively. Two further visits are scheduled for the 12th and 26th of March 2021, following which an addendum Gas Risk Assessment will be issued.

The intrusive works took place between the 10th and 12th February 2021 the weather during the investigation was generally slightly overcast, cold with occasional bouts of snow.

A site plan for the location of each excavation is presented in Figure 2 of Appendix B.

5 Ground Conditions

The logs created for the pits and boreholes, including those from previous investigations, are presented in Appendix D, and summarised in the table below. In summary, the ground encountered away from the stockpiles was topsoil over made ground over clay over sand over chalk.

Table 1: Summary of the trial hole logs

Depth to (mBGL)	Depth to (mBGL)	Geology	Description
GL	0.02 / 0.4	TOPSOIL	Dark brown silty sandy slightly clayey sometimes gravelly TOPSOIL, often with roots and rootlets. Gravel, where encountered, comprised brick, blacktop, flint, and rare clinker.
GL / 0.2	0.25 / 2.5	MADE GROUND	MADE GROUND comprising brown to reddish brown varying mixtures of clay, silt, sand, gravel, cobbles, and rare boulders. Gravel and cobbles include brick, rounded to angular flint, concrete, and occasional blacktop. Boulders include concrete and parts of old brick structures.
0.25 / 2.15	0.7 / 5.2	CLAY (silty/sandy/gravelly)	Firm to stiff reddish to orangish brown sandy, sometimes silty and/or gravelly CLAY. Gravel is rare fine to cobble-sized sub-angular to rounded flint.
0.1 / 2.0	2.2 / 4.1	SAND (clayey/silty/gravelly)	Medium dense reddish to orangish brown occasionally clayey/silty/gravelly fine to coarse SAND. Gravel is medium to cobble-sized angular to rounded flint.
2.4 / 5.2	3.0 / 6.0	CHALK	Highly weathered off-white mottled pale orange CHALK recovered as gravelly silt (and silty gravel with depth). Gravel is fine to coarse low to medium density chalk and occasional coarse rounded flint. Encountered in VVS2 – 5 and BH07 and BH08 only.

The made ground was generally consistent in composition across the site, comprising brown to reddish brown varying mixtures of clay, silt, sand, gravel, cobbles, and on rare occasions boulders. Gravel and cobbles included brick, rounded to angular flint, concrete, and occasional blacktop. Boulders of concrete and parts of old brick structures were encountered in a few pits. The made ground was generally underlain by slightly silty gravelly occasionally sandy Clays

over sands with variable proportions of silt, clay and gravel. However, the clay encountered in TP226 located near the southern end of the western stockpile was more plastic in appearance between 0.45 and 1.50m bgl.

Blacktop was encountered at surface in TP2 and FP1 and beneath topsoil/made ground in TP204 (between 0.1 and 0.18mBGL) and 225 (between 0.4 and 0.5mBGL).

In FP1 (west of the site) and FP3 (approximately in the centre) reworked clay was encountered beneath the made ground, to a depth of 1.5m.

The deepest made ground (over 1m and up to 2.15m deep) was generally encountered in the central portion of the site, particularly in the vicinity of POS2. This deeper made ground is broadly located beneath the footprint of the previous school structures with shallow made ground encountered to the north (previous open space). Deep made in FP1 is considered likely to be due to a service which was encountered at 1.5m although this excavation was also targeted on the location of old foundations and their removal is likely to have disturbed the ground further. Based on service plans that LEAP has available, the service may be either BT or UKPN – these are both shown on the plans as being a few metres further east than where FP1 was excavated. The deep made ground in FP3 is due to a possible pad footing, which was encountered at 1.1mBGL. This was 300mm thick and 700x700mm wide. Deep made ground was also encountered within FP4 and TP218. FP4 was targeted on the location of potential historical foundations whilst TP218 is located within the footprint of the school structure.

No trial holes were excavated into the stockpiles during the most recent phase of works. TP4, 6 - 12 from LEAP's previous investigation in 2020 were located within the stockpiles. The stockpile areas assessed were found to be of similar composition, comprising varying mixtures of clay, sand, and gravel. The gravel was found to comprise chalk, flint, brick, and concrete, and occasional fragments of wood, plastic, tile, rubber, and asphalt were also noted. Organic odours were recorded in the two trial pits undertaken into the western stockpile.

Obstructions and/or services were encountered in several pits, summarised in the table below:

Table 2: Summary of obstructions and services encountered

Job Number	Trial Hole ID	Depth of Obstruction/Service	Comments
LP2265	TP6	0.7	Concrete
	TP8	0.5	Electrical cable
	WS1A	0.3	Concrete
	WS1B	0.35	Concrete
	WS1C	0.3	Concrete
	FP1	1.5	Concrete – possibly BT or UKPN

Job Number	Trial Hole ID	Depth of Obstruction/Service	Comments
LP2466	FP3	1.1	Possible relict concrete pad footing (0.7x0.7x0.3m)
	TP206	0.3-0.45	Shingle on northern side of pit
	TP207	0.25	Electrical cable warning tape
	TP215	0.4	Concrete
	TP216	0.3	Dead electrical cable
	TP221	0.4	Electrical cable warning tape
	TP227	0.3	E-W oriented plastic pipe at 0.3m (50mm thick)
	TP229	0.5	Dead electric cable (oriented E-W)

None of the services mentioned in the table above were detected with the Cable Avoidance Tool.

Made ground was not encountered in FP7, which was located towards the northeast corner of the site. In WS3-5, anthropogenic materials were only encountered in the topsoil, which was logged as reworked.

Loose sands were encountered in WS3 between 3 and 4m and WS5 at 2m.

Chalk head was encountered only in WS4 from 2.7 to 3.2m. This comprised a mixture of silt, sand and gravel of chalk and flint.

5.1 Groundwater

Groundwater was encountered in two locations during the most recent works: at 1.7m in FP3, and 1.4m in TP218. All groundwater strikes encountered during this and previous investigations are summarised in Table 3, and groundwater monitoring results are summarised in Table 4.

Table 3: Summary of groundwater strikes

Job Number	Trial Hole ID	Date of Strike	Depth of Strike (mBGL)	Comments
LP2265	WS2	22/06/2020	6	Sample was slightly damp at 6m within chalk
	WS3		5	Sample was wet below 5m within chalk
	WS4		2.7	Sample was damp at 2.7m (at boundary between clayey sand and chalk head)

Job Number	Trial Hole ID	Date of Strike	Depth of Strike (mBGL)	Comments
LP2466	FP3	11/02/2021	1.7	Slow seepage at the base of pit within sandy clay
	TP218	12/02/2021	1.4	Fast seepage within made ground, accompanied by minor collapse. Water level rose by 5cm in approximately 5 minutes.

Table 4: Summary of groundwater monitoring

Trial Hole ID	Groundwater Depth (m bgl)			
	30/06/20	08/07/20	15/02/21	26/02/21
WS2	Dry	Dry	Dry	Dry
WS3	5.26	Dry	4	4.24
WS4	Dry	Dry	Dry	Dry
BH6	Wells Not Yet Installed		5.6	Dry
BH7			Well Not Accessible	Dry

6 Geotechnical Testing Results

Geotechnical field tests were undertaken comprising perth penetrometer tests in the trial pits, and hand penetrometer tests on samples of clay soils. SPT tests were also undertaken in the boreholes during the previous investigations by LEAP and Wilson Bailey. The results are summarised in the table below. In addition, a single Atterberg Limits test has been conducted on a sample of plastic clay recovered from TP226 at 1.1m.

Table 5: Summary of geotechnical test results

Stratum	Test Type	Range of Values (and results from previous investigation)
Clay	SPT 'N' Value	10 – 24 (8 – 28)
	Unconfined Compressive Strength (kPa)*	90 – 270 (130 – 580)

Stratum	Test Type	Range of Values (and results from previous investigation)
Sand	SPT 'N' Value	21 (6 – 37)
Chalk	SPT 'N' Value	(27 - 47)

*Measured using a hand penetrometer

SPT 'N' values of 8 - 28 were recorded in the clays, indicative of firm to stiff soils. 'N' values of 6 – 37 were recorded in the sands, consistent with loose to dense soil. Loose sands were encountered in WS3 between 3 and 4m and WS5 at 2m. These were both located near the site's eastern boundary.

Hand penetrometer testing undertaken during this investigation returned values ranging from 90kPa to 270kPa indicative of firm to stiff soils. Testing during LEAP's previous investigation in 2020 recorded higher values ranging from 130kPa to 580 kPa indicative of firm to very stiff soils. It should be noted that this was undertaken during the summer months, and so the clay soils are likely to have had lower moisture contents, and hence displayed higher strengths. The values obtained during both investigations suggest clay strengths ranging from firm to very stiff. There was no obvious correlation of soil strength with depth.

The results of an additional plasticity test completed near the western stockpile indicates that the clay had a plasticity index of 12% this is in general accordance with the plasticity previously encountered across the wider site which ranged from 10% - 21%.

6.1 Bearing Capacity Recommendations

6.1.1 Shallow Foundations

The near surface soils are fluvial in origin and demonstrate significant lateral and vertical variability as a result of their deposition with no particular spatial conformity identified to date. The site has also been subject to removal of relict foundations resulting in some areas of deep made ground. Some foundations and service ducts remain in the ground (refer Table 2).

All loads should be transferred beneath any topsoil, made ground, loose, soft, low strength, desiccated or disturbed soils and transferred onto the firm clays at depth. For low rise housing, based on local experience and BS8103¹ Table 8, an allowable bearing capacity of 85kPa is recommended for shallow foundations, minimum width 600mm, on the firm clays below about

BS8103-1:2011 Structural design of low-rise buildings. Code of practice for stability, site investigations, foundations, precast concrete floors and ground floor slabs for housing

1m, increasing to 125kPa for the medium dense sands at depth (typically below 1.5-1.8m but locally deeper/not present).

Foundation excavations should be inspected by a suitably qualified engineer prior to pouring concrete to ensure competent soils appropriate to the adopted bearing capacity, in this case 85kPa on the firm clays and 125kPa on the medium dense sands, are encountered at formation level. This could be confirmed by probing in foundation trenches during construction.

Given the plasticity of the soils encountered foundations will require deepening near trees in accordance with NHBC guidance. Where footings span different soil types, allowance for nominal reinforcement should be in place.

It has not been possible to investigate the soils beneath the stockpiles. Additional pitting in the vicinity of the stockpiles confirmed that the superficial normally consolidated clays are variable in strength, depth and outcrop and generally of low to medium plasticity. They are likely to have undergone settlement during loading but in light of the above characteristics, significant heave due to recovery on unloading, following removal of the stockpiles, is not anticipated.

Confirmation of the soil conditions beneath the stockpiles should be completed following stockpile removal as part of the planned formation inspections for validation purposes and a careful watch should be kept for any anomalous or suspect soils during construction.

7 Soil Risk Assessment

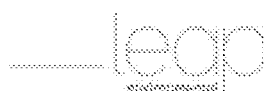
Due to the elevated levels of Benzo(a)Pyrene recorded during LEAP's previous investigation, additional samples from various depths have been tested during the most recent phase of works in order to ascertain the lateral and vertical extent of the contamination.

Samples were sent to ELAB to be tested for polycyclic aromatic hydrocarbons (PAHs).

Laboratory results have been compared to Tier 1 Site Assessment Criteria based on published Category 4 Screening Levels (C4SLs) and LQM/CIEH Suitable for Use Levels (S4ULs) and Generic Assessment Criteria (GAC).

Sets of GACs have been generated for SOMs of 1%, 2.5% and 6%. Soil samples collected during the most recent investigation were not tested for Total Organic Content, and so results from only the previous investigation will be used to determine an appropriate SOM.

TOC in the made ground samples collected from non-stockpiled areas ranged from 0.28 to 3.8%. Using the conversion of $SOM = TOC \times 1.72$, this equates to a SOM range of 1.1 to 6.6%. The made ground soils were generally found to have higher SOM. However, this may be solely due to the presence of coal tar within blacktop fragments, which were encountered in the made ground in several locations, rather than organic content in the soil. Therefore, an SOM of 1% is considered to be appropriate for the soils across the site.



In stockpiled areas the SOM values ranged from 1.5 to 4.5%. Most results were close to 2.5%, and so this is considered to be an appropriate SOM for the stockpiles.

7.1 Results

PAHs are widespread within made ground and the urban environment generally. They are one of the most common contaminants in made ground and the one that most commonly drives remediation. Benzo(a)pyrene is a particular problem, being very commonly found in association with tarmac, clinker and any burnt products and also being highly toxic to human health.

The mean Soil Organic Matter of the population has been used to determine an appropriate Tier 1 GAC for each population. The results are summarised as follows:

7.1.1 Soils between GL and 0.2m

All of the soils which were tested between GL and 0.2m were logged as topsoil and made ground.

Table 6: Summary of BaP and Naphthalene in soils between GL and 0.2m from non-stockpiled areas (32 samples total)- mean SOM 1%

Determinant	Range of results (mg/kg) (and results from previous investigation)	Tier1 Generic Assessment Criteria ¹ (mg/kg) Residential with plant uptake 1% SOM	Samples that exceed GAC
Benzo(a)pyrene ¹	0.02 – 56.0 (1.3 – 77.8)	5.0	A total of 16 samples (50%)
Naphthalene ²	<0.01 – 3.02 (<0.1 – 1.1)	2.3	A total of 2 Samples (6%)

Notes to table

1. As a surrogate marker for genotoxic PAH
2. As a marker compound for threshold PAH

7.1.2 Soils Between 0.2 and 0.5m

Of the 31No samples which were tested between 0.2 and 0.5mbgl, 6No samples were logged as natural soil.

Table 7: Summary of BaP and Naphthalene in soils between 0.2 and 0.5m from non-stockpiled areas (31 samples)- mean SOM 1%

Determinant	Range of results (mg/kg) (and results from previous investigation)	Tier1 Generic Assessment Criteria ¹ (mg/kg) Residential with plant uptake 1% SOM	Samples that exceed GAC
Benzo(a)pyrene ¹	<0.01 – 87.5 (0.4 – 32)	5.0	A total of 8 samples (25%)

Naphthalene ²	<0.01 – 1.56 (<0.1 – 0.5)	2/3	None
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Notes to table

3. As a surrogate marker for genotoxic PAH
4. As a marker compound for threshold PAH

7.1.3 Soils Below 0.5m

5No. of the 8No. samples that were tested below 0.5m depth were logged as natural soils.

Table 8: Summary of BaP and Naphthalene in soils below 0.5m depth from non-stockpiled areas (8 samples)- mean SOM 1%

Determinant	Range of results (mg/kg) (and results from previous investigation)	Tier1 Generic Assessment Criteria ¹ (mg/kg) Residential with plant uptake 1% SOM	Samples that exceed GAC
Benzo(a)pyrene ¹	<0.01 – 0.74 (<0.1)	5.0	None
Naphthalene ²	<0.01 – 0.11 (<0.1)	2/3	None

Notes to table

5. As a surrogate marker for genotoxic PAH
6. As a marker compound for threshold PAH

24 No. exceedances of B(a)P were recorded in total. These spanned most of the site, excluding only the western portion. 2No exceedances of Naphthalene were recorded within 0.2m in TP204 (located near the centre of the northern boundary) and TP224 (just north of the southern stockpile).

BaP exceedances were recorded at depths ranging from 0.05 to 0.5m. Between ground level and 0.20mbgl 16No. exceedances were recorded. These were distributed across much of the site although no exceedances were recorded in the west, where limited investigation was possible. Sampling between 0.20m and 0.50mbgl recorded a total of 8No exceedances. The exceedances at these depths were generally recorded in the centre and south, specifically in the POS2 area as well as in the rear garden areas of proposed plots 33 to 41, plots 104 to 112, plots 87 to 103 and plots 81 to 86. The deepest exceedance was recorded at 0.5m in TP229 with no exceedances recorded below this depth.

No exceedances of PAHs were recorded in any of the natural soils that were tested.

Figures 3 – 5 in Appendix B illustrate the spatial distribution of the exceedances that were encountered.

7.1.4 Stockpile Areas

Samples were not recovered from within the stockpiles during the most recent investigation. The following results are from LEAP's Phase I and II report (ref. LP2265).

Table 9: Summary of BaP and Naphthalene in stockpiled areas (9 samples) - mean SOM 2.5%

Determinant	Range of results (mg/kg)	Tier1 Generic Assessment Criteria ¹ (mg/kg) Residential with plant uptake 2.5% SOM	Samples that exceed GAC
Benzo(a)pyrene ¹	<0.1 - 27	5.0	(27mg/kg at 1.5m in TP9)
Naphthalene ²	<0.1 - 0.3	5.6	None

Notes to table

7. As a surrogate marker for genotoxic PAH
8. As a marker compound for threshold PAH

A single exceedance of BaP was recorded in TP9 at 1.5m. This trial pit was undertaken into the southern stockpile. Although no other exceedances were recorded, the potential for further localised contamination within the stockpiles should not be discounted.

7.2 Material re-use

As per the recommendations of the Phase II report, and in the absence of any information to the contrary, the soil stockpiles are considered to be waste arising from construction of the neighbouring site and as such cannot be re-used on site without appropriate permitting. Thus, it is assumed that they will be removed from site, possibly following screening to ensure they can be sent to the most appropriate and efficient waste streams.

Discussions with the client on site indicated the intention for potential re-use of site won material from below existing ground level (i.e. below or outside of stockpiled soils). The client outlined the intention to excavate the shallow soils, with the fines separated and disposed of offsite and the aggregate (brick, concrete, blacktop and flint) stockpiled for re-use during the construction. The separated fines will need to be tested in order to ascertain suitability for re-use for a different purpose, or the waste classification, if relevant. The Benzo(a)Pyrene contamination is considered to be related to coal tar containing blacktop which was incorporated into the underlying natural soils during demolition. Based on the elevated Benzo(a)Pyrene concentrations it is considered that any material segregation would need to separate the blacktop from the other aggregate or limit its re-use in accordance with EA guidance on use of treated asphalt waste². If segregated the blacktop would require disposal offsite (potentially as hazardous waste). Further testing of the blacktop material may be required to ascertain its classification for waste disposal. The inert aggregate, following

² Use of treated asphalt waste: RPS 75, Environment Agency, March 2014.

blacktop removal may be suitable for onsite re-use subject to geotechnical and chemical testing and appropriate permitting or use under a regulatory position statement.

7.3 Recommendations

Based on the findings of the site investigations to date, the shallow made ground soils would pose a risk to future site users where exposed at ground level within areas of soft landscaping such as gardens.

It is proposed that, as part of the enabling works, a 200mm strip will take place across the entirety of the site. For the northern third of the site, (i.e. in the areas of proposed plots 46 – 78), this is anticipated to be sufficient removal of the contaminated soils. However, the central and eastern portions of the site will require deeper stripping, to 500mm, or to natural soil. Subject to screening and possible re-use, as detailed in the previous section, it may be necessary to carry out some additional WAC testing in order to confirm the waste classification of any surplus or reject soil prior to offsite disposal.

Additional allowance should also be made for further excavation of localised areas of deeper contaminated soils that may be encountered during the construction phase. It is recommended that clean cover be used in the areas of the proposed gardens and public open space areas. This should comprise an appropriate thickness (minimum 200mm) to provide an adequate growing medium of clean imported topsoil and subsoil.

Access into some areas of the site was restricted due to the stockpiles of waste material and the presence of live services. It is recommended that once the stockpiles are removed further confirmatory inspection is undertaken beneath their footprints as part of the general formation inspections required for remediation verification.

Further investigation of the stockpiles may be necessary in order to confirm the appropriate waste streams for the soil fractions after screening.

A Remediation Method Statement (RMS) will be issued separately to this report, further detailing the recommendations for remediation of the site.

8 Ground Gas Monitoring

Two rounds of ground gas monitoring were undertaken during the previous investigation works on the 30th of June and 8th July 2020. The wells were monitored for methane, carbon dioxide, oxygen, hydrogen sulphide and carbon monoxide using a GA2000 gas analyser.

In accordance with BS8576 the gassing potential of the site is considered to be low and the sensitivity of the development to be high. The recommended monitoring regime in this case would comprise a minimum of monitoring over a two-month period. As such a further four fortnightly gas monitoring visits were scheduled as part of this investigation. To date two of

these additional visits have been completed on the 15th and 26th of February, respectively. Table 9 below summarises the results of all gas monitoring so far undertaken on site.

Table 10: Summary of land gas monitoring results

BH Ref	No. of Monitoring visits	Maximum Recorded Concentration*							
		CO ₂ (%)	CH ₄ (%)	CO (ppm)	H ₂ S (ppm)	O ₂ (%)	Flow rate (l/hr)	Atmospheric Pressure (mb)	Was response zone flooded?
WS2	4	4.2	0.2	0	0	16.0	0	1009 – 1037	No
WS3	4	4.4	0.2	0	0	16.0	0.1	1009 – 1037	No
WS4	4	2.2	0.2	0	0	16.9	0	1009 – 1037	No
BH7	1	0.1	0.2	0	0	20.4	0.1	1037	No
BH8	1	3.3	0.2	0	0	16.5	0	1037	No

*Except for oxygen where the minimum reading is reported.

A full record of the gas concentrations encountered during each visit is included in Appendix G. As a summary peak carbon dioxide and methane concentrations of up to 4.4% and 0.2% were recorded respectively with a maximum flow rate of 0.1 l/hr. It should be noted that WS2 is located close to an area of deep made ground. However, concentrations of gases that were recorded in this borehole were generally not high. This may be due to the fact that no putrescible material was noted within any of the made ground, and so it is not considered to be a source of significant volumes of gas.

It is noted that the maximum flow rate recorded 0.1 l/hr was recorded in only two wells during one of the monitoring visits. Furthermore, the flow rates recorded were only recorded during the initial reading with flow having reduced to 0 within 15 seconds. As such it is considered that the flow rates do not represent consistent gas generation within the subsurface and rather the equalization of pressure between the well and the atmosphere as the gas tap was opened. Monitoring visits having all been completed during periods of high atmospheric pressure (1009 – 1037mb). However, it is noted that three of these visits namely 30th of June and 8th of July 2020 and the 15th of February 2021 were completed during periods of falling atmospheric pressure.

8.1 Preliminary Gas Risk Assessment

A preliminary ground gas risk assessment has been made using the method outlined in CIRIA 665³ for low rise housing. This is consistent with current NHBC guidance for low rise housing.

In this assessment the model low rise house is assumed, i.e. one with a floor plan area of 8mx8m, a well-ventilated sub-floor void of 150mm and a minimum ventilation rate of one complete volume change per 24 hours.

A risk-based method is used to allow for identification of gas protection measures for such housing by comparing measured emission rates to generic “Traffic Lights”. Typical maximum concentrations of methane and carbon dioxide are considered and where these exceed typical maximums for the generation potential of the particular source then risk based Gas Screening Values are considered. In this assessment the highest concentrations have been combined with the highest flow rates 0.1 l/hr) to provide a conservative Tier 1 assessment.

The source is then rated as Green, Amber 1, Amber 2 or Red and appropriate design protection measures recommended in line with NHBC guidance and BS8485:2015.

Adopting these methods results in the following Gas Screening Values for both methane and carbon dioxide:

Table 11: Calculated Gas Screening Values

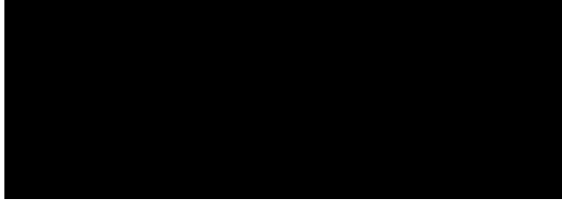
	Carbon Dioxide	Methane
	L/hr	L/hr
Gas Screening Value	0.0044	0.0002

The resulting Gas Screening Values of 0.0044l/hr for carbon dioxide and 0.0002l/hr for methane classify the site as Green, whereby a negligible gas regime has been identified and gas protection measures are not considered necessary. Furthermore, neither carbon dioxide or methane exhibited concentrations in excess of the cut off values of 5% and 1% respectively. A final Gas Risk Assessment will be issued separately on completion of the monitoring.

³ Wilson S, Oliver S, Mallett H, Hutchings H and Card G. 2007. Assessing risks posed by hazardous ground gases to buildings. CIRIA Report 665.

Please do not hesitate to contact the undersigned if you require any further information.

Yours faithfully,



Kleri Tantele MSc FGS

Enc.

Appendix A - Limitations

Appendix B - Figures

Appendix C – Photos

Appendix D – Trial Hole Logs

Appendix E – Geochemical Test Results

Appendix F – Gas Monitoring Results

This letter report has been prepared by Leap Environmental Ltd on the basis of information received from a variety of sources which Leap Environmental Ltd believes to be accurate. Nevertheless, Leap Environmental Ltd cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

Leap Environmental Ltd has used all reasonable skill, care and diligence in the design and execution of this report, taking into account the manpower and resources devoted to it in agreement with the Client. Although every reasonable effort has been made to obtain all relevant information, all potential contamination, environmental constraints or liabilities associated with the site may not necessarily have been revealed.



This report is generally consistent with the Eurocode requirements for a Ground Investigation Report, noting the limitations on brief to provision of pile design information only. However, the laboratory testing has been carried out on samples which do not comply with the Eurocode classifications as identified in tables 2 and 3 of EN ISO 22475-1. This report should not be deemed as a Geotechnical Design Report, and where any calculations have been made, these are not Eurocode compliant and are for indicative purposes only.

The conclusions reached in this report are necessarily restricted to those which can be determined from the information consulted, and may be subject to amendment in the light of additional information becoming available. These conclusions may not be appropriate for alternative schemes.

This report is confidential to the Client, and Leap Environmental Ltd accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by Leap Environmental Ltd beforehand. Any such party relies upon the report at their own risk.

APPENDIX A - LIMITATIONS

Limitations

LIMITATIONS

This report is confidential to the Client, and Leap Environmental Ltd accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by Leap Environmental Ltd beforehand. Any such party relies upon the report at their own risk. Unless explicitly agreed otherwise in writing, this report has been prepared under LEAP's standard terms and conditions, as included in the quotation for this works.

This report has been prepared by Leap Environmental Ltd on the basis of information received from a variety of sources which Leap Environmental Ltd believes to be accurate. Nevertheless, Leap Environmental Ltd cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

Leap Environmental Ltd has used all reasonable skill, care and diligence in the design and execution of this report, taking into account the manpower and resources devoted to it in agreement with the Client. Although every reasonable effort has been made to obtain all relevant information, all potential contamination, environmental constraints or liabilities associated with the site may not necessarily have been revealed. LEAP cannot be held responsible for any disclosures or changes in regulation that are provided post production of this report, and will not automatically update the report.

The conclusions reached in this report are necessarily restricted to those which can be determined from the information consulted, and may be subject to amendment in the light of additional information becoming available. These conclusions may not be appropriate for alternative schemes.

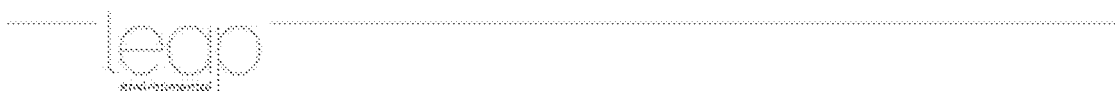
The extent of the exploratory holes, laboratory testing and monitoring undertaken may have been restricted due to a number of factors including accessibility, the presence of buried or overhead services, current development and site usage, timescales or clients specification. The exploratory holes only assess a small proportion of the site area with respect to the site as a whole, and as such may only provide an overall assessment of ground conditions on site. The presence of hotspots of undisclosed contamination or exceptional and unforeseen ground conditions cannot be discounted.

Eurocode 7 gives guidance on the type of sampling, sample quality, number and spacing of intrusive investigations, and number of laboratory tests required. It is intended that the Geotechnical Information section of this report will fulfil the general requirements of the Ground Investigation Report as set out in section 6 of Eurocode⁴, although this is subject to the restrictions imposed on the investigation as listed above. For geotechnical design, Eurocode 7 requires the Geotechnical Design Report to address both the geotechnical and

⁴ BS EN 1997 Eurocode 7- Geotechnical Design - Part 1: General Rules (2004) and Part 2: Ground Investigation and Testing (2007)

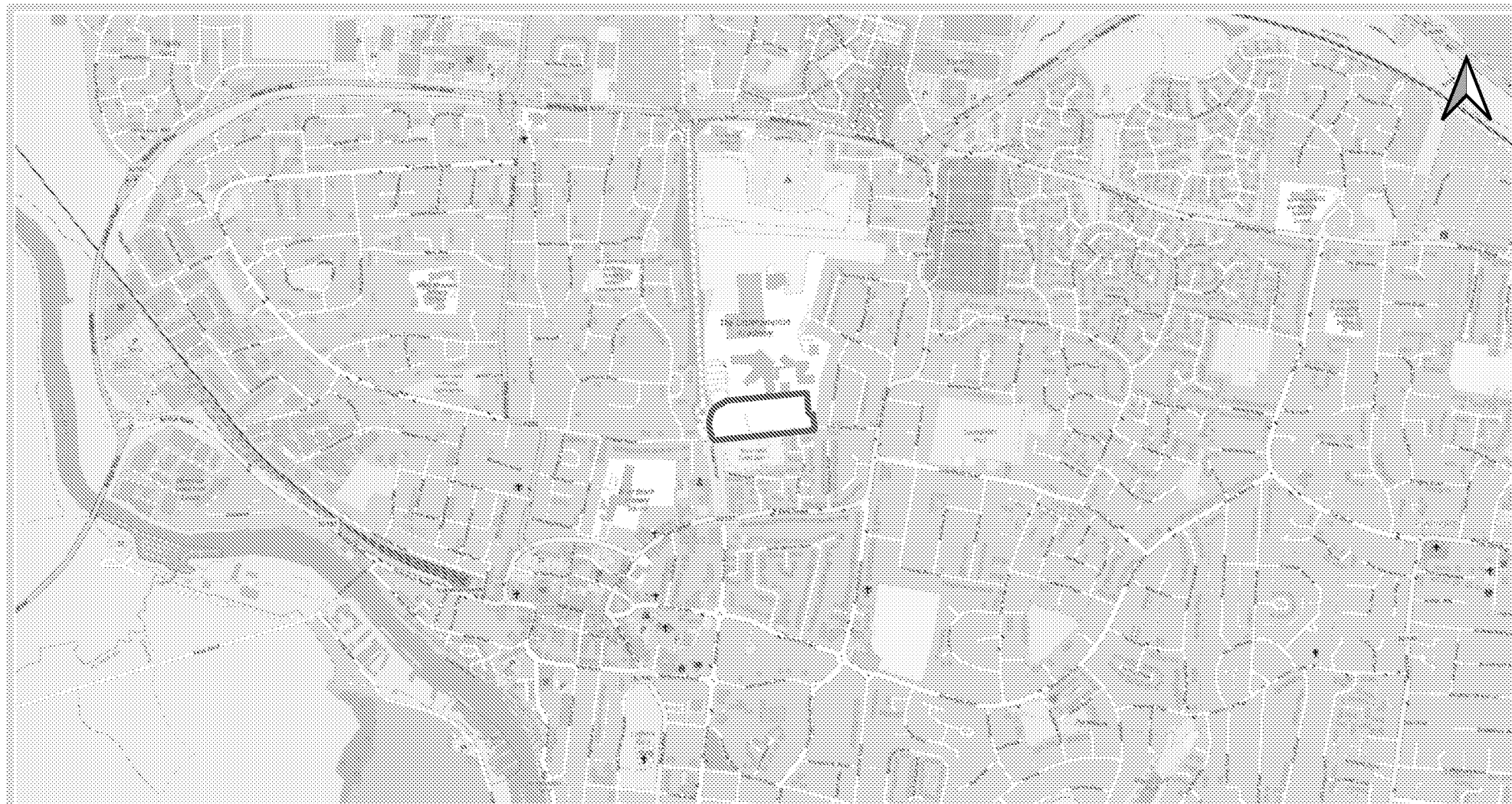
structural aspects of the geotechnical design for both the limit and serviceability states. The Geotechnical Appraisal section of this report will not meet the requirements of a Geotechnical Design Report (GDR), and should therefore be used for preliminary guidance only.

The presence of asbestos may be noted during the site walkover survey, intrusive investigations and/or from the results of contamination testing. However, this report does not constitute an asbestos survey. On this basis, the presence of asbestos on site cannot be discounted and a full asbestos survey should be undertaken.



APPENDIX B - FIGURES

Figures



Basemap: © OpenStreetMapcontributors

 Site boundary



Client: BoKlok Housing Ltd

Title: Site Location Plan

Project ID: LP2466

Project: Land off Elm Grove Road, Littlehampton

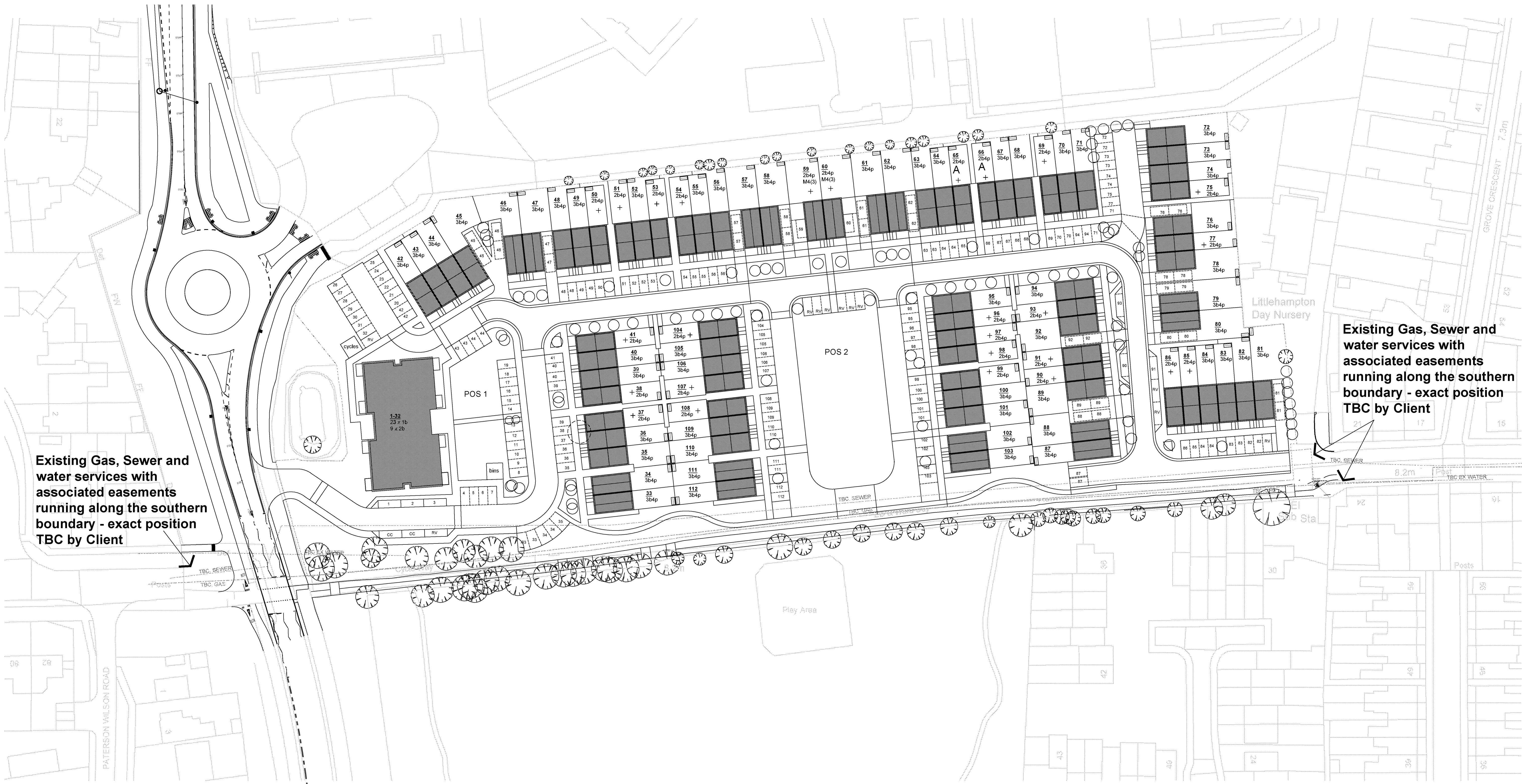
Date: 03/02/21

Figure No. 1

ILLUSTRATIVE SITE PLAN -
80 HOUSES AND 32 APARTMENTS

Drawings for illustration purposed only.
Further input required from all consultants
including Arb, Civils, utilities etc..

CDM 2015 Health & Safety Information
This information relates only to 'Significant Hazards' identified on this drawing
and is to be read in conjunction with the Designer's Hazard Register.



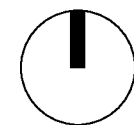
Existing Gas, Sewer and
water services with
associated easements
running along the southern
boundary - exact position
TBC by Client

Existing Gas, Sewer and
water services with
associated easements
running along the southern
boundary - exact position
TBC by Client

Schedule of Accommodations

Block 1	-	Apartments	-	32	- 4 storey's
23 x 1bed 2person					
9 x 2bed 4person					
2bed 4p	-	House	81.9m2	-	24 - 2 storey's
2bed 4p M4(3)	-	House	81.9m2	-	2 - 2 storey's
3bed 4p	-	House	88.9m2	-	54 - 2 storey's
A	-	Affordable units			
+	-	indicates 2 bed units			
TOTAL	-	112 units		-	80 houses and 32 Apartment

car parking -	1 space per apartment unit	= 32
	1 per house 2bed	= 26
	2 per house 3bed	= 108
	Car Club	= 2
	Residents Visitor Parking (10%)	= 11
Total		= 179



Client's Name
BoKlok

Job Title
6920 - Land South of Littlehampton
Academy Littlehampton

Drawing Title
Illustrative Site Plan

Scale
1:500 @ A1 / 1:1000 @ A3
metres 10 20 30 40

Drawn
MN

Checked
PF

Date
29.01.20

Job No
LTH-ECE-ZZ-ZZ-SK-A-SL-5000 P09

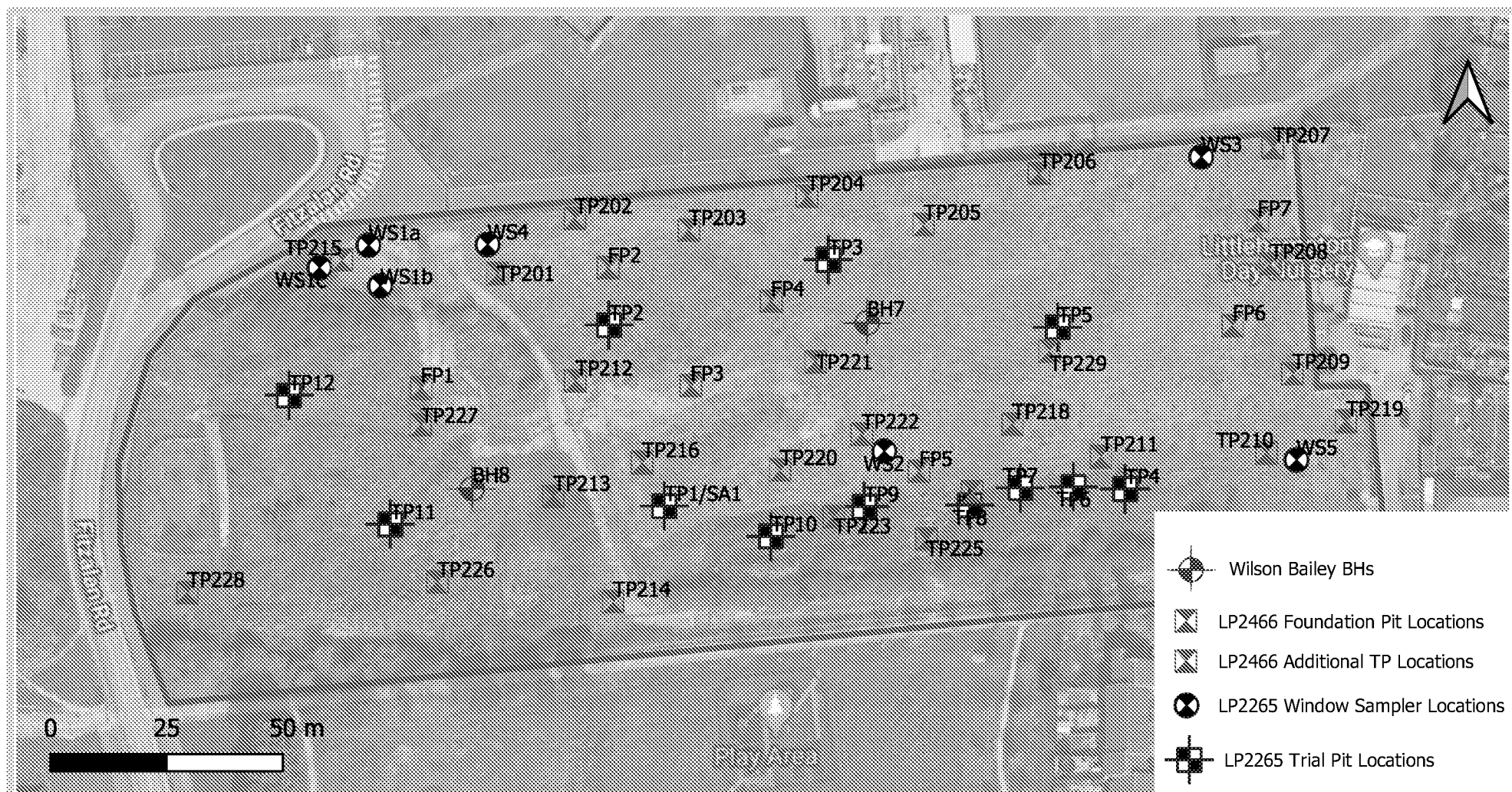
Rev
1

Status
PRELIMINARY

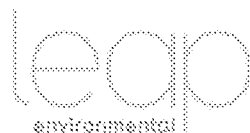
P09 21.12.20 Road Layout amended to suit WSCC comment MN/YY MN
Rev Date Revision Details Dr Ch

London: 76 Great Suffolk Street
London, SE1 0BL
T 0207 928 2773 E london@ecearchitecture.com
Sussex: Brooklyn Chambers, 11 Goring Road
Worthing, West Sussex, BN12 4AP
T 01903 248777 E sussex@ecearchitecture.com
Bristol: Westworks, Colston Street, Bristol, BS1 4XE
T 0117 214 1101 E bristol@ecewestworks.com
ECE Architecture
www.ecearchitecture.com

CAD Plot date: 21/12/2020 - 14:48:55 6920 site plan.dwg



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:	01/03/21	Figure No.	2

APPENDIX C – SITE PHOTOGRAPHS

Site Photographs



Plate 1: View of site from access road, facing east



Plate 2: View of part of western stockpiles, facing west



Plate 3: View towards the southwest portion of site post vegetation clearance

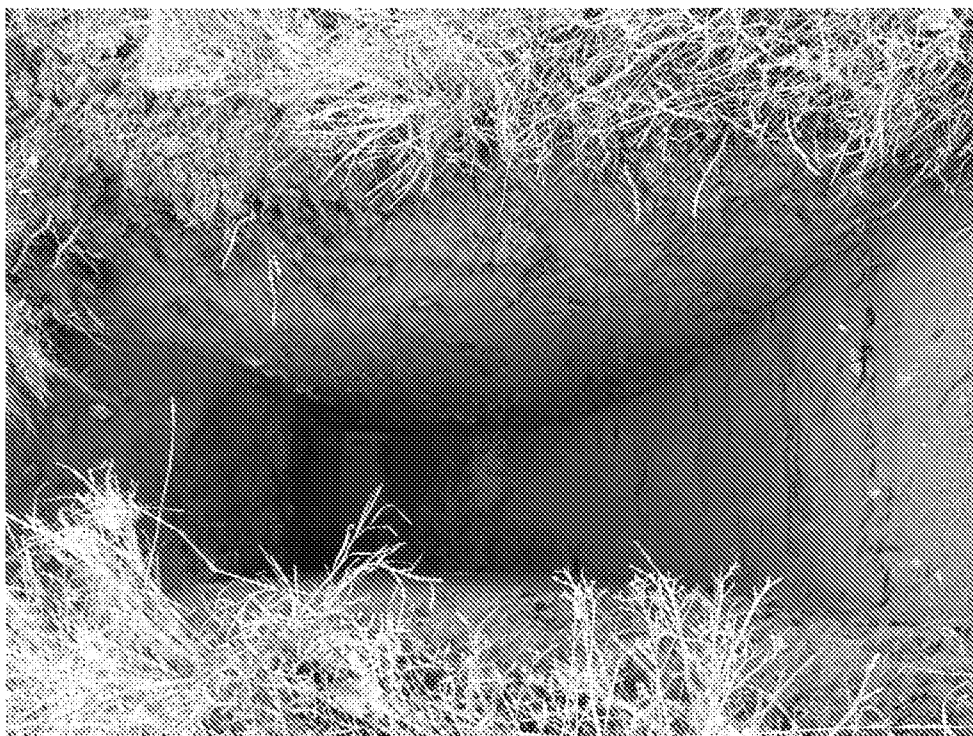


Plate 4: TP226



Plate 5: TP223



Plate 6: Pipe encountered in TP227



Plate 7: TP201



Plate 8: Electrical warning tape in TP207



Plate 9: TP204



Plate 10: Shingle in TP206



Plate 11: TP218



Plate 12: TP225



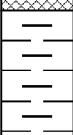
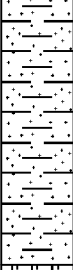
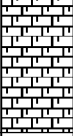
Plate 13: Suspected footing recovered from FP3



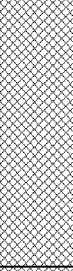
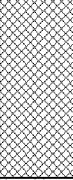
Plate 14: Concrete obstruction in FP1

APPENDIX D – TRIAL HOLE AND BOREHOLE LOGS

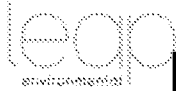
**Trial Hole and
Borehole Logs**

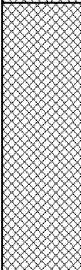
 WILSON BAILEY GEOTECHNICAL & ENVIROMENTAL						Site Former Littlehampton Academy site		Number BH-07
Excavation Method Drive-in Windowless Sampler		Dimensions Location 503331 E 102638 N		Ground Level (mOD) 9.50	Client BokLok Housing Limited		Job Number 15734	Sheet 1/1
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20-0.30	EBH7-1				(0.65)	MADE GROUND: Greyish brown sandy gravelly CLAY. Gravel is brick, concrete and asphalt.		
0.90-1.00 1.00-1.45	DBH7-2 SPT(C) N=8	0.00	1,1/2,2,2,2	8.85	0.65 (0.85)	Stiff dark brown CLAY		
1.60-1.70	DBH7-3			8.00	1.50 (0.80)	Firm to stiff orangish brown slightly sandy CLAY		
2.00-2.45	SPT(C) N=19	0.00	3,5/5,3,5,6	7.20	2.30	Light orange-brown sandy CLAY		
3.00-3.45	SPT(C) N=10	0.00	3,3/2,3,2,3		(1.80)			
3.50-3.60	DBH7-4							
4.00-4.45	SPT(C) N=27	0.00	7,6/7,6,6,8	5.40	4.10 (0.90)	Structureless cream CHALK consisting of chalk gravel in a marly chalk matrix.		
4.80-5.00 5.00-5.45	DBH7-5 SPT(C) N=47	5.00	10,9/10,12,13,12	4.50	5.00	Complete at 5.00m		
Remarks Groundwater not encountered during drilling. Groundwater monitoring standpipe installed with a response zone from 1.00 m to 5.00 m below ground level.							Scale (approx) 1:50	Logged By Figure No. 15734.BH-07

 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	5.20	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	6.00	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					
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 FP3 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 1.70		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						
	0.80	ES		0.90			Brown silty sandy gravelly MADE GROUND. Gravel is fine to cobble-sized brick, fine to coarse sub-rounded concrete, rare coarse blacktop fragments, and fine to coarse sub-rounded to angular flint.		
							Dark greyish brown very sandy REWORKED CLAY.		
				1.50			300 x 700 x 700mm horizontal concrete slab present at 1.1m (possible pad footing).		
				1.70			Stiff reddish brown slightly sandy CLAY.		
							Hand Pen at 1.7m = 210kPa		
							Minor seepage at base of pit		
							End of pit at 1.70 m		
Remarks: Trial pit remained stable. Possible 300x700x700mm concrete pad footing was encountered at 1.1m. Minor seepage at the base of the pit.									
Stability: Stable									



 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	
Client: BoKlok Housing Ltd.								Logged KT	

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.	
			N=15	1.40			Hand Pen at 1.2m = 150kPa	
							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 [Redacted]				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.		
	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.		
							End of pit at 2.10 m		
Remarks: Trial pit remained dry and stable.									
Stability: Stable									

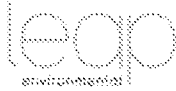
1
2
3
4
5

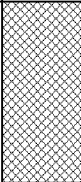
Leap Environmental Ltd The Atrium, Curtis Road Dorking, Surrey RH4 1XA 				Trial Pit Log				Trialpit No FP6 Sheet 1 of 1	
Project Name: Elmgrove Road Additional PAH Testing and Gas Monitoring				Project No. LP2466		Co-ords: - Level:		Date 11/02/2021	
Location: Land off Elmgrove Road, Littlehampton, BN17 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
				1.10			Medium dense reddish brown coarse SAND.	
				1.75			End of pit at 1.75 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 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				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.	1
	0.30	ES		0.60				
	1.05	ES		1.05		Hand Pen at 1.05m = 120kPa End of pit at 1.05 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 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	1 2 3 4 5
	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.	
				0.80			Stiff reddish brown slightly sandy CLAY.	
							Hand Pen at 0.8m = 250kPa 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 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 Logged ADC	
Client: BoKlok Housing Ltd.							

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		0.60			Brown REWORKED silty clay with occasional brick	
				1.10			Orange brown clayey slightly gravelly SAND. Gravel is occasional fine to medium rounded flint.	
							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	N=10	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.	
				1.00			Hand Pen at 1m = 145kPa End of pit at 1.00 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 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

