

Samuel Parry,
The Longley Group,
Unit 4 Brook Court,
Blakeney Road,
Beckenham,
Kent,
BR3 1HG

11th July 2022

Our Ref: 4551 22 07 11 Ltr Rpt 01 Rev A AS SP

Dear Samuel,

SITE: Armoury Drive, Gravesend, DA12 1NB
SERVICE: Ground Gas Risk Assessment Addendum Letter Report

Introduction

The work covered in this report was undertaken on behalf of The Longley Group, in accordance with Sevenoaks Environmental Consultancy Ltd's (SEC) proposal dated January 2022 (Ref: 4551 22 01 05 Ltr 01 FPA 01 REV A LB CW). This addendum provides comment on the environmental ground gas monitoring carried out as part of the previous site investigation and should be read in conjunction with the Preliminary Geo-Environmental Site Investigation Report (Ref: 4551 22 04 21 Rpt 06 Rev B EH CW) previously provided.

The site was noted to form an approximately 'L' shaped plot previously occupied by a former St John's Ambulance Garage and a Water Tower Structure with associated tarmac hardstanding (See attached Figures 1 & 2 – Site Location Plan and Existing Site layout Plan). The approved proposed development associated with the planning application (Ref: 2020/0561) is understood to involve the construction of 1 No. 2-storey block of flats to the western end of the site and 2No. detached bungalows to the eastern end with gardens and areas of soft landscaping (see attached Figure 3 – Proposed Development Plan).

As part of the Geo-Environmental Site Investigation referred to above, SEC were instructed to carry out 9no. environmental ground gasses and groundwater monitoring visits. Details of the standpipes installed and their response zone backfill / materials have been provided in the relevant attached Exploratory Hole Records. Also see attached the Exploratory Hole Location Plan.

Assessment

9 No. rounds of environmental ground gas monitoring was carried out between 9th March 2022 and 7th July 2022 and included 2no. rounds of monitoring undertaken at periods of low atmospheric pressure to help inform a preliminary ground gas risk assessment given consideration of the potential on site sources of ground gas that have been identified which include the following:

- Made Ground associated with the sites former use as a garage and its potential use for storage and leaks of oils/paints/fuels and identified to contain elevated concentrations of PAHs;
- Former site use as a garage with an above ground tank and as part of a barracks;

Off-site sources of potential contamination identified primarily included an infilled chalk pit ~167m north east (1954 – 1981), tanks 76m north east (1954 – 1993) and 49m south east (1954 – 1978)

Based on the rounds of monitoring conducted, concentrations of carbon dioxide were recorded to be typically below 5% although the highest concentration recorded was 7.3% by Vol (WS05). Methane concentrations were generally low although spikes up to ~45% (WS05 monitoring round No. 5) were recorded. This spike in methane was identified for the first few seconds of monitoring at WS05 and then the methane concentration reduced back down to 0% by Vol. During the other visits concentrations of Methane were not recorded to be elevated, except for visit No. 6 where another methane spike was recorded for a few seconds before returning to 0% by Vol. No elevated concentrations of VOCs were recorded and flow rates were recorded up to a maximum of 0.4l/hr (WS01 and WS05) (see attached Environmental Monitoring data).

Of potential relevance it is known that a gas main leak occurred nearby to the north of the site, which was reportedly repaired in the early part of 2022. However during the environmental ground gas monitoring visits and also prior to the conduct of the previous Site Investigation (which was after the reported repair was made) a strong methane odour has been observed within the manhole located adjacent to the north of the site in Albert Murray Close which is also incidentally close by to WS05.

Discussion and Recommendations

The results of the environmental ground gas monitoring indicate that a ground gas screening value of 0.0292 l/hr is applicable to the site. This corresponds with Characteristic Situation 1 of the current CIRIA C665 guidance. However, given that carbon dioxide concentrations have been recorded in excess of 5%, spikes of highly elevated methane have been recorded on site and the apparently persistent methane which continues to collect within a manhole adjacent to the site possibly associated with the gas main leak adjacent to the north of the site, it is recommended that a precautionary approach be adopted with respect to potential ground gas risks on site. Accordingly it is recommended that Characteristic Situation 2 of CIRIA C665 Guidance should be adopted for the site.

Based upon the assumption that the proposed building will comprise a Type A Building as described in the BS 8485:2015 guidance i.e. private housing with small sized rooms, it is recommended that at least 2 No. different design measures be employed within the design of the proposed building in order to reach a minimum gas protection score of 3.5 points. Inclusion of a passively vented sub-floor void and low permeability hydrocarbon resistant gas protection membrane within the design would achieve the required points (however please refer to Tables 5, 6 and 7 of the BS 8485:2015 guidance for

further details). Please note that all joints and penetrations should be appropriately sealed and that protective measures should be fitted appropriately in accordance with the manufacturer's specification and current guidance including BRE414 and BS8485.

At an early design stage prior to construction a Verification Plan detailing the gas protection materials' specifications, methodology of installation, installation design and the installers qualifications and experience should be produced by a suitably qualified independent specialist for submission to the Regulators for their approval prior to installation of the protection measures to avoid proceeding at risk. A suitably qualified independent specialist should also produce a Validation Report in accordance with C735 for the membrane installation to certify the installation of the protective measures complies with the requirements of the Verification Plan.

It is recommended that the existing monitoring boreholes should be retained until the ground gas risk assessment has been approved by the Regulators.

Potential residual risks should be mitigated by the implementation of a Discovery Strategy on site during the redevelopment works which should include for the immediate reporting of any potential indicators of ground or water contamination (e.g. cement bonded asbestos sheeting fragments, ash/clinker or hydrocarbon odours) for additional separate assessment by an Environmental Consultant. Additionally groundworkers should wear appropriate PPE/RPE, work in well ventilated areas, avoid confined spaces, avoid contact with soil and groundwater, not smoke, adopt high standards of personal hygiene, and operate with due care.

It is also noted that the recommendations made in the previous Geo-Environmental Site Investigation report remain applicable and are reiterated below for reference;

- That prior to the proposed development, all general rubbish and drums of fuel should be appropriately removed from site and disposed of at suitably licensed facilities (all waste disposal documents to be retained);
- That the existing potentially coal tar rich tarmac surfacing be disposed of from site to suitably licensed waste management facilities as hazardous waste under waste code 17 03 01. All waste disposal documentation should be retained for inclusion within a future Validation Report. To help facilitate appropriate waste disposal from site, the tarmac surfacing should be carefully excavated and segregated from the underlying material under the supervision of an Environmental Consultant;
- That a watching brief be maintained by an Environmental Consultant during the removal of the hardstanding across the site and in particular the ground slab of the former buildings. Confirmatory validation samples should be recovered for analysis to confirm an absence of impact associated with contaminants of concern including metals, PAHs, hydrocarbons and asbestos;
- That remedial excavation be conducted to remove the lead and asbestos impacted Made Ground identified on site for appropriate disposal to suitably licensed facilities. Remedial excavation should be overseen by an Environmental Consultant and be certified by soil validation sample analysis from the sides and base of the remedial excavation. Any imported backfill material (e.g. engineered fill / aggregate, subsoil or topsoil) should be chemically validated in relation to suitability for use on site as part of the proposed development, including the review of the supplier's chemical batch data prior to import and chemical analysis of validation samples following importation to site;

- That an asbestos picking exercise be conducted during the excavation of asbestos impacted material locally to TP01 and TP03, to remove fragments of cement bonded asbestos sheeting for separate disposal. Asbestos picking should be conducted by Category A & B Asbestos Awareness trained operatives and to help mitigate potential Health and Safety risks appropriate PPE / RPE should be worn by operatives during the remedial excavation and asbestos picking, including disposable suits and RPE;
- That all waste arisings should be disposed of from site appropriately in accordance with EA WM3 guidance. The impacted Made Ground should be disposed of as Non-Hazardous waste under waste code 17 05 04 and picked asbestos containing material fragments as Hazardous waste under waste code 17 06 05. All arisings should be segregated based on waste stream types and according to waste classification. All waste disposal tickets should be retained;
- That a “clean” cover system be provided to a minimum thickness of 475mm across landscaped / garden areas. The cover system should comprise the provision of a high visibility marker layer (permeable geotextile or similar) overlain by imported certified “clean” topsoil to the required minimum thickness. Subject to existing and proposed site levels it may be necessary to remove some existing soils to facilitate the cover system. Prior to delivery of any imported topsoil to site, the supplier’s chemical batch data should be provided to an Environmental Consultant for review and following provision of the cover system to landscaped areas it should be validated by an Environmental Consultant. This should include chemical analysis of a representative number of imported cover system validation samples based on a minimum frequency of 1 validation sample per garden / landscaped area as a minimum or 1 sample per 50m3 per material source for larger areas. In addition the thickness of cover system should be certified;
- That the water supply pipework included within the design of the proposed development should be chemically resistant barrier pipe. Alternatively the water supplier should be contacted to confirm chemically resistant barrier pipe is not required;
- That groundworkers should wear appropriate PPE/RPE, work in well ventilated areas, avoid confined spaces, avoid contact with soil and groundwater, not smoke, adopt high standards of personal hygiene, and operate with due care;
- That a Discovery Strategy should be implemented on site during the redevelopment work which should include for the immediate reporting of any potential indicators of ground or water contamination e.g. asbestos fragments, ash / clinker or hydrocarbon odours for separate assessment by an Environmental Consultant;
- That prior to the conduct of any remedial work, a Remedial Method Statement should be approved by the Regulators; and
- That any remedial work conducted on site as part of the proposed development should be certified and documented within a Validation Report produced by an Environmental Consultant.

Please refer to the attached General Limitations and Exceptions

Kind Regards

Damian Jones

Managing Director

d.jones@sevenoaksenvironmental.co.uk

Enc.

Site Location Plan

Existing Site Layout Plan

Proposed Site Layout

Exploratory Hole Location Plan

Exploratory Hole Records

Environmental Monitoring

General Limitations and Exceptions

Gravesham Borough Council



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SITE: Armoury Drive, Gravesend

SCALE: NTS

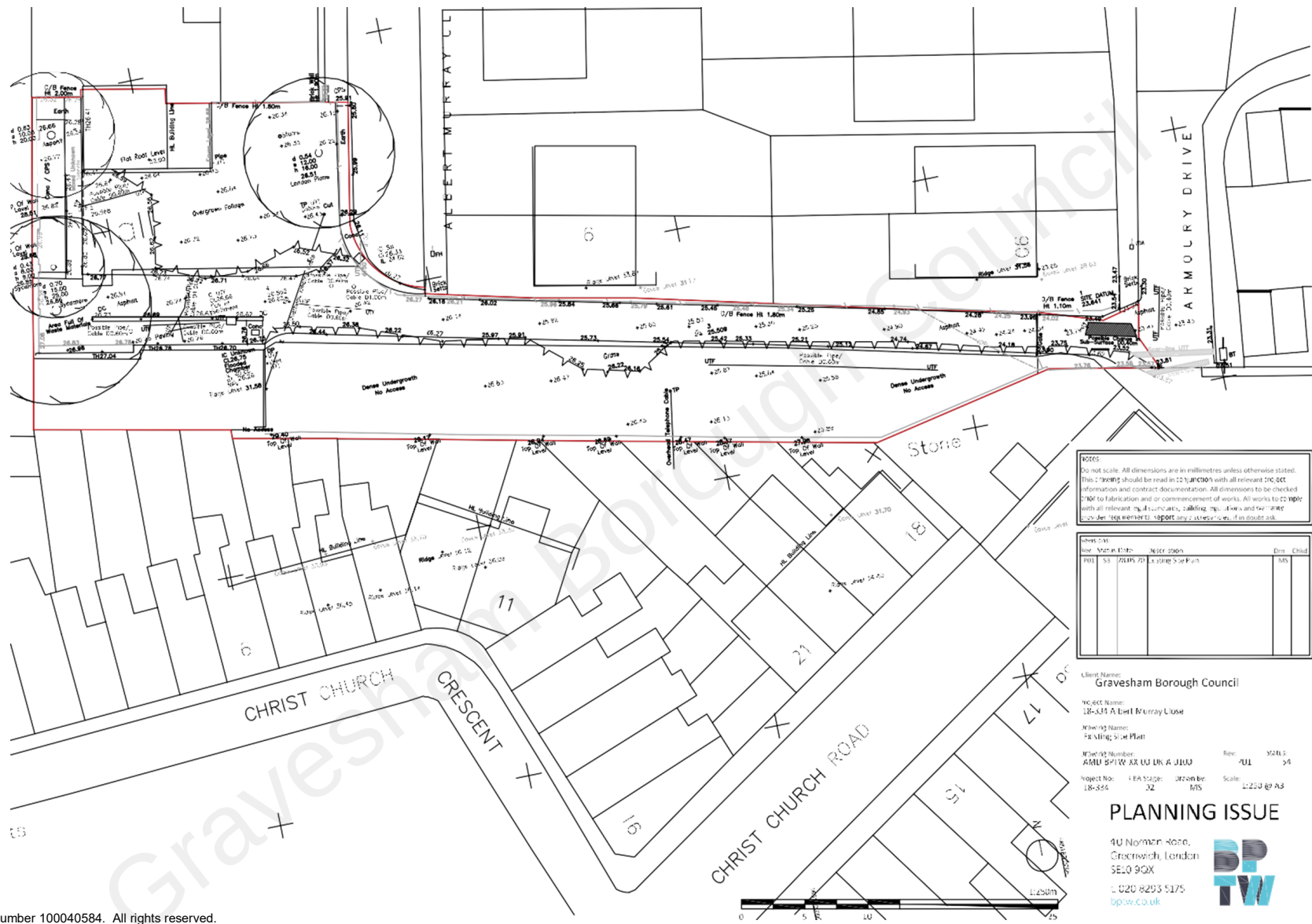
JOB NO: 4551

FIGURE TITLE: Site Location Plan

REV: 01

FIGURE NO: 01

 **SEVENOAKS**
ENVIRONMENTAL
CONSULTANCY



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SITE: Armoury Drive, Gravesend	SCALE: NTS	JOB NO: 4551	
FIGURE TITLE: Existing Layout Plan	REV: 01	FIGURE NO: 02	



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SITE: Armory Drive, Gravesend

SCALE: NTS

JOB NO: 4551

FIGURE TITLE: Site Location Plan

REV: 01

FIGURE NO: 03



WINDOW SAMPLE LOG

Project Combined Site Investigation - Former St Johns Ambulance HQ, Armoury Drive, DA12 1NB				Window Sample No WS01
Job No 4551	Date 25-02-22	Ground Level (m)	Co-Ordinates ()	
Contractor Sevenoaks Environmental Consultancy Ltd				Sheet 1 of 1

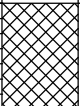
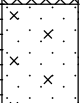
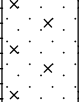
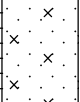
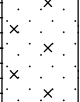
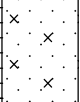
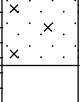
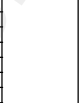
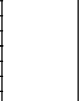
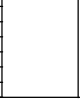
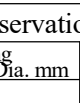
SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.05	D	PID: 0.0ppm				0.15	MADE GROUND: Bituminous surfacing with hydrocarbon smell noted throughout.		
0.50	D	PID: 0.4ppm				(0.50) 0.65	MADE GROUND: Soft dark orange mottled black slightly sandy Clay with rare gravels. Gravels are fine to medium sub-rounded to sub-angular bituminous surfacing and tile fragments.		
1.00	D	PID: 0.4ppm					Medium dense orange mottled yellow slightly clayey Sand. Sand is fine.		
1.00-1.45	SPTN	= 11 blows				(1.45)			
1.50	D	PID: 4.1ppm							
2.00	D	PID: 4.1ppm				2.10			
2.00-2.45	SPTN	= 10 blows					Loose to medium dense grey mottled orange slightly gravelly slightly silty fine SAND. Gravel is fine subrounded flint fragments.		
2.50	D	PID: 18.1ppm				(1.35)			
3.00	D	PID: 18.9ppm				3.45			
3.00-3.45	SPTN	= 14 blows					Medium dense grey mottled orange slightly clayey SAND, with rare medium sub-rounded flint gravel.		
3.50	D	PID: 5.9ppm				(1.00)			
4.00	D	PID: 11.5ppm				4.45			
4.00-4.45	SPTN	= 16 blows							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.
All dimensions in metres Scale 1:50			Client The Longley Group			Method/ Plant Used CDS Rig			Logged By EH		

WINDOW SAMPLE LOG 4551 ARMOURY DRIVE GPJ AGS3 ALL GDT 5/4/22

WINDOW SAMPLE LOG

Project Combined Site Investigation - Former St Johns Ambulance HQ, Armoury Drive, DA12 1NB				Window Sample No WS02
Job No 4551	Date 25-02-22	Ground Level (m)	Co-Ordinates ()	
Contractor Sevenoaks Environmental Consultancy Ltd				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.05	D	PID: 4.6ppm				(0.70)	MADE GROUND: Loose to medium dense dark brown very clayey gravelly Sand with rootlets. Gravels are fine to medium sub-angular to sub-rounded flint glass and tile fragments.		
0.50	D	PID: 7.5ppm				0.70	Medium dense grey mottled orange slightly silty fine SAND.		
1.00	D	PID: 5.1ppm							
1.00-1.45	SPTN	= 12 blows							
1.50	D	PID: 6.6ppm							
2.00	D	PID: 0.6ppm							
2.00-2.45	SPTN	= 21 blows							
2.50	D	PID: 5.7ppm				(3.75)			
3.00	D	PID: 9.5ppm							
3.00-3.45	SPTN	= 24 blows							
3.50	D	PID: 40.8ppm							
4.00	D	PID: 5.3ppm							
4.00-4.45	SPTN	= 20 blows				4.45			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.

All dimensions in metres
Scale 1:50

Client **The Longley Group**

Method/
Plant Used

CDS Rig

Logged By
EH

WINDOW SAMPLE LOG

Project Combined Site Investigation - Former St Johns Ambulance HQ, Armoury Drive, DA12 1NB				Window Sample No WS03
Job No 4551	Date 25-02-22	Ground Level (m)	Co-Ordinates ()	
Contractor Sevenoaks Environmental Consultancy Ltd				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.05	D	PID: 0.5ppm				0.30	MADE GROUND: Soft to firm dark brown mottled white slightly sandy very gravelly Clay with cobbles. Sand is fine. Gravel is fine to coarse angular to subrounded flint, brick, concrete and tile fragments. Cobbles are up to 10cm in diameter.		
0.50	D	PID: 0.4ppm				(0.80)	MADE GROUND: Soft to firm dark brown slightly sandy gravelly Clay. Sand is fine. Gravels are fine to coarse rounded to sub-angular flint, cement and brick fragments.		
1.00	D	PID: 0.7ppm				1.10			
1.00-1.45	SPTN	= 12 blows				1.25	MADE GROUND: Loose to medium dense brown mottled orange slightly clayey gravelly Sand, with rare rootlets. Sand is fine. Gravels are fine to coarse rounded to sub-angular flint, concrete and brick fragments.		
2.00	D	PID: 11.4ppm					Medium dense grey mottled orange slightly silty fine Sand.		
2.00-2.45	SPTN	= 16 blows							
3.00	D	PID: 24.6ppm				(3.20)			
3.00-3.45	SPTN	= 21 blows							
4.00	D	PID: 1.1ppm				4.45			
4.00-4.45	SPTN	= 21 blows							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.
All dimensions in metres Scale 1:50			Client The Longley Group			Method/ Plant Used CDS Rig			Logged By EH		

WINDOW SAMPLE LOG 4551 ARMOURY DRIVE GPJ AGS3 ALL GDT 5/4/22

WINDOW SAMPLE LOG

Project Combined Site Investigation - Former St Johns Ambulance HQ, Armoury Drive, DA12 1NB				Window Sample No WS04
Job No 4551	Date 25-02-22	Ground Level (m)	Co-Ordinates ()	
Contractor Sevenoaks Environmental Consultancy Ltd				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.05	D	PID: 0.0ppm				0.25	MADE GROUND: Soft dark brown slightly sandy gravelly Clay. Sand is fine. Gravels are fine to medium sub-angular to rounded flint, brick and concrete fragments.		
0.50	D	PID: 0.0ppm				(0.90)	Medium dense grey mottled orange slightly silty gravelly SAND. Sand fine to medium. Gravels are fine to medium sub-angular to rounded flint fragments.		
1.00	D	PID: 0.3ppm				1.15			
1.00-1.45	SPT	16 blows					Medium dense grey mottled orange slightly silty fine SAND.		
1.50	D	PID: 0.3ppm							
2.00	D	PID: 0.9ppm							
2.00-2.45	SPT	11 blows							
2.50	D	PID: 1.5ppm							
3.00	D	PID: 1.3ppm							
3.00-3.45	SPT	25 blows							
3.50	D	PID: 0.2ppm							
4.00	D	PID: 0.9ppm							
4.00-4.45	SPT	15 blows				4.45			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.
All dimensions in metres Scale 1:50			Client The Longley Group			Method/ Plant Used CDS Rig			Logged By EH		

WINDOW SAMPLE LOG 4551 ARMOURY DRIVE GPJ AGS3 ALL GDT 5/4/22

WINDOW SAMPLE LOG

Project Combined Site Investigation - Former St Johns Ambulance HQ, Armoury Drive, DA12 1NB				Window Sample No WS05
Job No 4551	Date 25-02-22	Ground Level (m)	Co-Ordinates ()	
Contractor Sevenoaks Environmental Consultancy Ltd				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.05	D	PID: 0.0ppm					MADE GROUND: Soft to firm dark brown mottled yellow slightly sandy gravelly Clay, with occasional rootlets to 0.15m bgl. Sand is fine. Gravels are fine to coarse sub-angular to sub-rounded brick, flint and tile fragments.		
0.50	D	PID: 0.0ppm				(1.35)			
1.00	D	PID: 0.1ppm				1.35			
1.00-1.45	SPT N = 8 blows						Loose to medium dense grey mottled orange slightly silty slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium rounded flints. ...@between 3.20m and 3.30m bgl gravelly lense noted. Gravel is coarse, subrounded of flint.		
1.20	D	PID: 3.3ppm							
1.50	D	PID: 25.7ppm							
2.00	D	PID: 11.9ppm							
2.00-2.45	SPT N = 8 blows								
2.50	D	PID: 8.8ppm				(3.10)			
3.00	D	PID: 2.1ppm							
3.00-3.45	SPT N = 19 blows								
3.50	D	PID: 4.7ppm							
4.00	D	PID: 1.3ppm							
4.00-4.45	SPT N = 15 blows					4.45			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.
All dimensions in metres Scale 1:50			Client The Longley Group			Method/ Plant Used CDS Rig			Logged By EH		

WINDOW SAMPLE LOG 4551 ARMOURY DRIVE GPJ AGS3 ALL GDT 5/4/22



Date: 18/03/2022
Site: Armoury Drive
Job Ref: 4551
Monitoring Round: 1

Borehole Ref:	Methane %	Carbon Dioxide %	Oxygen %	Carbon Monoxide (ppm)	H2S %	VOCs (ppm)	Flow l/hr	Dip [m]	Plumb [m]	Comments
WS01	0.0	2.1	19.4	0.0	0.0	0.0	0.3	Dry	4.02	
WS02	0.0	2.6	17.1	0.0	0.0	0.0	0.1	Dry	3.85	
WS03	0.0	1.5	19.9	0.0	0.0	0.0	0.4	Dry	3.98	
WS04	0.0	1.7	18.6	0.0	0.0	0.0	0.1	Dry	4.06	
WS05	0.0	2.9	17.5	0.0	0.0	0.0	0.1	Dry	3.98	

Atmospheric pressure start:	1030mb
Atmospheric pressure finish:	1030mb
Weather:	Sunny



Date: 31/03/2022
Site: Armoury Drive
Job Ref: 4551
Monitoring Round: 2

Borehole Ref:	Methane %	Carbon Dioxide %	Oxygen %	Carbon Monoxide (ppm)	H2S %	VOCs (ppm)	Flow l/hr	Dip [m]	Plumb [m]	Comments
WS01	0.0	0.1	20.7	0.0	0.0	0.0	0.1	Dry	3.93	
WS02	0.0	0.1	20.6	0.0	0.0	0.0	0.1	Dry	3.75	
WS03	0.0	1.8	19.5	0.0	0.0	0.0	0.1	Dry	3.90	
WS04	0.0	2.2	17.7	0.0	0.0	0.0	0.1	Dry	3.97	
WS05	0.0	3.3	17.8	0.0	0.0	0.0	0.1	Dry	3.87	

Atmospheric pressure start:	987mb
Atmospheric pressure finish:	985mb
Weather:	Snowing



Date: 21/04/2022
Site: Armoury Drive
Job Ref: 4551
Monitoring Round: 3

Borehole Ref:	Methane %	Carbon Dioxide %	Oxygen %	Carbon Monoxide (ppm)	H2S %	VOCs (ppm)	Flow l/hr	Dip [m]	Plumb [m]	Comments
WS01	0.0	2.2	19.4	0.0	0.0	0.0	0.1	Dry	4.03	
WS02	0.0	3.3	17.0	0.0	0.0	0.0	0.1	Dry	3.85	
WS03	0.0	1.8	19.7	0.0	0.0	0.0	0.3	Dry	3.98	
WS04	0.0	2.4	17.8	0.0	0.0	0.0	0.1	Dry	4.05	
WS05	0.0	3.6	17.7	0.0	0.0	0.0	0.1	Dry	3.95	

Atmospheric pressure start:	1001mb
Atmospheric pressure finish:	1004mb
Weather:	Sunny



Date: 29/04/2022
Site: Armoury Drive
Job Ref: 4551
Monitoring Round: 4

Borehole Ref:	Methane %	Carbon Dioxide %	Oxygen %	Carbon Monoxide (ppm)	H2S %	VOCs (ppm)	Flow l/hr	Dip [m]	Plumb [m]	Comments
WS01	0.0	2.3	19.5	0.0	0.0	0.0	0.4	Dry	4.03	
WS02	0.0	3.4	17.5	0.0	0.0	0.0	0.0	Dry	3.87	
WS03	0.0	1.5	20.2	0.0	0.0	0.0	0.2	Dry	3.99	
WS04	0.0	2.6	18.3	0.0	0.0	0.0	0.0	Dry	4.05	
WS05	0.0	3.2	18.3	0.0	0.0	0.0	0.1	Dry	3.97	

Atmospheric pressure start:	1016mb
Atmospheric pressure finish:	1015mb
Weather:	Sunny



Date: 12/05/2022
Site: Armoury Drive
Job Ref: 4551
Monitoring Round: 5

Borehole Ref:	Methane %	Carbon Dioxide %	Oxygen %	Carbon Monoxide (ppm)	H2S %	VOCs (ppm)	Flow l/hr	Dip [m]	Plumb [m]	Comments
WS01	0.0	2.4	19.1	0.0	0.0	0.0	0.1	Dry	4.04	CH4 and LEL was at around 5% and dropped to 0 after ~3 seconds
WS02	0.0	3.4	18.4	0.0	0.0	0.0	0.0	Dry	3.77	
WS03	0.0	1.5	19.7	0.0	0.0	0.0	0.1	Dry	3.97	
WS04	0.0	2.8	18.1	0.0	0.0	0.0	0.0	Dry	4.06	
WS05	0.0	3.4	18.2	0.0	0.0	0.0	0.1	Dry	3.97	CH4 started at ~45% and dropped to 0 after ~3 seconds

Atmospheric pressure start:	1005mb
Atmospheric pressure finish:	1010mb
Weather:	Sunny



Date: 25/05/2022
Site: Armoury Drive
Job Ref: 4551
Monitoring Round: 6

Borehole Ref:	Methane %	Carbon Dioxide %	Oxygen %	Carbon Monoxide (ppm)	H2S %	VOCs (ppm)	Flow l/hr	Dip [m]	Plumb [m]	Comments
WS01	0.0	2.5	18.9	0.0	0.0	0.0	0.3	Dry	3.92	CH4 was at around 0.8% and dropped to 0 after ~4 seconds
WS02	0.0	2.4	18.4	0.0	0.0	0.0	0.1	Dry	3.66	
WS03	0.0	1.5	19.5	0.0	0.0	0.0	0.1	Dry	3.87	
WS04	0.0	2.9	17.3	0.0	0.0	0.0	0.1	Dry	3.95	
WS05	0.0	3.7	17.2	0.0	0.0	0.0	0.4	Dry	3.87	

Atmospheric pressure start:	998mb
Atmospheric pressure finish:	1001mb
Weather:	Sunny



Date: 10/06/2022
Site: Armoury Drive
Job Ref: 4551
Monitoring Round: 7

Borehole Ref:	Methane %	Carbon Dioxide %	Oxygen %	Carbon Monoxide (ppm)	H2S %	VOCs (ppm)	Flow l/hr	Dip [m]	Plumb [m]	Comments
WS01	0.0	2.5	18.4	0.0	0.0	0.0	1.9	Dry	4.05	
WS02	0.0	2.3	18.8	0.0	0.0	0.0	1.9	Dry	3.78	
WS03	0.0	1.5	19.4	0.0	0.0	0.0	1.5	Dry	3.98	
WS04	0.0	3.9	16.7	0.0	0.0	0.0	1.5	Dry	3.98	
WS05	0.0	3.2	17.3	0.0	0.0	0.0	1.6	Dry	4.06	

Atmospheric pressure start:	1004mb
Atmospheric pressure finish:	1010mb
Weather:	Overcast



Date: 23/06/2022
Site: Armoury Drive
Job Ref: 4551
Monitoring Round: 8

Borehole Ref:	Methane %	Carbon Dioxide %	Oxygen %	Carbon Monoxide (ppm)	H2S %	VOCs (ppm)	Flow l/hr	Dip [m]	Plumb [m]	Comments
WS01	0.0	2.4	18.9	0.0	0.0	0.0	0.3	Dry	4.03	
WS02	0.0	2.0	19.6	0.0	0.0	0.0	0.1	Dry	3.77	
WS03	0.0	1.6	20.1	0.0	0.0	0.0	0.1	Dry	3.97	
WS04	0.0	2.9	17.7	0.0	0.0	0.0	0.1	Dry	4.05	
WS05	0.0	4.6	13.3	0.0	0.0	0.0	0.4	Dry	3.95	

Atmospheric pressure start:	1018mb
Atmospheric pressure finish:	1017mb
Weather:	Sunny



Date: 07/07/2022
Site: Armoury Drive
Job Ref: 4551
Monitoring Round: 9

Borehole Ref:	Methane %	Carbon Dioxide %	Oxygen %	Carbon Monoxide (ppm)	H2S %	VOCs (ppm)	Flow l/hr	Dip [m]	Plumb [m]	Comments
WS01	0.0	0.8	20.3	0.0	0.0	0.3	0.0	Dry	4.03	
WS02	0.0	1.4	19.9	0.0	0.0	0.0	0.0	Dry	3.77	
WS03	0.0	1.4	19.7	0.0	0.0	0.0	0.0	Dry	3.98	
WS04	0.0	2.4	18.2	0.0	0.0	0.0	0.0	Dry	4.06	
WS05	0.0	7.3	11.8	0.0	0.0	0.0	0.4	Dry	3.96	

Atmospheric pressure start:	1025mb
Atmospheric pressure finish:	1023mb
Weather:	Sunny

General Limitations and Exceptions

1. The advice given in this report with respect to contaminated land / pollution is based on the guidelines available at the time of writing.
2. The Client is advised that the conditions observed on site by SEC at the time of the investigation or assessment are subject to change. Certain indicators of the presence of hazardous substances may have been latent at the time of the most recent site reconnaissance or investigation and they may subsequently have become observable.
3. Comments made relating to land gas or groundwater conditions are based on observations made at the time of an investigation unless otherwise stated. However, land gas or groundwater conditions may vary as a result of seasonal or other effects.
4. Ground contamination often exists as small discrete areas of contamination and there can be no certainty that any or all such areas have been located, sampled and / or identified.
5. Whilst commonly regarded as one of the most reliable drilling techniques, cable percussive drilling may result in a certain amount of soil mixing.
6. This assessment may be subject to amendment in light of additional information becoming available.
7. The findings and opinions conveyed in this report are based on information obtained from a variety of sources, including that from 1) previous site investigations and 2) chemical testing laboratories, and which SEC has assumed are correct. Nevertheless, SEC cannot and does not guarantee the authenticity or reliability of the information it has relied upon. SEC can accept no responsibility for inaccuracies within the data supplied by other parties.
8. This report is written in the context of an agreed scope of work between SEC and the Client and should not be used in a different context. In light of additional information becoming available, improved practices and changes in legislation amendment or re-interpretation of the assessment or report in whole or part may be necessary after its original submission.
9. This report is provided for sole use by the Client and is confidential to them. No responsibility whatsoever for the contents of the report will be accepted to anyone other than the Client.
10. SEC believes that providing information about limitations is essential to help the Client identify and thereby manage risks.
11. The copyright of written materials supplied shall remain the property of SEC but with a royalty free perpetual licence, granted to the Client on payment in full of any outstanding monies.
12. SEC does not provide legal advice and the advice of the Clients legal advisors may also be required.
13. The use of data generated by this site investigation for the design of foundations or geo-technical assessment was outside the scope of this report.
14. An ecological, topographical or asbestos survey was outside of the scope of this report.

15. SEC notes that all recommendations made within our report are subject to regulatory approval and should be agreed with them prior to the conduct of any further site investigation, remediation or development works.
16. This report represents a stage in an iterative process of investigation and assessment and as such it is possible that further work may be recommended.
17. The report is issued on the condition that SEC will under no circumstances be liable for any loss arising directly or indirectly from ground conditions between the boreholes or trial pits which have not been shown by the borehole, trial pits or other tests carried out during the investigation.
18. In addition, SEC will not be liable for any loss whatsoever arising directly or indirectly from any opinion given on the possible configuration of strata both between the borehole and/or trial pit positions and/or below the maximum depth of the investigation. Such opinions, where given, are for guidance only.
19. No allowance has been made in this report for testing which may be required for waste categorisation prior to the removal of any material from site for disposal.
20. No person other than the client to whom this report is addressed, shall rely on it in any respect and no duty of care shall be owed to any such third party.
21. That this investigation has relied on information from a discrete number of exploratory hole locations and allowances should be made for the variation in ground conditions between these locations and within the site boundary.
22. The opinions expressed in this report are based on the ground conditions revealed by the site works, together with an assessment of the site and of laboratory test results. Whilst opinions may be expressed relating to sub-soil conditions in parts of the site not investigated, for example between or beyond borehole positions, these are only for guidance only and no liability can be accepted for their accuracy.
23. It should be noted that the Made Ground depth recorded above is that encountered within the exploratory holes undertaken during the phase of work to which this report pertains. Owing to the variable nature and unknown deposition criteria of Made Ground it is possible that deeper or more extensive areas of Made Ground may exist at this site which has not been revealed by the current work. SEC can only comment on the findings within the exploratory holes conducted and cannot be held liable for variation of ground conditions between exploratory hole.
24. The above should take into account any LPA requirements with regard to the sites archaeological sensitivity (e.g. Watching Brief on excavation works)