

Seagate Homes
Holbeach Manor
Fleet Road
Holbeach
PE12 7AX

Date 9 May 2024
Our Ref JHG/113341A

Dear Sirs,

STATION YARD, MILL DROVE SOUTH, COWBIT, SPALDING, LINCOLNSHIRE

Introduction

The client, Seagate Homes, is proposing residential development comprising twenty-one dwellings on land at Station Yard, Mill Drove South, Cowbit, Spalding, Lincolnshire.

In preparation for this development the client instructed Ground Engineering Limited to carry out a further three soil gas monitoring visits to supplement an original three visits completed as part of an initial site investigation whose findings are detailed in Ground Engineering Reports C15840: December 2022 and C15840A: February 2023. Monitoring of the original standpipes BH1 and BH2 had been intended, however site stripping works in March 2024 had destroyed these installations. The client subsequently instructed Ground Engineering to install two new standpipes in WS1 and WS2.

Location, Topography and Geology of the Site

The site lies on the northern side of the Lincolnshire village of Cowbit which is about 5km to the south of Spalding as shown in Figure 1. The flat and level fenland site is centred at National Grid Reference TF 2653 1820 and stands at about 3mOD.

The site comprises a 40m wide by 110m long plot of derelict land, former railway sidings, located to the north of Stone Gate, and to the west of Mill Drove South. Prior to site stripping works carried out in March 2024 a dirt track ran along the western side of the site which was overgrown with grass, brambles, bushes, and Silver Birch and Hawthorn saplings. Along the southern margin of the site was a double height brick constructed building, believed to have been a goods or engine shed.

The geological map for the area, sheet 144 'Spalding' at 1:50,000 scale, and Geology of Britain online viewer, show the site to be covered by Tidal Flat Deposits.

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The initial ground investigation encountered a 0.10m to 1.00m thick surface layer of made ground over superficial Tidal Flat Deposits comprising soft and very soft, organic clay with localised layers/lenses of sand and peat.

Marine Sand was encountered below the Tidal Flat Deposits depths between 5.00m and 6.00m. Glacial Till was present below the Marine Sand at 11.80m and 12.30m depth and at 17.50m depth the solid geology of the Oxford Clay was encountered.

Site Work

The site work was carried out on 15 April 2024 and comprised two window sample boreholes at the locations shown in Figure 2. Service plans were consulted, and a cable avoidance tool (CAT) was used to check for the absence of buried services prior to excavation.

The exploratory hole records have been produced in accordance with BS5930:2015+A1:2020 'Code of Practice for Site Investigations,' and are provided to the rear of this report together with the test results. The records provide the descriptions and depths of the various strata encountered, samples taken, and the groundwater conditions observed during excavation and on completion.

The window sample boreholes, WS1 and WS2, were sunk to a depth 3.00m and were formed by a small track-mounted window sampling and super heavy dynamic probing rig. The window sampling equipment consisted of drive-in sample tubes of specially constructed and strengthened steel, lined with a plastic core-liner. The barrels were initially of 87mm internal diameter and were reduced in diameter with successive barrels with increasing depth. Upon extraction, a continuous 'undisturbed' profile of the soil was obtained within the plastic liners.

A groundwater monitoring installation comprising 50mm diameter perforated HDPE pipe, was inserted close to the base of the boreholes at 3.00m depth. The annulus between the pipe and the borehole was backfilled with silica gravel to a depth of 1.00m. A bentonite seal was inserted between 0.50m and 1.00m, above which the tube was sealed by a gas valve and a lockable protective cover was fixed in concrete.

Return Visits to Site

Weekly return visits to site were undertaken on 19 & 26 April 2024 and 2 May 2024 to monitor the standpipe installations, WS1 and WS2, for depth to groundwater and the concentrations of methane, carbon dioxide and oxygen. Measurement was carried out using a Gasdata GFM430, which also recorded the atmospheric pressure and flow rate.

Previous monitoring of standpipes BH1 and BH2 had been carried out on 5, 12 & 20 January 2023 as documented in Ground Engineering Report C15840A: February 2023.

The monitoring results are presented on and following the borehole records to the rear of this report.

Ground Conditions

The ground conditions in WS1 and WS2 comprised 0.40m thickness of made ground, which rested on superficial Tidal Flat Deposits.

The made ground comprised a 0.10m to 0.15m thick surface layer of black, grey and brown, gravelly sand, which rested on brown and orange brown sand and gravel present to 0.40m depth. The gravel fraction was composed of angular brick and concrete with some ash and glass also present within the upper layer.

Below the made ground the boreholes passed into Tidal Flat Deposits which primarily comprised layers of soft and very soft, brown, dark brown, grey and dark grey, silty clay/organic clay which contained decayed plant matter. Layers of brown and grey, fine sand and soft, grey and brown, sandy clay/silt; were also present in WS1 and WS2 between 0.40m and 0.70m depth; and a brown, clayey, silty fine sand was identified between 0.70m and 1.40m in WS2.

No groundwater was encountered during boring and standpipe water levels, during the period between 19 April 2024 and 2 May 2024, fluctuated between 1.09m and 1.26m in WS1 and between 1.91m and 1.91m in WS2.

Soil Gas

Return visits to site were undertaken on 5, 12 & 20 January 2023 (BH1 & BH2 - C15840A); and 19 & 26 April 2024; and 2 May 2024 (WS1 & WS2 - 113341A) to monitor the standpipe installations for depth to groundwater and the concentrations of methane, carbon dioxide and oxygen. Measurement was carried out using a Gasdata GFM430, which also recorded the atmospheric pressure and flow rate.

Concentrations of less than 0.1% by volume methane were encountered with carbon dioxide concentrations between 0.6% and 5.0% by volume. Oxygen levels of between 12.0% and 21.0% were also measured.

The results indicate a Gas Screening Value (GSV) of 0.0001l/hr for methane and 0.0050l/hr for carbon dioxide.

The results fall into CS1 as defined by BS8485:2015+A1:2019 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'.

Conclusions

The desk study suggests that there are no landfills within 250m of the site. Reference to NHBC Foundation document NF94, April 2023 suggests that the Tidal Flat Deposits are unlikely to provide a credible source of ground gas due to the organic material being locked in a low permeability matrix.

The GSV values, measured, over six monitoring visits for methane and carbon dioxide fall within a CS1 very low hazard potential in accordance with BS8485:2015+A1:2019.

Reference to Table 4 of BS8485:2015+A1:2019 indicates that for a Type A building, representative of private housing, no gas protection measures are required for a CS1 categorisation.

In conclusion, on the basis of these findings, no specific gas protection measures would be deemed necessary.

GROUND ENGINEERING LIMITED



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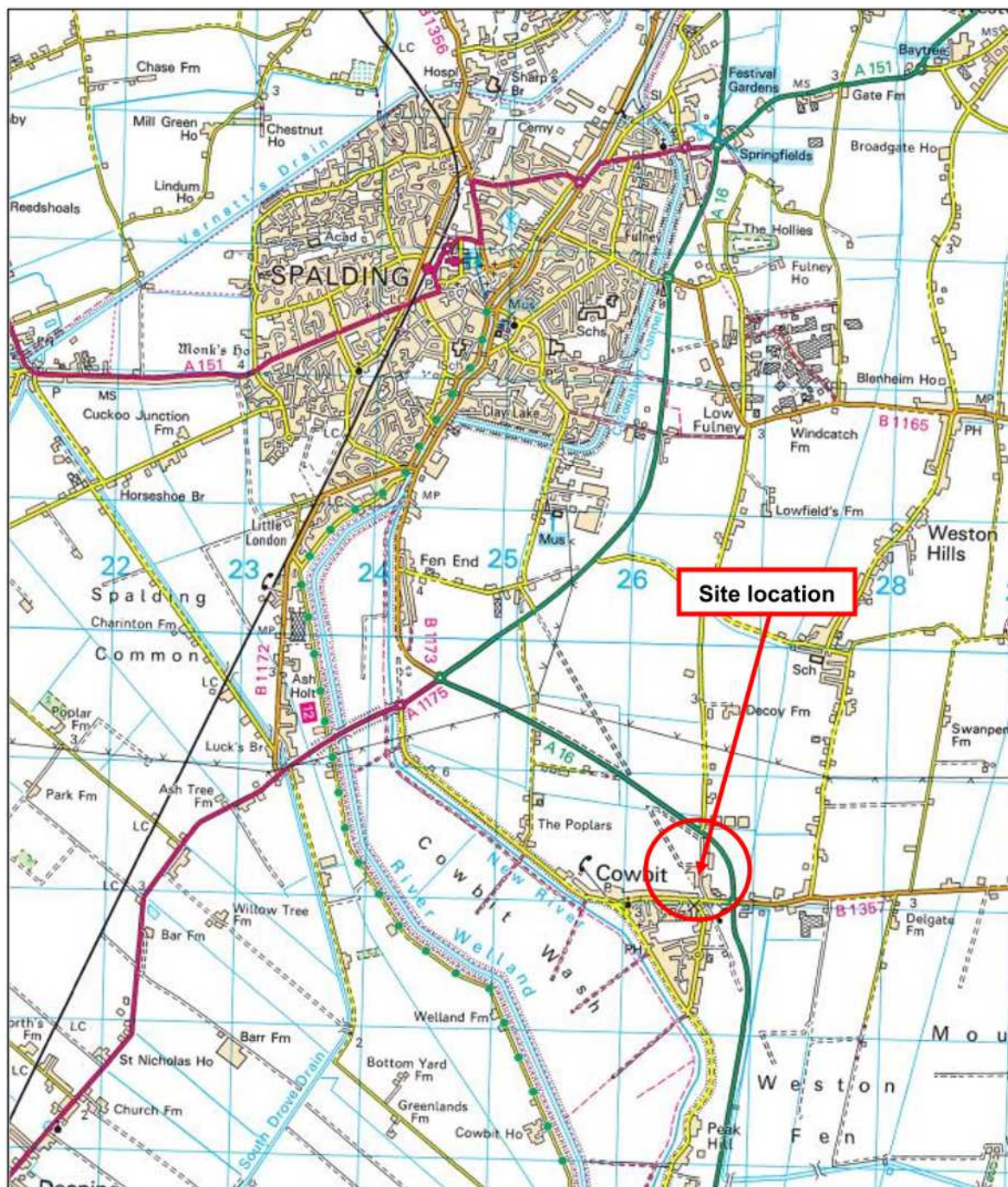
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Associate Director

Site Location Plan

Figure 1

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Project : Station Yard, Mill Drove South, Cowbit,
Lincolnshire

Client : Seagate Homes

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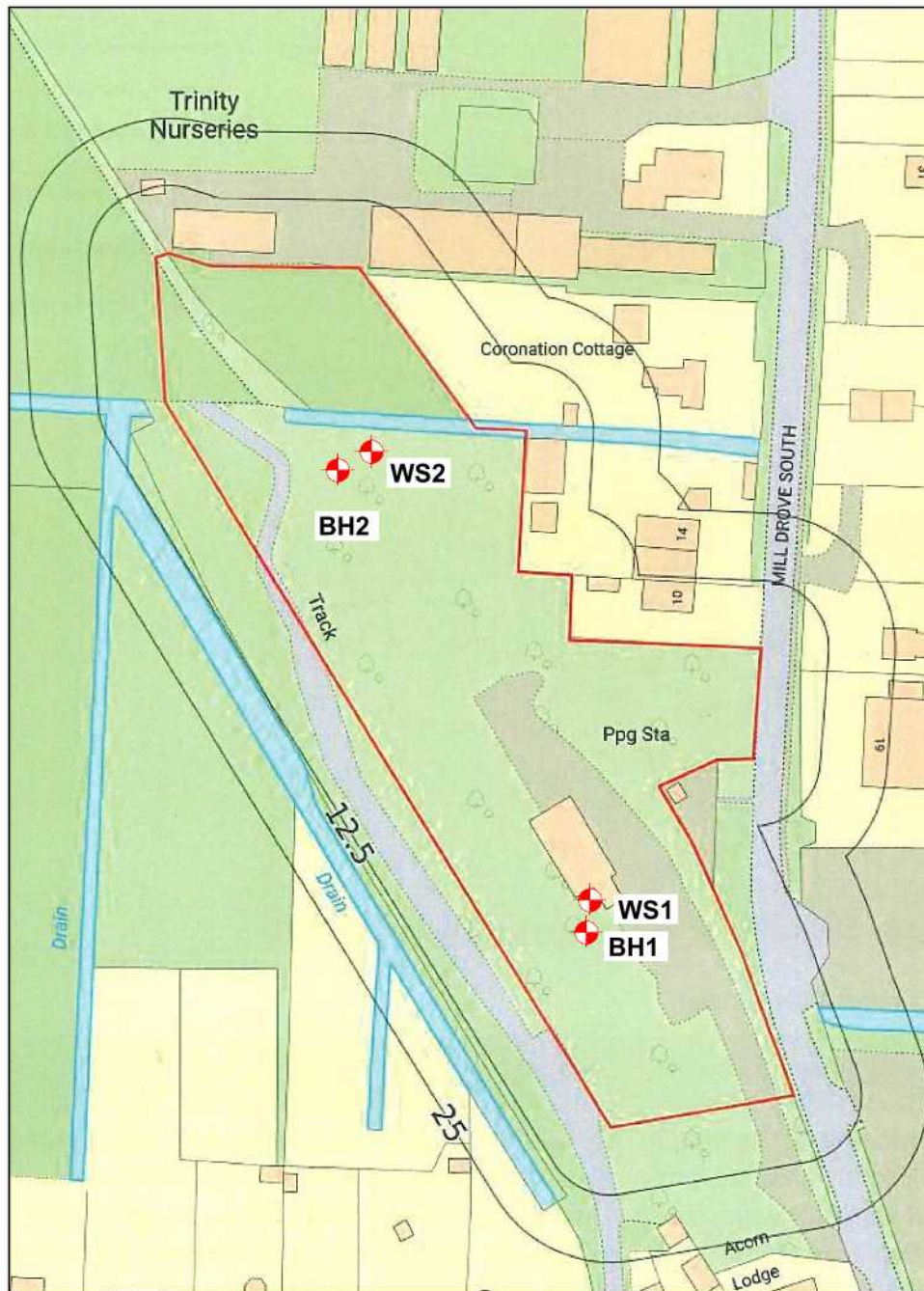
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Exploratory Hole Location Plan

Figure 2



KEY



Boreholes BH1 & BH2 (C15840)
Boreholes WS1 & WS2 (113341)

Scale
40m

Project : Station Yard, Mill Drove South, Cowbit,
Lincolnshire

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Project No.

113341A

GROUND ENGINEERING L I M I T E D Tel: 01733-566566 www.groundengineering.co.uk			Site: FORMER STATION YARD, MILL DROVE SOUTH, COWBIT				WINDOW SAMPLE WS1			
			Date: 15/04/24		Hole Size: 87mm dia to 2.00m 77mm dia to 3.00m		Ground Level:			
Samples and in-situ Tests			(Date) Water	Inst.	Description of Strata	Legend	Depth m	O.D. Level m		
Depth m	Type	Result								
0.30	D1			MADE GROUND - Black and grey, silty, gravelly SAND. Gravel of ash and brick fragments.		0.10				
				MADE GROUND - Loose, brown and orange brown SAND AND GRAVEL of brick and concrete.		0.40				
0.60	D2			Soft, brown and grey, silty SAND. (TIDAL FLAT DEPOSIT)		0.60				
0.90	D3			Very soft, brown and grey, silty CLAY.						
1.20	D4			(TIDAL FLAT DEPOSIT)						
1.20-2.00	U1			Soft, dark brown, organic CLAY with gastropod shells. (TIDAL FLAT DEPOSIT)		1.60				
				Very soft, dark grey and dark brown, organic CLAY with occasional decayed plant matter. (TIDAL FLAT DEPOSIT)		2.00				
2.00-3.00	U2									
Hole completed at 3.00m depth										
REMARKS 1. Starter pit excavated from 0.00m to 1.20m depth 2. Gas monitoring standpipe installed to 3.00m depth							Project No 113341			
							Scale 1:25	Page 1/1		
KEY D - Disturbed Sample J - Jar Sample B - Bulk Sample MP - Mackintosh Probe U - Undisturbed Sample V - Vane Shear Test W - Water Sample Cohesion () kPa ∇ Water Strike P() - Hand Penetrometer ∇c Depth to Water Cohesion () kPa on completion ∇s Standpipe Level			Groundwater Strikes Depth m No Struck Rose to Rate Cased Sealed				Groundwater Observations Date Hole Casing Water			
							15/04/24 3.00 19/04/24 3.00 1.00 1.09 26/04/24 3.00 1.00 1.26 02/05/24 3.00 1.00 1.09			

L I M I T E D
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WINDOW SAMPLE
WS2

Date: 15/04/24

Hole Size:	87mm dia to 2.00m
	77mm dia to 3.00m

Ground
Level:

REMARKS	1. Starter pit excavated from 0.00m to 1.20m depth 2. Gas monitoring standpipe installed to 3.00m depth	Project No 113341	
		Scale 1:25	Page 1/1

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GROUND ENGINEERING LIMITED

Groundwater/Gas Monitoring Record

Site: Station Yard, Mill Drive South, Cowbit

Report Ref: C15840 (BH1 & BH2)
113341A (WS1 & WS2)

Date	Borehole No.	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Flow Rate (l/hr)	Atmosph. Pressure (mb)	Depth of Well (m bgl)	Depth to Groundwater (m bgl)
		Peak	Steady	Peak	Steady	Min.	Max.				
05/01/23	BH1	<0.1	<0.1	0.6	0.6	20.0	20.0	<0.1	1017	7.00	1.85
12/01/23	BH1	<0.1	<0.1	0.8	0.8	18.5	18.5	<0.1	1001	7.00	1.78
20/01/23	BH1	<0.1	<0.1	1.8	1.8	18.6	18.6	<0.1	1016	7.00	1.81
12/04/24	BH1	BH1 Standpipe found to have been destroyed by groundworks									
19/04/24	WS1	<0.1	<0.1	0.6	0.6	21.0	21.0	<0.1	1014	3.00	1.09
26/04/24	WS1	<0.1	<0.1	0.6	0.6	20.2	20.2	<0.1	1006	3.00	1.26
02/05/24	WS1	<0.1	<0.1	0.5	0.5	19.9	19.9	<0.1	1001	3.00	1.09
02/02/23	BH2	<0.1	<0.1	3.9	3.9	16.2	16.2	<0.1	1018	7.00	1.73
16/02/23	BH2	<0.1	<0.1	4.9	4.9	15.0	15.0	<0.1	1001	7.00	1.65
20/03/23	BH2	<0.1	<0.1	3.2	3.2	18.0	18.0	<0.1	1016	7.00	1.70
12/04/24	BH2	BH2 Standpipe found to have been destroyed by groundworks									
19/04/24	WS2	<0.1	<0.1	5.0	5.0	12.0	12.0	<0.1	1014	3.00	1.90
26/04/24	WS2	<0.1	<0.1	2.2	2.2	17.8	17.8	<0.1	1006	3.00	1.91
02/05/24	WS2	<0.1	<0.1	2.7	2.7	17.1	17.1	<0.1	1001	3.00	1.81