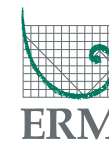


- Sealed service entries
- Service corridors
- Concrete slab incorporating vapour resistant membrane
- Landfill
- High permeable strata (Skerries bands)
- Low permeable strata (Clay / Edwalton mudstone)
- Engineered clay low permeable strata
- Foul sewer drainage channel
- Discontinuous perched groundwater, associated with weathered and high permeable strata

- 1 Lateral migration through high permeable intervening strata
- 2 Lateral migration along bedding
- 3 Potential vertical migration through cracks & fissures
- 4 Low permeable strata restricting gas migration
- 5 Vapour membrane with building restricting gas migration

SCALE: Not to Scale	VERSION: A
SIZE: A4	DRAWN: MTC
PROJECT: 0383453	CHECKED: CIY
DATE: 13/02/2017	APPROVED: ADS

Figure 3b
Revised Conceptual Site Model,
Lubbethorpe, Leicester Lane, LE19 4AS



Goodman



- Phase 1 Borehole
- Phase 2 Borehole
- Site Boundary
- Engineered Clay Layer

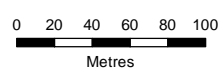


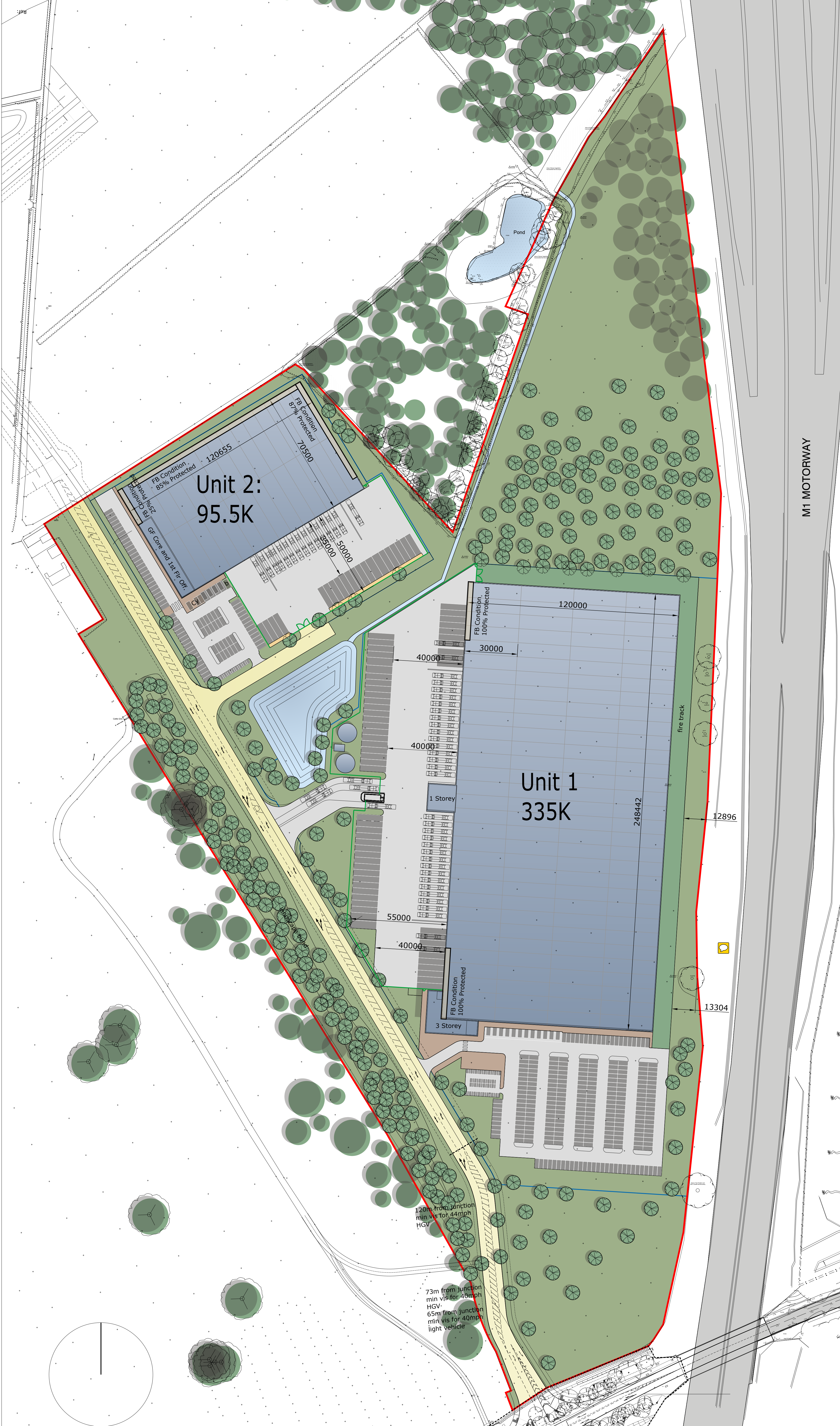
Figure 4
Area for Engineered Clay Layer Placement
Lubbesthorpe, LE19 4AS

SCALE: See Scale Bar	VERSION: A
SIZE: A4	DRAWN: MTC
PROJECT: 0383453	CHECKED: PB
DATE: 15/02/2017	APPROVED: ADS



Goodman

PROJECTION: British National Grid



M1 MOTORWAY

Development not to exceed 40,000 sq.m. GIA

Site area: 151,236sq.m. / 37.37 acres / 15.12 hectares

Unit 1:
 Warehouse = 29,808 sq.m. [320,854 sq.ft.]
 Office [3 Storey] = 1,068 sq.m. [11,500 sq.ft.]
 Hub Office [1 storey] = 234 sq.m. [2,525 sq.ft.]
 Gatehouse = 26.9 sq.m. [289 sq.ft.]
 Total GIA [excluding gatehouse] = 31,110 sq.m. [334,879 sq.ft.]
 Nett Site area = 66,554 sq.m. [716,384 sq.ft.]
 16.44 Acres/6.66 Hectares
 Density = 46.7%
 No. Docks Doors = 30
 No Level Access Doors = 4
 No Trailers = 90
 No Cars [inc wheelchair] = 270 [12 whchr]
 No of Cycles = 80
 No of Motorcycles = 28
 Haunch = 15m

Unit 2:
 Warehouse = 8,506 sq.m. [91,560 sq.ft.]
 Office [1st flr] = 384 sq.m. [4,100 sq.ft.]
 Total GIA = 8,890 sq.m. [95,660 sq.ft.]
 Nett Site area = 18,665.6 sq.m. [200,916 sq ft] 4.61 Acres/1.87 Hectares
 Density = 47.6%
 No. Docks Doors = 10
 No Level Access Doors = 2
 No Trailers = 36
 No Cars [inc wheelchair] = 86 [4 whchr]
 No of Cycles = 24
 No of Motorcycles = 9
 Haunch = 12m



Architects | Masterplanners

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 www.stephengeorge.co.uk

Lubbesthorpe - Leicester

Site Plan

Drawing status: PLANNING
 CAD reference: 10-101-P003
 Drawn: KBL
 Team: JY
 Date: 01/02/2017
 Scale: 1:1000@ A1

Project no: 10-101 Dwg no: P003 Rev: P1

Annex A

Borehole Logs



Environmental Resources Management

Borehole Log

Borehole No.

BH01

Page 1 of 1

Client: Goodman	Borehole Diameter: 100mm	Ground Level: 77.618m ASL
Location: Lubbesthorpe, Leicester	Drill Rig Type: MI3	Easting: 454293.130
ERM Project No: 0383453	Drilling Method: Solid Stem Rotary	Northing: 300172.428
Compiled by: Peter Bray	Logged by: Peter Bray	Total Depth: 10m
Checked by: Claire Illingworth Yurdakok	Dates Drilled: 12/12/2016	

Description of Strata	Legend	Depth of strata (mbgl)	Depth (mbgl)	Observations	PID (ppmv)	Sampling	Sample Intervals	Ground-water Depth	Backfill/Installation Details
Soft, dark brown / yellow, slightly sandy, CLAY. Sand is medium to coarse.		0.0m bgl	0.0	NVO.					
		0.3m bgl	-0.5	NVO.					
Soft, mottled orange / grey, silty, CLAY with very rare gravel. Gravel is fine to medium, chalk and flint.		1.1m bgl	-1.0	NVO.					
Percentage gravel increases with depth (from 1 to 5%).		1.8m bgl	-1.5	NVO.					
Soft to firm, mottled grey / brown, slightly gravelly, CLAY. Possible weathered mudstone. Gravel is fine to medium chalk (5%).			-2.0	NVO.					
Firm, grey, slightly gravelly, (weathered) MUDSTONE. Gravel is chalk.			-2.5					▼	
			-3.0						
			-3.5						
			-4.0						
			-4.5						
			-5.0						
			-5.5						
			-6.0						
Dark red, MUDSTONE.		6.2m bgl	-6.5	NVO.					
			-7.0						
			-7.5						
Grey, slightly clayey, SANDSTONE. Sand is medium to coarse. (Skерrie-band).		8.0m bgl	-8.0	NVO.				▽	
			-8.5						
Dark red, MUDSTONE.		9.0m bgl	-9.0	NVO.					
			-9.5						
			-10.0						

Remarks:

m bgl: metres below ground level. m ASL: metres above sea level
 NVO: no visual or olfactory evidence of impact.
 Hand excavated to 1.5m bgl prior to drilling work.
 No soil samples were collected from the soil bore.

Groundwater:

▽ Strike: 8.1m bgl
 ▼ Resting Water Depth: 2.6m bgl

Backfill/Installation Details:

Concrete: 0.0 - 0.1m
 Bentonite: 0.1 - 0.4m
 Gravel: 0.4 - 10m
 Plain pipe: 0.0 - 0.5m
 Slotted screen: 0.5 - 10m
 Well diameter: 100mm
 Slot size: 1mm
 Well material: HDPE
 Backfill: -



Environmental Resources Management

Borehole Log

Borehole No.

BH02

Page 1 of 1

Client: Goodman	Borehole Diameter: 100mm	Ground Level: 75.211m ASL
Location: Lubbesthorpe, Leicester	Drill Rig Type: MI3	Easting: 454341.375
ERM Project No: 0383453	Drilling Method: Solid Stem Rotary	Northing: 300200.198
Compiled by: Peter Bray	Logged by: Peter Bray	Total Depth: 10m
Checked by: Claire Illingworth Yurdakok	Dates Drilled: 13/12/2016	

Description of Strata	Legend	Depth of strata (mbgl)	Depth (mbgl)	Observations	PID (ppmv)	Sampling	Sample Intervals	Ground-water Depth	Backfill/Installation Details
Soft, dark brown, silty, CLAY with very rare gravels. Gravel is very coarse, flint.	[Symbol]	0.0m bgl	0.0	NVO.					[Symbol]
Soft, orange / grey mottled, CLAY.	[Symbol]	0.2m bgl	-0.5	NVO.					[Symbol]
From 0.5m, approximately 5% is gravel. Gravel is fine to medium, rounded to subrounded, chalk. Percentage gravel increases with depth.	[Symbol]	1.1m bgl	-1.0	NVO.				▽	[Symbol]
Light grey / mottled brown, gravelly, CLAY. Gravel is fine to medium, rounded to subrounded, chalk.	[Symbol]	2.0m bgl	-2.0	NVO.					[Symbol]
Some water ingress at 1.4m.	[Symbol]		-2.5						[Symbol]
Soft to firm, light grey, slightly gravelly, CLAY. Gravel is fine to medium, rounded to subrounded, chalk. (Weathered mudstone).	[Symbol]		-3.0						[Symbol]
	[Symbol]		-3.5						[Symbol]
	[Symbol]		-4.0						[Symbol]
	[Symbol]		-4.5						[Symbol]
	[Symbol]		-5.0						[Symbol]
	[Symbol]		-5.5						[Symbol]
	[Symbol]		-6.0						[Symbol]
Dark red, MUDSTONE.	[Symbol]	6.0m bgl	-6.0	NVO.				▼	[Symbol]
	[Symbol]		-6.5						[Symbol]
Light grey, slightly clayey, SANDSTONE. Sand is medium to coarse. (Skerrie-band).	[Symbol]	6.8m bgl	-7.0	NVO.				▽	[Symbol]
	[Symbol]		-7.5						[Symbol]
	[Symbol]		-8.0						[Symbol]
	[Symbol]		-8.5						[Symbol]
Brown / dark red, MUDSTONE.	[Symbol]	8.5m bgl	-8.5	NVO.					[Symbol]
	[Symbol]		-9.0						[Symbol]
	[Symbol]		-9.5						[Symbol]
	[Symbol]		-10.0						[Symbol]

<p>Remarks:</p> <p>m bgl: metres below ground level. m ASL: metres above sea level NVO: no visual or olfactory evidence of impact. Hand excavated to 1.5m bgl prior to drilling work. No soil samples were collected from the soil bore.</p> <p>Groundwater:</p> <p>▽ Strike: 7.5m bgl (surface water ingress observed at 1.4m bgl). ▼ Resting Water Depth: 6.2m bgl</p>	<p>Backfill/Installation Details:</p> <p>Concrete: 0.0 - 0.1m Bentonite: 0.1 - 0.4m Gravel: 0.4 - 10m Plain pipe: 0.0 - 0.5m Slotted screen: 0.5 - 10m Well diameter: 100mm Slot size: 1mm Well material: HDPE Backfill: -</p>
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Environmental Resources Management

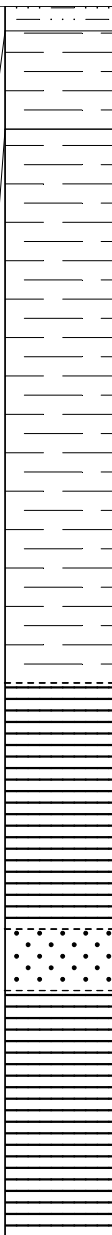

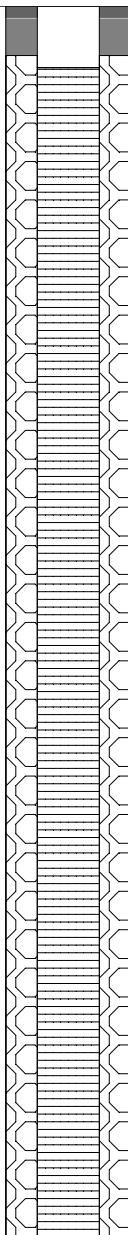
Borehole Log

Borehole No.

BH03

Page 1 of 1

Client: Goodman	Borehole Diameter: 100mm	Ground Level: 76.470m ASL
Location: Lubbesthorpe, Leicester	Drill Rig Type: MI3	Easting: 454420.809
ERM Project No: 0383453	Drilling Method: Solid Stem Rotary	Northing: 300069.345
Compiled by: Peter Bray	Logged by: Peter Bray	Total Depth: 10m
Checked by: Claire Illingworth Yurdakok	Dates Drilled: 13/12/2016	

Description of Strata	Legend	Depth of strata (mbgl)	Depth (mbgl)	Observations	PID (ppmv)	Sampling	Sample Intervals	Ground-water Depth	Backfill/Installation Details
<p>Soft, light brown, slightly clayey, slightly gravelly, SAND. Sand is fine to medium. Gravel is fine to coarse, flint and chalk (<5%).</p> <p>Soft to firm, light grey / brown mottled, slightly gravelly, CLAY. Gravel is fine to medium, chalk.</p> <p>Clay becomes red and slightly silty with depth.</p> <p>Soft, red / brown, silty, slightly sandy, slightly gravelly, CLAY. Gravel is chalk. (Weathered mudstone).</p>		0.0m bgl 0.2m bgl 1.0m bgl 5.5m bgl 7.5m bgl 8.0m bgl	0.0 -0.5 -1.0 -1.5 -2.0 -2.5 -3.0 -3.5 -4.0 -4.5 -5.0 -5.5 -6.0 -6.5 -7.0 -7.5 -8.0 -8.5 -9.0 -9.5 -10.0	NVO. NVO. NVO. NVO. NVO. NVO.					

Remarks:

m bgl: metres below ground level. m ASL: metres above sea level
 NVO: no visual or olfactory evidence of impact.
 Hand excavated to 1.5m bgl prior to drilling work.
 No soil samples were collected from the soil bore.

Groundwater:

- Strike: 8.8m bgl (surface water ingress observed at 1.5m bgl)
- Resting Water Depth: 8.0m bgl

Backfill/Installation Details:

Concrete: 0.0 - 0.1m
 Bentonite: 0.1 - 0.4m
 Gravel: 0.4 - 10m
 Plain pipe: 0.0 - 0.5m
 Slotted screen: 0.5 - 10m
 Well diameter: 100mm
 Slot size: 1mm
 Well material: HDPE
 Backfill: -



Environmental Resources Management

Borehole Log

Borehole No.

BH04

Page 1 of 1

Client: Goodman	Borehole Diameter: 100mm	Ground Level: 75.854m ASL
Location: Lubbesthorpe, Leicester	Drill Rig Type: MI3	Easting: 454513.541
ERM Project No: 0383453	Drilling Method: Solid Stem Rotary	Northing: 300127.476
Compiled by: Peter Bray	Logged by: Peter Bray	Total Depth: 10m
Checked by: Claire Illingworth Yurdakok	Dates Drilled: 14/12/2016	

Description of Strata	Legend	Depth of strata (mbgl)	Depth (mbgl)	Observations	PID (ppmv)	Sampling	Sample Intervals	Ground-water Depth	Backfill/Installation Details
Soft, dark brown, very silty, CLAY. Some black, organic / 'coal-like' material at base of layer (fines upwards). Slightly firm, red / brown, silty, sandy, CLAY with occasional cobbles of flint and gravel of fine to medium, rounded to subrounded chalk. From 1.5m, approximately 1m containing pockets (5cm x 5cm) of light brown / yellow, silty, SAND.	[Symbol]	0.0m bgl 0.3m bgl	0.0 -0.5	NVO. NVO.				▽	[Symbol]
Firm, grey, gravelly, CLAY. Gravel is medium to coarse, flint. (Weathered mudstone). Water encountered at 5.5m, approximately 0.2m thick.	[Symbol]	3.3m bgl	-3.5	NVO.				▽	[Symbol]
Red, slightly silty, MUDSTONE.	[Symbol]	7.5m bgl	-7.5	NVO.					[Symbol]
Grey / white, slightly clayey, SANDSTONE. (Skerrie-band).	[Symbol]	9.5m bgl	-9.5	NVO.					[Symbol]
Red, slightly silty, MUDSTONE.	[Symbol]	9.7m bgl	-9.7	NVO.					[Symbol]

Remarks:

m bgl: metres below ground level. m ASL: metres above sea level
 NVO: no visual or olfactory evidence of impact.
 Hand excavated to 1.5m bgl prior to drilling work.
 No soil samples were collected from the soil bore.

Groundwater:

▽ Strike: 6.5m bgl
 ▼ Resting Water Depth: 1.1m bgl

Backfill/Installation Details:

Concrete: 0.0 - 0.1m
 Bentonite: 0.1 - 0.4m
 Gravel: 0.4 - 10m
 Plain pipe: 0.0 - 0.5m
 Slotted screen: 0.5 - 10m
 Well diameter: 100mm
 Slot size: 1mm
 Well material: HDPE
 Backfill: -



Environmental Resources Management

Borehole Log

Borehole No.

BH05

Page 1 of 1

Client: Goodman	Borehole Diameter: 100mm	Ground Level: 81.676m ASL
Location: Lubbesthorpe, Leicester	Drill Rig Type: MI3	Easting: 454549.109
ERM Project No: 0383453	Drilling Method: Solid Stem Rotary	Northing: 299959.245
Compiled by: Peter Bray	Logged by: Peter Bray	Total Depth: 10m
Checked by: Claire Illingworth Yurdakok	Dates Drilled: 14/12/2016	

Description of Strata	Legend	Depth of strata (mbgl)	Depth (mbgl)	Observations	PID (ppmv)	Sampling	Sample Intervals	Ground-water Depth	Backfill/Installation Details
Soft, dark brown, very clayey, gravelly, SILT. Gravel is medium to coarse, flint.		0.0m bgl	0.0	NVO.					
Soft to firm, red / brown, slightly silty, slightly gravelly, CLAY. Gravel is medium to coarse, rounded to subrounded, flint.		0.4m bgl	-0.5	NVO.					
Percentage gravel increases with depth from 5 to 10%.		1.5m bgl	-1.5	NVO.					
Soft to firm, red, very gravelly, CLAY. Gravel is medium to coarse, flint and grey.			-2.0						
			-2.5						
			-3.0						
			-3.5						
			-4.0						
			-4.5						
			-5.0						
Grades into light brown / yellow, very sandy, CLAY. Gravel is rare.			-5.5						
			-6.0						
			-6.5						
			-7.0						
Grey / red, slightly gravelly, CLAY. Gravel is chalk and flint. (Weathered mudstone).		6.0m bgl	-6.0	NVO.					
			-6.5						
			-7.0						
			-7.5						
Red / grey, very sandy, occasionally gravelly, MUDSTONE. Sand is coarse. Gravel is medium to coarse, flint.		7.5m bgl	-7.5	NVO.					
			-8.0						
			-8.5						
			-9.0						
			-9.5						
			-10.0						

Remarks:

m bgl: metres below ground level. m ASL: metres above sea level
 NVO: no visual or olfactory evidence of impact.
 Hand excavated to 1.5m bgl prior to drilling work.
 No soil samples were collected from the soil bore.

Groundwater:

☒ Strike: 7.5m bgl
 ▼ Resting Water Depth: 8.8m bgl

Backfill/Installation Details:

Concrete: 0.0 - 0.1m
 Bentonite: 0.1 - 0.4m
 Gravel: 0.4 - 10m
 Plain pipe: 0.0 - 0.5m
 Slotted screen: 0.5 - 10m
 Well diameter: 100mm
 Slot size: 1mm
 Well material: HDPE
 Backfill: -



Environmental Resources Management

Borehole Log

Borehole No.

BH06

Page 1 of 1

Client: Goodman	Borehole Diameter: 100mm	Ground Level: 80.757m ASL
Location: Lubbesthorpe, Leicester	Drill Rig Type: MI3	Easting: 454507.120
ERM Project No: 0383453	Drilling Method: Solid Stem Rotary	Northing: 299876.378
Compiled by: Peter Bray	Logged by: Peter Bray	Total Depth: 10m
Checked by: Claire Illingworth Yurdakok	Dates Drilled: 15/12/2016	

Description of Strata	Legend	Depth of strata (mbgl)	Depth (mbgl)	Observations	PID (ppmv)	Sampling	Sample Intervals	Ground-water Depth	Backfill/Installation Details
Very soft, red / brown, silty, slightly gravelly, CLAY. Gravel is medium to coarse, subangular to rounded, flint and lithics.		0.0m bgl	0.0	NVO.					
Becomes firmer (to soft) with depth.			-0.5						
			-1.0						
			-1.5						
			-2.0						
			-2.5						
Soft, light brown, rare gravelly, CLAY. Gravel is medium to coarse, subangular to rounded, flint and lithics.		2.5m bgl	-2.5	NVO.					
			-3.0						
			-3.5						
			-4.0						
Red, sandy, MUDSTONE.		4.0m bgl	-4.0	NVO.					
			-4.5						
			-5.0						
Grey / white, slightly clayey, SANDSTONE. (Skerrie-band).		5.0m bgl	-5.0	NVO.					
			-5.5						
Some small interbeds with the red mudstone ~0.1m thick.		5.8m bgl	-6.0	NVO.					
			-6.5						
Red, very sandy, MUDSTONE. Sand is medium to coarse.		6.5m bgl	-6.5	NVO.					
			-7.0						
Hard, white, SANDSTONE. (Skerrie-band).		7.0m bgl	-7.0	NVO.					
			-7.5						
Red, very sandy, MUDSTONE. Sand is medium to coarse.			-8.0						
			-8.5						
			-9.0						
			-9.5						
Dark grey, very sandy, gravelly, MUDSTONE. Gravel is flint.		8.2m bgl	-8.2	NVO.					
			-8.5						
			-9.0						
			-9.5						
			-10.0						

<p>Remarks:</p> <p>m bgl: metres below ground level. m ASL: metres above sea level NVO: no visual or olfactory evidence of impact. Hand excavated to 1.5m bgl prior to drilling work. No soil samples were collected from the soil bore.</p> <p>Groundwater:</p> <p>☒ Strike: Dry</p> <p>☒ Resting Water Depth: Dry</p>	<p>Backfill/Installation Details:</p> <p>Concrete: 0.0 - 0.1m Bentonite: 0.1 - 0.4m Gravel: 0.4 - 10m Plain pipe: 0.0 - 0.5m Slotted screen: 0.5 - 10m Well diameter: 100mm Slot size: 1mm Well material: HDPE Backfill: -</p>
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Environmental Resources Management

Borehole Log

Borehole No.

BH11

Page 1 of 1

Client: Goodman	Borehole Diameter: 100mm	Ground Level: 79.809m ASL
Location: Lubbesthorpe, Leicester	Drill Rig Type: MI3	Easting: 454451.563
ERM Project No: 0383453	Drilling Method: Solid Stem Rotary	Northing: 299959.191
Compiled by: Peter Bray	Logged by: Claire Illingworth Yurdakok	Total Depth: 7m
Checked by: Claire Illingworth Yurdakok	Dates Drilled: 26/01/2017	

Description of Strata	Legend	Depth of strata (mbgl)	Depth (mbgl)	Observations	PID (ppmv)	Sampling	Sample Intervals	Ground-water Depth	Backfill/Installation Details
MADE GROUND: Soft grey brown clay with rare gravel of flint (topsoil).		0.0m bgl	0.0	NVO.					
Soft orange brown, fine sandy, slight gravelly, CLAY. Gravel of angular flint and well rounded pebbles of flint (approximately 15 cm).		0.4m bgl	-0.5	NVO.					
			-1.0						
			-1.5						
			-2.0						
			-2.5						
			-3.0						
			-3.5						
			-4.0						
			-4.5						
Grey, dry, gravelly, weathered MUDSTONE. Gravel of fine to medium flint and chalk.		4.7m bgl	-5.0	Much fine to medium chalk gravel was observed at 4.7 to 5 m bgl.					
			-5.5						
Light grey MUDSTONE with some gravel of chalk.		6.0m bgl	-6.0	NVO.					
			-6.5						
			-7.0						

Remarks:

m bgl: metres below ground level. m ASL: metres above sea level
 NVO: no visual or olfactory evidence of impact.
 Hand excavated to 1.5m bgl prior to drilling work.
 No soil samples were collected from the soil bore.

Groundwater:

- Strike: Groundwater was not encountered during the works.
- Resting Water Depth: Groundwater was not encountered during the works.

Backfill/Installation Details:

- Concrete: 0.0 - 7.0m
- Bentonite: 0.0 - 7.0m
- Gravel: -
- Plain pipe: -
- Slotted screen: -
- Well diameter: 100mm
- Slot size: -
- Well material: -
- Backfill: Bentonite concrete grout.



Environmental Resources Management

Borehole Log

Borehole No.

BH12

Page 1 of 1

Client: Goodman	Borehole Diameter: 100mm	Ground Level: 80.042m ASL
Location: Lubbesthorpe, Leicester	Drill Rig Type: MI3	Easting: 454564.196
ERM Project No: 0383453	Drilling Method: Solid Stem Rotary	Northing: 300023.033
Compiled by: Peter Bray	Logged by: Claire Illingworth Yurdakok	Total Depth: 7.5m
Checked by: Claire Illingworth Yurdakok	Dates Drilled: 31/01/2017	

Description of Strata	Legend	Depth of strata (mbgl)	Depth (mbgl)	Observations	PID (ppmv)	Sampling	Sample Intervals	Ground-water Depth	Backfill/Installation Details
MADE GROUND: Soft, grey / brown clay with rare gravel of flint (topsoil).		0.0m bgl	0.0	NVO.					
Soft, red / brown, slightly sandy, very gravelly, CLAY. Gravel is fine to medium, of flint, chalk and rounded pebbles (approximately 7 cm).		0.3m bgl	-0.5	NVO.					
			-1.0						
			-1.5						
			-2.0	NVO.					
Brown, sandy, gravelly, weathered MUDSTONE. Fine to medium gravel of flint.		2.0m bgl	-2.5						
			-3.0						
			-3.5						
			-4.0	NVO.					
Hard, brown, sandy, gravelly, weathered MUDSTONE. Gravel of fine to medium flint.		3.7m bgl	-4.5	NVO.					
Yellow / brown, clayey, slightly gravelly, SANDSTONE. Gravel of fine to medium flint.		4.2m bgl	-5.0	NVO.					
			-5.5	NVO.					
Very hard, dark grey, very gravelly, MUDSTONE. Gravel of fine to medium flint.		4.5m bgl	-6.0						
			-6.5						
			-7.0						
			-7.5						
Brown, clayey, slightly gravelly, SANDSTONE.		6.0m bgl	-6.0	NVO.			▽		
Red / brown, gravelly, MUDSTONE. Gravel of fine to medium flint.		6.3m bgl	-6.5	NVO.					

Remarks:

m bgl: metres below ground level. m ASL: metres above sea level
 NVO: no visual or olfactory evidence of impact.
 Hand excavated to 1.5m bgl prior to drilling work.
 No soil samples were collected from the soil bore.

Groundwater:

▽ Strike: 6m bgl
 ▼ Resting Water Depth: Groundwater monitoring well not installed.

Backfill/Installation Details:

Concrete: 0.0 - 7.5m
 Bentonite: 0.0 - 7.5m
 Gravel: -
 Plain pipe: -
 Slotted screen: -
 Well diameter: 100mm
 Slot size: -
 Well material: -
 Backfill: Bentonite concrete grout.



Environmental Resources Management

Borehole Log

Borehole No.

BH13

Page 1 of 1

Client: Goodman	Borehole Diameter: 100mm	Ground Level: 80.517m ASL
Location: Lubbesthorpe, Leicester	Drill Rig Type: MI3	Easting: 454528.447
ERM Project No: 0383453	Drilling Method: Solid Stem Rotary	Northing: 299991.150
Compiled by: Peter Bray	Logged by: Claire Illingworth Yurdakok	Total Depth: 7.5m
Checked by: Claire Illingworth Yurdakok	Dates Drilled: 25/01/2017	

Description of Strata	Legend	Depth of strata (mbgl)	Depth (mbgl)	Observations	PID (ppmv)	Sampling	Sample Intervals	Ground-water Depth	Backfill/Installation Details
MADE GROUND: Soft, grey / brown, clay with rare gravel of flint (topsoil).		0.0m bgl	0.0	NVO.					
Orange, slightly sandy, very gravelly, CLAY. Gravel of angular fine to medium flint. Coarse gravel (10 to 15 cm) of sandstone and flint.		0.6m bgl	-0.5	NVO.					
Yellow / orange, sandy, gravelly, CLAY. (Weathered mudstone). Gravel of fine flint.		2.0m bgl	-2.0	NVO.					
Yellow, weathered, clayey, SANDSTONE. Gravel of fine flint and chalk.		6.0m bgl	-6.0	NVO.					
			-7.0						
			-7.5						

Remarks:

m bgl: metres below ground level. m ASL: metres above sea level
 NVO: no visual or olfactory evidence of impact.
 Hand excavated to 1.5m bgl prior to drilling work.
 No soil samples were collected from the soil bore.

Groundwater:

- Strike: 7.0m bgl
- Resting Water Depth: Groundwater monitoring well not installed.

Backfill/Installation Details:

- Concrete: 0.0 - 7.5m
- Bentonite: 0.0 - 7.5m
- Gravel: -
- Plain pipe: -
- Slotted screen: -
- Well diameter: 100mm
- Slot size: -
- Well material: -
- Backfill: Bentonite concrete grout.



Environmental Resources Management

Borehole Log

Borehole No.

BH14

Page 1 of 1

Client: Goodman	Borehole Diameter: 100mm	Ground Level: 80.840m ASL
Location: Lubbesthorpe, Leicester	Drill Rig Type: MI3	Easting: 454502.264
ERM Project No: 0383453	Drilling Method: Solid Stem Rotary	Northing: 299937.999
Compiled by: Peter Bray	Logged by: Claire Illingworth Yurdakok	Total Depth: 8m
Checked by: Claire Illingworth Yurdakok	Dates Drilled: 26/01/2017	

Description of Strata	Legend	Depth of strata (mbgl)	Depth (mbgl)	Observations	PID (ppmv)	Sampling	Sample Intervals	Ground-water Depth	Backfill/Installation Details
MADE GROUND: Soft, grey / brown, clay with rare gravel of flint (topsoil).		0.0m bgl	0.0	NVO.					
Soft, orange / brown, sandy, slightly gravelly, CLAY. Gravel of chalk and occasional angular flint and well rounded pebbles.		0.5m bgl	-0.5	NVO.					
Yellow / brown, sandy, slightly gravelly, CLAY. Gravel is fine to medium of sandstone, flint and chalk.		3.0m bgl	-3.0	NVO.					
Yellow, slightly gravelly, weathered, SANDSTONE. Gravel is fine to medium of sandstone and chalk.		4.8m bgl	-5.0	NVO.					
Yellow / brown, SANDSTONE.		5.7m bgl	-6.0	NVO.					

Remarks:

m bgl: metres below ground level. m ASL: metres above sea level
 NVO: no visual or olfactory evidence of impact.
 Hand excavated to 1.5m bgl prior to drilling work.
 No soil samples were collected from the soil bore.

Groundwater:

- Strike: Groundwater was not encountered during the works.
- Resting Water Depth: Groundwater monitoring well not installed.

Backfill/Installation Details:

Concrete: 0.0 - 8.0m
 Bentonite: 0.0 - 8.0m
 Gravel: -
 Plain pipe: -
 Slotted screen: -
 Well diameter: 100mm
 Slot size: -
 Well material: -
 Backfill: Bentonite concrete grout.



Environmental Resources Management

Borehole Log

Borehole No.

BH15

Page 1 of 1

Client: Goodman	Borehole Diameter: 100mm	Ground Level: 80.445m ASL
Location: Lubbesthorpe, Leicester	Drill Rig Type: MI3	Easting: 454445.911
ERM Project No: 0383453	Drilling Method: Solid Stem Rotary	Northing: 299909.447
Compiled by: Peter Bray	Logged by: Claire Illingworth Yurdakok	Total Depth: 8.5m
Checked by: Claire Illingworth Yurdakok	Dates Drilled: 26/01/2017	

Description of Strata	Legend	Depth of strata (mbgl)	Depth (mbgl)	Observations	PID (ppmv)	Sampling	Sample Intervals	Ground-water Depth	Backfill/Installation Details
MADE GROUND: Soft, grey / brown, clay with rare gravel of flint (topsoil).		0.0m bgl	0.0	NVO.					Backfill/Installation Details
Soft, orange / brown, fine sandy, slightly gravelly, CLAY. Gravel of angular flint and well rounded pebbles of flint (approximately 10 cm).		0.4m bgl	-0.5	NVO.					
			-1.0						
			-1.5						
			-2.0						
			-2.5						
			-3.0						
Grey, weathered MUDSTONE.		3.0m bgl	-3.0	NVO.					
			-3.5						
			-4.0						
Red / brown, silty, fine sandy, MUDSTONE, with fine to medium gravel of chalk and fine coal fragments.		4.0m bgl	-4.0	NVO.					
			-4.5						
			-5.0						
			-5.5						
No return		6.0m bgl	-6.0	NVO.					
			-6.5						
Red / brown, silty, fine sandy, MUDSTONE.		6.9m bgl	-7.0	NVO.					
No return		7.0m bgl	-7.0	NVO.					
			-7.5						
			-8.0						
			-8.5						

Remarks:

m bgl: metres below ground level. m ASL: metres above sea level
 NVO: no visual or olfactory evidence of impact.
 Hand excavated to 1.5m bgl prior to drilling work.
 No soil samples were collected from the soil bore.

Groundwater:

- Strike: Groundwater was not encountered during the works.
- Resting Water Depth: Groundwater monitoring well not installed.

Backfill/Installation Details:

- Concrete: 0.0 - 8.5m
- Bentonite: 0.0 - 8.5m
- Gravel: -
- Plain pipe: -
- Slotted screen: -
- Well diameter: 100mm
- Slot size: -
- Well material: -
- Backfill: Bentonite concrete grout.



Environmental Resources Management

Borehole Log

Borehole No.

BH16

Page 1 of 1

Client: Goodman	Borehole Diameter: 100mm	Ground Level: 82.155m ASL
Location: Lubbesthorpe, Leicester	Drill Rig Type: MI3	Easting: 454546.056
ERM Project No: 0383453	Drilling Method: Solid Stem Rotary	Northing: 299920.369
Compiled by: Peter Bray	Logged by: Claire Illingworth Yurdakok	Total Depth: 9.5m
Checked by: Claire Illingworth Yurdakok	Dates Drilled: 31/01/2017	

Description of Strata	Legend	Depth of strata (mbgl)	Depth (mbgl)	Observations	PID (ppmv)	Sampling	Sample Intervals	Ground-water Depth	Backfill/Installation Details
MADE GROUND: Soft, grey / brown, clay with rare gravel of flint (topsoil).		0.0m bgl	0.0	NVO.					Backfill/Installation Details
Soft, red / brown, sandy, slightly gravelly, CLAY. Gravel is fine to medium, of flint and rounded pebbles.		0.5m bgl	-0.5	NVO.					
			-1.0						
			-1.5						
Weathered, red / brown, clayey, slightly gravelly, SANDSTONE. Gravel of fine to medium flint and chalk.		2.0m bgl	-2.0	NVO.					
			-2.5						
			-3.0						
			-3.5						
Hard, red / brown, clayey, slightly gravelly, SANDSTONE. Gravel of fine to medium flint and chalk.		3.7m bgl	-4.0	NVO.					
			-4.5	NVO.					
Red, fine sandy, slightly gravelly, MUDSTONE. Gravel of fine to coarse chalk.		4.5m bgl	-5.0	NVO.					
			-5.5						
			-6.0	NVO.					
Hard, red / brown, fine sandy, slightly gravelly, MUDSTONE. Gravel of fine to coarse chalk and fine coal fragments.		5.7m bgl	-6.5	NVO.					
			-7.0						
			-7.5						
			-8.0	NVO.					
Light brown / orange, gravelly, Mudstone. Gravel fine to medium flint and chalk and fine coal fragments, at 8.2 to 9.5 coal was no longer observed.		8.0m bgl	-8.5	NVO.					
			-9.0						
			-9.5						

Remarks:

m bgl: metres below ground level. m ASL: metres above sea level
 NVO: no visual or olfactory evidence of impact.
 Hand excavated to 1.5m bgl prior to drilling work.
 No soil samples were collected from the soil bore.

Groundwater:

- Strike: Groundwater was not encountered during the works.
- Resting Water Depth: Groundwater monitoring well not installed.

Backfill/Installation Details:

Concrete:	0.0 - 9.5m
Bentonite:	0.0 - 9.5m
Gravel:	-
Plain pipe:	-
Slotted screen:	-
Well diameter:	100mm
Slot size:	-
Well material:	-
Backfill:	Bentonite concrete grout.

Annex B

Ground Gas Risk Assessment

Table: Soil Gas Screening

Site: Lubbesthorpe

Completed by: Peter Bray

Checked by: Claire Illingworth Yurdakök

Table B4a - QRA - Soil Gas Results CO2

Location	Date	Baro Press mb	Flow L/hour	Steady state CO2 %	Max Flow Rate L/hour	Max Concentration CO2 %	Calculated GSV CH4	Characteristic Situation	Comments
BH01	23/12/2016	1017	0.1	0.9	0.1	2.0	0.0009	1	Very Low risk
BH02	23/12/2016	1017	0.1	0.8	0.1	1.0	0.0008	1	Very Low risk
BH03	23/12/2016	1016	0.1	0.3	-3.4	0.5	-0.0102	1	Very Low risk
BH04	23/12/2016	1016	0.1	0.6	-0.1	0.6	-0.0006	1	Very Low risk
BH05	23/12/2016	1015	0.1	0.3	0.1	0.3	0.0003	1	Very Low risk
BH06	23/12/2016	1015	0.1	0.5	3.4	0.5	0.0170	1	Very Low risk

Table B4b - QRA - Soil Gas Results CH4

Location	Date	Baro Press mb	Flow L/hour	Steady State CH4 %	Max Flow Rate	Max Concentration CH4	Calculated GSV CO2	Characteristic Situation	Comments
BH01	23/12/2016	1017	0.1	0.1	0.1	0.1	0.0001	1	Very Low risk
BH02	23/12/2016	1017	0.1	0.1	0.1	0.1	0.0001	1	Very Low risk
BH03	23/12/2016	1016	0.1	0.1	-3.4	0.1	-0.0034	1	Very Low risk
BH04	23/12/2016	1016	0.1	0.1	-0.1	0.1	-0.0001	1	Very Low risk
BH05	23/12/2016	1015	0.1	0.1	0.1	0.1	0.0001	1	Very Low risk
BH06	23/12/2016	1015	0.1	0.1	3.4	0.1	0.0034	1	Very Low risk

Values used for the GSV calculation

Less than limit of detection

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APPENDIX D BWB INVESTIGATION, JULY 2019



ENVIRONMENT

Mather Jamie
Enderby Relief Road
Enderby

Ground Investigation Report

ENVIRONMENT

Mather Jamie
Enderby Relief Road
Enderby
Ground Investigation Report

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July 2019

DOCUMENT ISSUE RECORD

Document Number:	ERR-BWB-ZZ-XX-YE-RP_0002_GIR
BWB Reference:	NTH2304

Revision	Date of Issue	Status	Author:	Checked:	Approved:
1	July 2019	Final	Thomas Yarnell BSc FGS	Luke Cross BSc (Hons)	Tim Hull BSc MSc CGeol FGS SiLC SQP
					

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FIGURES

Figure 2.1 Site Location Plan

Drawings

Drawing 1: Proposed Site Development Plan

Drawing 2: Exploratory Hole Location Plan

Drawing 3: Geolocation Cross Sections

APPENDICES

Appendix 1: Exploratory Hole Records

Appendix 2: Gas Monitoring Results

1. INTRODUCTION

Instruction

- 1.1 BWB Consulting (BWB) was instructed by Mather Jamie (the Client) to carry out a Ground Investigation and produce a factual report for Enderby Relief Road, Enderby. Original details of the instruction are shown in the proposal reference *20190510/02/CL01/NTH2304/TJH/RPD*.
- 1.2 The proposed development is understood to involve the construction of a new relief road, part of which runs along the route of an existing private road on the north boundary of a landfill operated by Suez.
- 1.3 A plan, current at the time of writing this report, showing the proposed arrangement of the relief road is presented as **Drawing 1** (ref: ERR-BWB-HGN-05-DR-D-100_Highways General Arrangement, dated 3rd May 2018).

Objectives

- 1.4 The objectives of the project are to:
 - Confirm the prevailing ground and groundwater conditions at exploratory hole locations as selected by the Client;
 - Monitoring the levels of Ground Gas within the boreholes at intervals throughout the drilling; and
 - Provide a factual account of the ground investigation.
- 1.5 The report presents the factual data relating to the ground investigation completed on/between 12th July 2019. The investigation was completed under a CQA plan reference ERR-BWB-EGT-XX-HS-YE-0001_CQA_S1_P3 dated June 2019 and under the supervision of an independent CQA Engineer Nick Cawthorne.
- 1.6 The report has been completed in accordance with BS10175:2011(+A2:2017) 'Investigation of Potentially Contaminated Sites, Code of Practice' and CLR11 'Model Procedures for the Management of Land Contamination'.

Scope of Works

- 1.7 The ground investigation scope of works was completed between 8th and 12th July 2019 and comprised the following:
 - Non-intrusive survey of excavation locations for underground utilities;
 - 18 Dynamic sampling boreholes; and
 - Ground Gas Monitoring at 1.0m intervals throughout the drilling process.

2. THE SITE

Site Location

- 2.1 The site is located just off Harolds Lane, located approximately 1km to the north of Enderby village at National Grid Coordinates 454000, 300290. The location of the site is shown in **Figure 2.1** below.

Figure 2.1 Site Location Plan



Site Description

- 2.2 The existing site consists of a private road known as Harolds Lane, which provides access to the landfill operational buildings, farm and two cottages. The farm is predominately arable land with a small herd of cows and a field utilised as grazing land for horses. The landfill operational area comprise an office and various gas and leachate treatment facilities. The majority of the site is generally flat with an incline to the west of the site where Harolds Lane meets Warren Park Way.
- 2.3 The road surface gradually declines in condition, from being asphalt covered in the west and central areas before becoming a gravel track once past the eastern boundary of the landfill.
- 2.4 The site is bound by the Warren Park Industrial units to the north and west, with the M69 Motorway located approximately 230m to the north of the site and the M1 approximately 300m to the east. The newly constructed Leicester Commercial Park is located immediately southeast of the site.

3. ENVIRONMENTAL AND GEOTECHNICAL GROUND INVESTIGATION

- 3.1 Intrusive ground investigation works were undertaken between 8th and 12th July 2019 and comprised the following:
- Clearance of investigation locations by a specialist buried services tracing company;
 - Collection of coordinates and elevations of exploratory hole locations;
 - The advancement of 18 dynamic sampler boreholes to a maximum depth of 3.00 metres below ground level (m bgl) which backfilled with bentonite, arisings and concrete; and
 - Periodic monitor of the Ground Gas within the boreholes during the drilling.
- 3.2 An exploratory hole location plan is presented as **Drawing 2**. BWB exploratory hole records are presented as **Appendix 1** and the groundwater monitoring data is presented as **Appendix 2**.
- 3.3 The site investigation works were carried out in general accordance with BS5930:2015 'Code of Practice for Site Investigations' and BS10175:2017 'Investigation of Potentially Contaminated Sites'.

Hole Location Strategy

- 3.4 The dynamic sampler boreholes DS01 to DS15 were positioned beneath the proposed road extension to assess underlying ground conditions and assess the potential for ground gas migration from the neighbouring landfill.
- 3.5 Potions DS16 to DS18 where position to provide ground condition details for the relief road and next phase of the Leicester Commercial Park development.

Limitations and Uncertainty

- 3.6 Locations DS02, DS02A, DS03, DS05, DS05A, DS06, DS07 and DS08 where all terminated at shallow depths (typically <1.0m bgl) due to large near surface obstructions or deeper obstructions preventing advancement.
- 3.7 Locations DS04, DS05, DS05A and DS05B were moved to within the Suez compound to reduce the risk of potentially damaging the landfill gas and leachate pipes that ran beneath the road.

4. GROUND CONDITIONS

Geological Summary

- 4.1 The recorded ground conditions are summarised in **Table 4:1** below and **Drawing 3** presents a geological cross section through the site.

Table 4:1 Summary of Ground Conditions

Stratum	Top Depth (m)		Base Depth (m)		Thickness (m)	
	Min	Max	Min	Max	Min	Max
Topsoil	Ground level		0.10	0.15	0.10	0.15
Made Ground	Ground level	0.10	0.25	1.90	0.25	1.90
Possible Reworked Natural	0.25	0.75	1.10	1.30	0.35	1.05
Possible Oadby Member	0.70	1.90	1.15	2.00	0.10	0.55
Oadby Member	1.30	1.30	1.85	1.85	0.55	0.55
Possible Edwalton Member	1.10	1.45	1.50	1.90	Not proven	
Edwalton Member	1.85	1.85	3.00	3.00	Not proven	

Geological Descriptions

Topsoil

- 4.2 Topsoil was encountered in four of the locations (DS15 to DS18), all positioned to the east of the site. The topsoil generally comprised either a greyish brown to brown fine sand or firm brown slightly sandy slightly gravelly clay. Roots and rootlets were noted throughout the stratum.

4.3 Made Ground

- 4.4 Hardstanding comprising either concrete (DS05B only) or asphalt was noted at 13 locations across the site and was recorded to a maximum thickness of 0.19m bgl (DS02A).
- 4.5 Typically the hardstanding was underlain by a compacted slightly sandy gravel of crushed limestone. Beneath this was typically interlocking cobbles and boulders of limestone. It is understood that this surface made up the haul road for the quarry immediately south of the site (pre-land).

- 4.6 In location DS03, following the diamond coring of the underlying limestone/granodiorite boulders, cobbles of limestone/granodiorite boulders were noted, including frequent voids between the rocks. This location was position on the slope up towards Warren Park Way and is believed to have been created through the use of waste stone products from the quarry.
- 4.7 Made Ground was typically recorded beneath the boulders, note to comprise brown or grey gravelly sand or sandy gravel, gravel inclusions were found to include brick, timber and ceramic products.
- 4.8 In two locations (DS01 and DS09), arising between 0.25 and 1.3m & 0.75 and 1.1m respectively were recorded as "Possible Reworked Natural", voids / air pockets were noted along with frequent bundles of roots which suggests the material had been placed.

Oadby Member

- 4.9 Arisings denoted to the Oadby Member were recorded at locations DS01, DS05B, DS10 and SD15 to a maximum depth of 2.0m. the arisings were typically recorded as a –
- Soft grey mottled green slightly gravelly very sandy clay;
 - Soft greenish grey clay;
 - Orangish brown gravelly sand; and
 - Firm greyish brown occasionally reddish brown slightly gravelly clay.

Edwalton Member

- 4.10 The weathered deposits of the Edwalton Member was recorded within 9 locations, typically to the central and eastern area of the site. The arisings were noted as –
- Firm brownish red occasionally speckled dark grey slightly gravelly clay;
 - Stiff reddish brown slightly gravelly sandy desiccated clay (arising's as a sandy gravel); or
 - Weathered reddish brown with occasionally grey bands (skerries (2mm-15mm thick) mudstone arising's as a slightly sandy slightly clayey gravel.
- 4.11 This stratum was recorded to a maximum depth of 3.0m and was noted to become stiffer and more competent with depth. Location DS18 was terminated at 1.5m due to the present of an obstruction (believed to be a cobble) within the Edwalton Member.

Hydrogeology

- 4.12 No groundwater strikes were encountered during this phase of works.

Contamination Observations

- 4.13 No visual or olfactory evidence of contamination was noted during the advancement of the borehole locations. No elevated gas readings were recorded on personal monitors during the works.
- 4.14 Atmospheric pressure varied during the works with a general fall from 1018mB on 8 July to a low of 1010mB on 10 July rising to 1012mB on 12 July. The boreholes nearest the extraction compound were drilled at the highest atmospheric pressure to minimise any potential impact to the extraction system.
- 4.15 Elevated carbon dioxide concentrations were noted at DS02 (10.52%v/v at 0.8m bgl) and DS03 (6.1%v/v at 0.7m bgl), with a peak methane level recorded at location DS11 (0.3%v/v at 1.9m). It should be noted that the methane at DS11 was only recorded briefly and should not be taken as a constant gas omission.
- 4.16 The carbon dioxide levels recorded with DS02 and DS03 were considered to be a result of gas building up with the voids noted between the cobbles and boulders beneath the existing road structure.

Reinstatement

- 4.17 On completion of each borehole the holes were backfilled with bentonite and the surface reinstated under the supervision of the CQA engineer.

5. REFERENCES

1. British Standards Institution, (BSI), BS 10175:2011+A2:2017, Investigation of Contaminated Sites – Code of Practice
2. British Standards Institution, (BSI), BS5930:2015) Code of practice for ground investigations
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10. Environment Agency 2008, Human health toxicological assessment of contaminants in soil Science Report – SC050021/SR2
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12. Health and Safety Executive (HSE) 'Protection of workers and the general public during the Development of Contaminated Land (1991).
13. NHBC Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D Publication 66: 2008.

DRAWINGS

Drawing 1: Proposed Site Development Layout



Goose Spinney Woodland

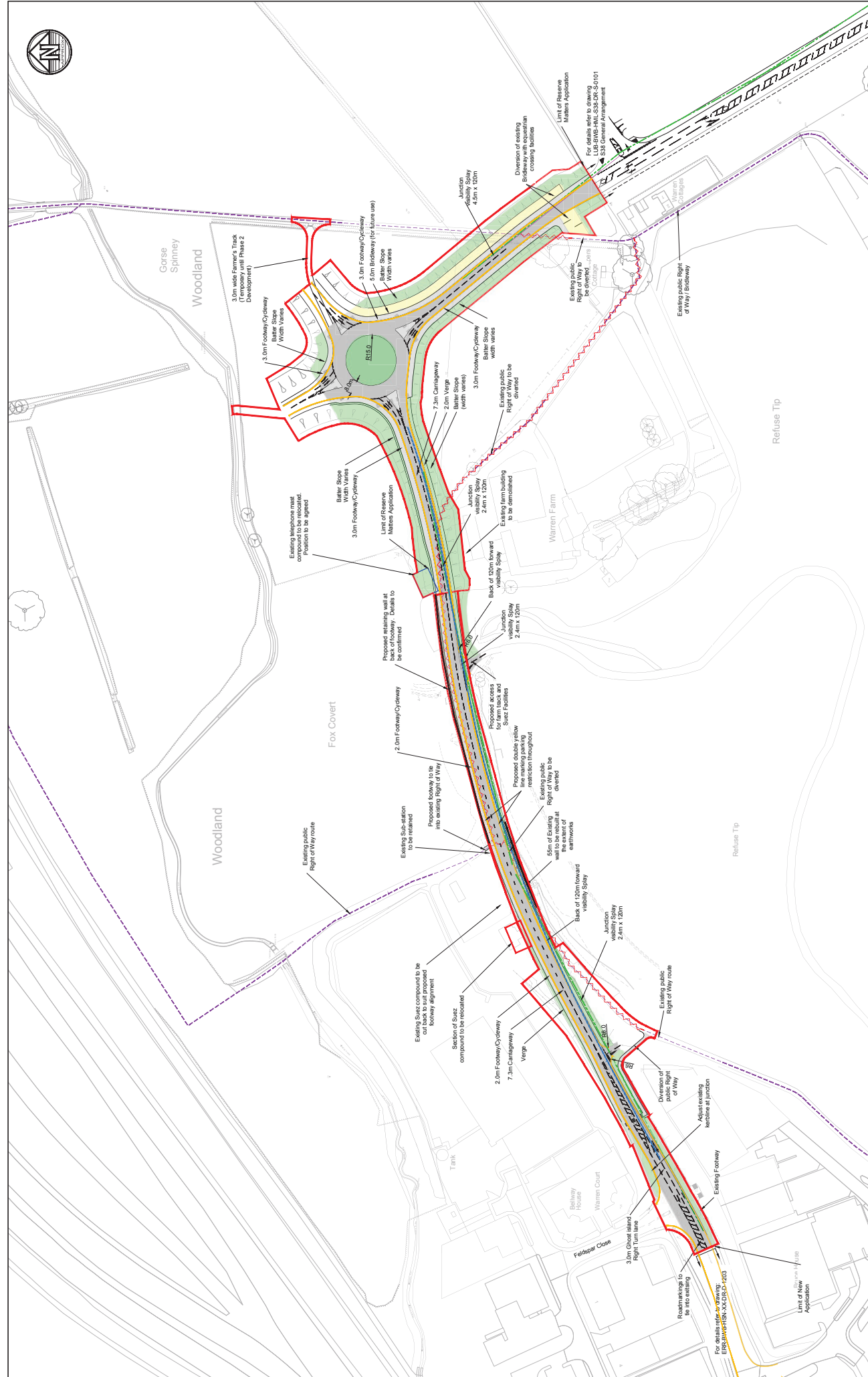
Woodland

Fox Covert

Warren Farm

Refuse Tip

Refuse Tip



NOTES

1. Do not scale the drawing. All dimensions must be dimensioned/checked on site. In doubt ask.
2. The drawing is to be read in conjunction with all relevant notices, engineers and specialist advice and specifications.
3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. It is considered to have one step reduction for horizontal alignment.
6. 1.5m clearance considered at the base of kerb for proposed earthwork.

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Key

	Existing Public Right of Way
	Existing Public Right of Way to be removed/extended
	Existing Red Line Boundary
	Planning Red Line Boundary
	Junction Visibility Splay
	Forward Visibility Splay
	Proposed Retaining Wall

ISSUES & REVISIONS

Rev	Issue	Date
P1	13.05.18 Issued for Comment	05/11/20
P2	15.05.18 Issued for Planning	05/11/20
P3	15.05.18 Planning Boundary Amended	05/11/20

Client
THE TRUSTEES OF DRUMMOND ESTATE

Drawn: G. Jones
Checked: D. Gray
Date: 03.05.18
Scale: 1:1000

Project Name: **PLANNING**

Project Code: ERR-BWB-HGN-06-DR-D-100

Sheet: S8 P3

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Drawn This: Highway General Arrangement
Checked This: Enderby Relief Road, Leicestershire

Drawing 2: Exploratory Hole Location Plan
