



Haigh Huddleston & Associates

Civil & Structural Engineering Consultants

Firth Buildings, 99 -101 Leeds Road, Dewsbury, WF12 7BU

t 01924 464342 f 01924 450662 e trevor.haigh@haighhuddleston.co.uk

Our Ref: E17/6874/MD/001

Date: 15 November 2017

F.A.O. Daryl LeVine

Martin Walsh Associates
Firth Buildings
99-103 Leeds Road
Dewsbury
WF12 7BU

Dear Sir,

Re: Proposed development on former Dewsbury Fire Station, Huddersfield Road

Subsequent to the Desk Top Study, and concerns raised by The Coal Authority in their planning consultation regarding the above development, rotary borehole investigation work has been undertaken to determine the presence of shallow mine workings and locate the three shafts recorded to be on site.

The investigation works on site were restricted by the presence of the fire station and associated buildings on site, the services in the north west of the site and the underground petrol interceptor in the parking area to the east of the fire station.

For the investigation works, three boreholes were undertaken to a depth of 30m to determine the presence of shallow mine workings. To locate the three shafts and approximate the shaft diameters, shallow boreholes were undertaken in a grid at 1.5m and 2m spacings in the recorded locations of the shafts.

In general, outside the shafts, the boreholes proved up to 2.5m of made ground overlying weather mudstone. Beneath this were alternating bands of mudstone and a band of sandstone. In BH01 a 0.6m thick seam of immature coal was encountered at a depth of 0.5-1.10m below existing ground levels that was not encountered in any of the other boreholes. In all three boreholes taken to 30m depth, a 0.3m thick seam of coal was encountered at depths of 21.40m to 21.80m below existing ground levels in the west of the site and 15.20m to 15.50m in the east.

Inside the footprint of the shafts, the boreholes proved a shallow depth of made ground overlying a 0.4m thick reinforced concrete slab with broken ground beneath. Immediately beneath the slab was a short depth of void, below which was backfill material that was displaced with minimal effort by the drilling rig. It was not possible to determine the type of reinforcement to the slab from the borehole.

A site survey indicating the locations of the investigatory boreholes and the borehole logs is attached to the rear of this letter.

SHAFT INVESTIGATION

For the shaft investigation, a borehole was first undertaken at the centre of the recorded mineshaft taken from the Coal Authority plans. An investigatory grid was then established at each shaft location to determine an approximate size of the shafts at each location.

423420-001 (Boreholes 11, 12, 14-18)

The surface to the north-west of the fire station consisted of a 0.2m reinforced concrete slab. Beneath this in boreholes 12 and 15 there was 0.2-0.3m of hardcore overlying a 0.4m thick concrete slab capping the shaft. The shaft was recorded as broken strata, however, immediately beneath the slab was a short depth of void, below which was backfill material that was displaced with minimal effort by the drilling rig.

In Boreholes 11, 14 and 16-18 surrounding the shaft there was between 0.6m and 1.8m of made ground overlying the natural weathered mudstone bedrock.

The borehole investigation to this shaft was restricted by the presence of the wooden hoarding to the site boundary and the presence of services running in the adjacent footpath.

Approximate maximum shaft diameter 3.4m

423420-002 (Boreholes 2-5, 19-29)

In the car parking area to the south east of the fire station, there was a 0.2m thick layer of tarmac.

Beneath this in boreholes 3-4, 19-20, 24 and 26 there was 0.3-0.6m of made ground overlying a 0.3- 0.4m thick reinforced concrete slab capping the shaft. The shaft was recorded as broken strata, however, immediately beneath the slab was a short depth of void, below which was backfill material that was displaced with minimal effort by the drilling rig.

In Boreholes 2, 5, 21-23, 25 and 27-29 surrounding the shaft there was between 2.0m and 2.3m of made ground overlying the natural weathered mudstone bedrock.

Approximate maximum shaft diameter 5.4m

423420-004 (Boreholes 6-9, 30-35)

In the car parking area to the south east of the fire station, there was a 0.2m thick layer of tarmac.

Beneath this in boreholes 6, 8, 32 and 34 there was 1.2-1.4m of made ground overlying a 0.3m thick reinforced concrete slab capping the shaft. The shaft was recorded as broken strata, however, immediately beneath the slab was a short depth of void, below which was backfill material that was displaced with minimal effort by the drilling rig.

In Boreholes 7, 9, 30-31, 33 and 35 surrounding the shaft there was between 2.1m and 2.2m of made ground overlying the natural weathered mudstone bedrock.

Approximate maximum shaft diameter 4.2m

From the above, it would appear that although the shafts have been backfilled and capped, the cap has been constructed off made ground and not natural bedrock. In addition to this, the cap does not appear to extend sufficiently beyond the footprint of the shaft.

SHALLOW MINE WORKINGS (Boreholes 1, 13 and 36)

The three boreholes taken to 30m depth proved an unworked 0.3m thick seam of coal at a depth of 21.40m to 21.80m below existing ground levels in the west of the site and 15.20m to 15.50m in the east. We can therefore confirm that the site has greater than ten times seam thickness of competent rock cover, and this property should not be at risk from mining subsidence in accordance with Ciria SP32.

Additionally, given the limited seam thickness, it is doubtful that significant workings will have been undertaken beneath the site.

GAS MONITORING

Due to the presence of the mineshafts on site, two of the boreholes undertaken on site were installed with monitoring stations to determine if ground gases would adversely affect the proposed development. To date, the monitoring has been undertaken on a single occasion.

The monitoring recorded a peak carbon dioxide concentration of 2.7% in Gas Well 02 and no methane. No flow rate was detected in the boreholes.

Based on the maximum concentrations and gas flow rates measured, the gas regime found on this site can be currently classified as **Green** using the NHBC Traffic Light System in conjunction with CIRIA Report C665, or **CS1** by BS 8485:2015 Table 2. The gas monitoring is ongoing and a final report will be prepared upon completion detailing and gas protection measures required for the proposed development.

FURTHER WORK

The gas monitoring is to be completed and a report compiled detailing any gas protection measures required.

Following demolition of the buildings, a site strip should be undertaken at the location of the shafts as the current concrete caps to the shafts are considered inadequate by modern standards.

Once the diameter of the shafts and the depth to bedrock has been established, a reinforced concrete mineshaft cap can be designed and submitted for approval by The Coal Authority prior to construction on site.

The building should be located away from the existing shafts and the proposed foundations should be taken down to the mudstone bedrock to avoid loadings being transferred to the shaft. The final location of the building should be agreed with the Coal Authority and Kirklees Council.

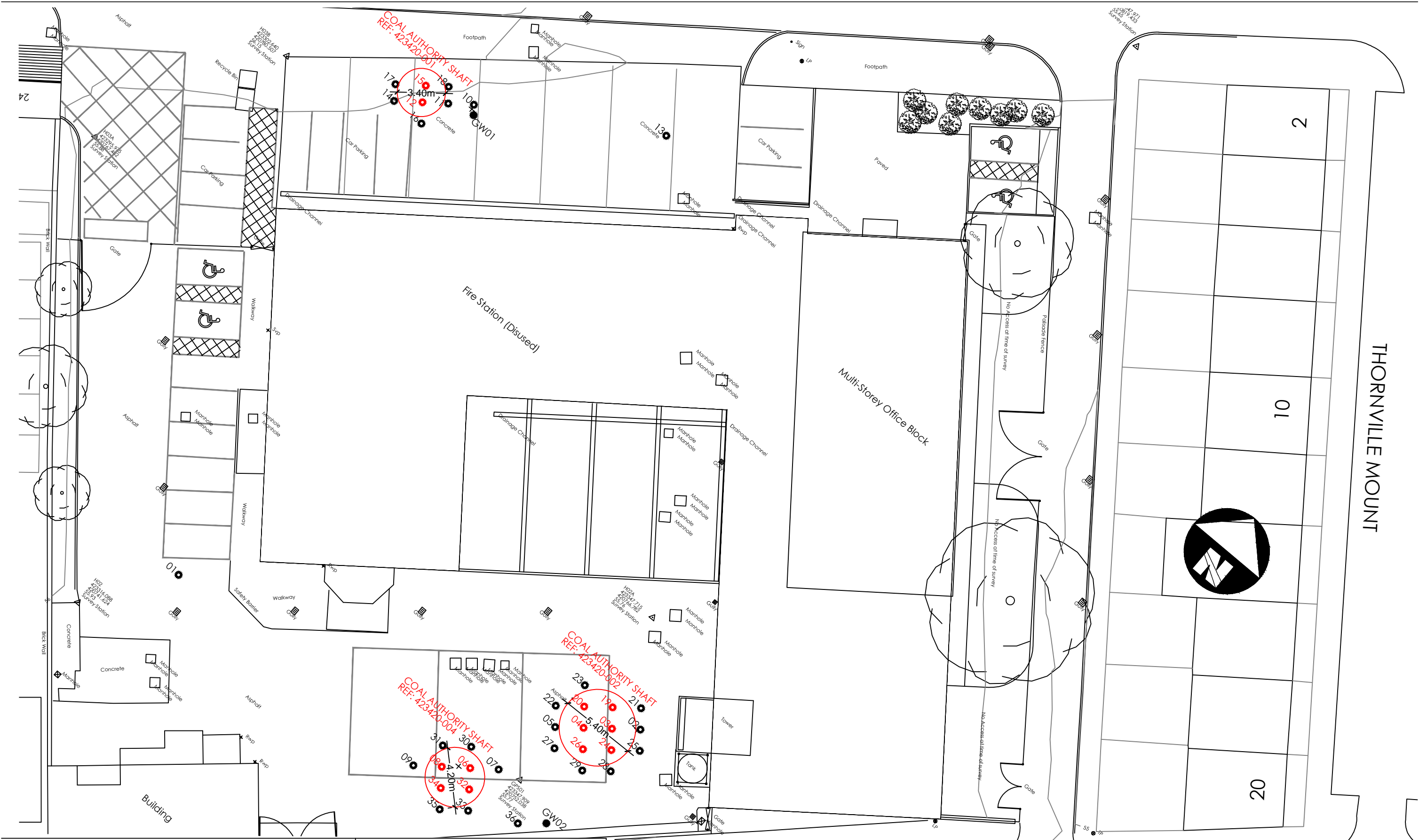
We trust that the above is sufficient for your current requirements, however should you need any further information please do not hesitate to contact me direct.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'M Dean', with a large, stylized 'D' and a long horizontal stroke extending to the right.

MICHAEL DEAN
m.dean@haighhuddleston.co.uk

Enclosure.



Client	WSG Holdings Ltd
Project	Dewsbury Fire Station
Detail	Borehole Location Plan
Scale	1:250@A3
Dwn	MD
Chkd	
Date	Nov'17
Dwg No.	E17/6874/03

KEY:

- 04 ● BOREHOLE WITH SHAFT ENCOUNTERED
- 05 ● BOREHOLE
- GW02 ● GAS MONITORING STATION
- 2.40m ← ESTIMATED MAXIMUM SHAFT DIAMETER



Client	WSG Holdings Ltd
Project	Dewsbury Fire Station
Detail	Borehole Location Plan (Proposed Site)
Scale	1:250@A3
Dwn	MD
Chkd	
Date	Nov'17
Dwg No.	E17/6874/03/02

KEY:	
04	BOREHOLE WITH SHAFT ENCOUNTERED
05	BOREHOLE
GW02	GAS MONITORING STATION



GROUND SUPPORT SERVICES (UK) LTD
 GEOTECHNICAL AND GROUND SUPPORT FOUNDATION SPECIALISTS

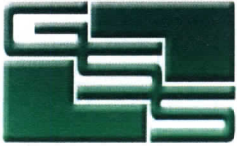
Unit D2B Bryans Close, Harworth Industrial Estate, Harworth, South Yorkshire, DN11 8RY
 Phone: 01302 744 322 Email: thomas@groundssupportservices.net

Site Investigation Drillers log	Site: <u>Dewsbury Fire Station</u>	Sheet: <u>1 of 3</u>
Rig: <u>Soilmec 400</u>	Crew: <u>G Pilkington J Frogget</u>	Date: <u>19-10-17</u>
Hours on site:	Travelling Time:	

Equipment used:					
BH	Depth	Strata Description	BH	Depth	Strata Description
move rig to Dewsbury Fire Station					
1	0.00 - 0.20	Tarmac	4	0.00 - 0.20	Tarmac
	0.20 - 0.50	made ground		0.20 - 0.80	made ground
	0.50 - 1.10	Coal weatherd		0.80 - 1.20	Concrete
	1.10 - 3.00	mudstone brown weatherd		1.20 - 12.50	Broken strata
	3.00 - 6.20	mudstone brown	5	0.00 - 0.20	Tarmac
	6.20 - 16.40	mudstone grey		0.20 - 2.40	made ground
	16.40 - 19.90	Sandstone grey		2.40 - 3.70	mudstone brown weatherd
	19.20 - 21.40	mudstone grey			
	21.40 - 21.70	Coal		3.70 - 6.50	mudstone brown
	21.70 - 30.00	mudstone grey			
2	0.00 - 0.20	Tarmac	6	0.00 - 0.20	Tarmac
	0.20 - 2.50	made ground		0.20 - 1.40	made ground
	2.50 - 3.60	mudstone brown weatherd		1.40 - 1.70	Concrete
	3.60 - 6.50	mudstone brown		1.70 - 12.50	Broken strata
3	0.00 - 0.20	Tarmac	7	0.00 - 0.20	Tarmac
	0.20 - 0.60	made ground		0.20 - 2.30	made ground
	0.60 - 1.00	Concrete		2.30 - 3.70	mudstone brown weatherd
	1.00 - 12.50	Broken strata		3.70 - 6.50	mudstone brown

Casing / Water level details										
BH	Casing Die	Casing Depth	Strike	Water Rise	Sealed	Totals	BH's	Drill	Case	Core
1			15.00			Today				
						Previous				
						To date				


Signed:  Driller

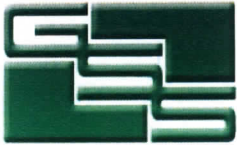


GROUND SUPPORT SERVICES (UK) LTD
 GEOTECHNICAL AND GROUND SUPPORT FOUNDATION SPECIALISTS

Unit D2B Bryans Close, Harworth Industrial Estate, Harworth, South Yorkshire, DN11 8RY
 Phone: 01302 744 322 Email: thomas@groundsupportservices.net

Site Investigation Drillers log			Site: <i>Dewsbury Fire Station</i>			Sheet: <i>2 of 3</i>				
Rig: <i>Soilmec 400</i>			Crew: <i>G Pilkington J Fogget</i>			Date: <i>19-10-17</i>				
Hours on site:				Travelling Time:						
Equipment used:										
BH	Depth	Strata Description	BH	Depth	Strata Description					
<i>8</i>	<i>0.00 - 0.20</i>	<i>Tarmac</i>	<i>12</i>	<i>0.00 - 0.40</i>	<i>Concrete</i>					
	<i>0.20 - 1.40</i>	<i>made ground</i>		<i>0.20 - 0.40</i>	<i>made ground</i>					
	<i>1.40 - 1.70</i>	<i>Concrete</i>		<i>0.40 - 0.80</i>	<i>Concrete</i>					
	<i>1.70 - 12.50</i>	<i>Broken strata</i>		<i>0.80 - 12.50</i>	<i>Broken strata</i>					
<i>9</i>	<i>0.00 - 0.20</i>	<i>Tarmac</i>	<i>13</i>	<i>0.00 - 0.20</i>	<i>Concrete</i>					
	<i>0.20 - 2.30</i>	<i>made ground</i>		<i>0.20 - 2.00</i>	<i>made ground</i>					
	<i>2.30 - 3.70</i>	<i>mudstone brown weathered</i>		<i>2.00 - 3.60</i>	<i>mudstone brown weathered</i>					
	<i>3.70 - 6.50</i>	<i>mudstone brown</i>		<i>3.60 - 5.80</i>	<i>mudstone brown</i>					
<i>10</i>	<i>0.00 - 0.20</i>	<i>Concrete</i>		<i>5.80 - 16.00</i>	<i>mudstone grey</i>					
	<i>0.20 - 2.00</i>	<i>made ground</i>		<i>16.00 - 20.00</i>	<i>Sandstone grey</i>					
	<i>2.00 - 3.40</i>	<i>mudstone brown weathered</i>		<i>20.00 - 21.50</i>	<i>mudstone grey</i>					
	<i>3.40 - 6.50</i>	<i>mudstone brown</i>		<i>21.50 - 21.80</i>	<i>Coal</i>					
<i>11</i>	<i>0.00 - 0.20</i>	<i>Concrete</i>	<i>14</i>	<i>0.00 - 0.20</i>	<i>Concrete</i>					
	<i>0.20 - 2.00</i>	<i>made ground</i>		<i>0.20 - 0.80</i>	<i>made ground</i>					
	<i>2.00 - 3.40</i>	<i>mudstone brown weathered</i>		<i>0.80 - 3.70</i>	<i>mudstone brown weathered</i>					
	<i>3.40 - 6.50</i>	<i>mudstone brown</i>		<i>3.70 - 6.50</i>	<i>mudstone brown</i>					
Casing / Water level details										
BH	Casing Die	Depth	Strike	Water Rise	Sealed	Totals	BH's	Drill	Case	Core
						Today				
						Previous				
						To date				

Signed:  Driller

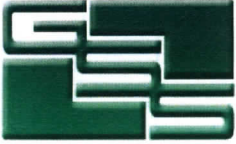


GROUND SUPPORT SERVICES (UK) LTD
 GEOTECHNICAL AND GROUND SUPPORT FOUNDATION SPECIALISTS

Unit D2B Bryans Close, Harworth Industrial Estate, Harworth, South Yorkshire, DN11 8RY
 Phone: 01302 744 322 Email: thomas@groundsupportservices.net

Site Investigation Drillers log			Site: <i>Duesbury Fire Station</i>			Sheet: <i>1 of 3</i>				
Rig: <i>Soilmec 400</i>			Crew: <i>G Pilkington J Frogget</i>			Date: <i>20-10-17</i>				
Hours on site:					Travelling Time:					
Equipment used:										
BH	Depth	Strata Description	BH	Depth	Strata Description					
<i>17</i>	<i>0.00-0.20</i>	<i>Concrete</i>	<i>19</i>	<i>0.00-0.20</i>	<i>Tarmac</i>					
	<i>0.20-2.00</i>	<i>made ground</i>		<i>0.20-0.50</i>	<i>made ground</i>					
	<i>2.00-3.70</i>	<i>mudstone brown weatherd.</i>		<i>0.50-0.80</i>	<i>Concrete</i>					
	<i>3.70-6.50</i>	<i>mudstone brown</i>		<i>0.80-6.50</i>	<i>Broken strata</i>					
			<i>20</i>	<i>0.00-0.20</i>	<i>Tarmac</i>					
<i>18</i>	<i>0.00-0.20</i>	<i>Concrete</i>		<i>0.20-0.50</i>	<i>made ground</i>					
	<i>0.20-2.00</i>	<i>made ground</i>		<i>0.50-0.80</i>	<i>Concrete</i>					
	<i>2.00-3.70</i>	<i>mudstone brown weatherd.</i>		<i>0.80-6.50</i>	<i>Broken strata</i>					
	<i>3.70-6.50</i>	<i>mudstone brown</i>	<i>21</i>	<i>0.00-0.20</i>	<i>Tarmac</i>					
				<i>0.20-2.50</i>	<i>made ground</i>					
<i>Gaswell 1</i>				<i>2.50-3.60</i>	<i>mudstone brown weatherd</i>					
	<i>0.00-0.20</i>	<i>Concrete</i>		<i>3.60-6.50</i>	<i>mudstone brown</i>					
	<i>0.20-2.00</i>	<i>made ground</i>								
	<i>2.00-3.60</i>	<i>mudstone brown weatherd.</i>	<i>22</i>	<i>0.00-0.20</i>	<i>Tarmac</i>					
	<i>3.60-4.00</i>	<i>mudstone brown</i>		<i>0.20-2.40</i>	<i>made ground</i>					
<i>Install</i>	<i>3.00 mt</i>	<i>slotted pipe</i>		<i>2.40-3.60</i>	<i>mudstone brown weatherd</i>					
	<i>1.00 mt</i>	<i>plain pipe</i>								
<i>Gravel</i>	<i>4.00 mt</i>	<i>to 1.00 mt</i>		<i>3.60-6.50</i>	<i>mudstone brown</i>					
<i>Bentonite</i>	<i>1.00 mt</i>	<i>to 0.00 mt</i>								
	<i>1 end cap</i>	<i>1 gas tap</i>	<i>23</i>	<i>0.00-0.20</i>	<i>Tarmac</i>					
	<i>Concrete in</i>	<i>1 cover.</i>		<i>0.20-2.20</i>	<i>made ground</i>					
Casing / Water level details										
BH	Casing Die	Depth	Strike	Water Rise	Sealed	Totals	BH's	Drill	Case	Core
						Today				
						Previous				
						To date				


Signed *[Signature]* Driller



GROUND SUPPORT SERVICES (UK) LTD
GEOTECHNICAL AND GROUND SUPPORT FOUNDATION SPECIALISTS

Unit D2B Bryans Close, Harworth Industrial Estate, Harworth, South Yorkshire, DN11 8RY
 Phone: 01302 744 322 Email: thomas@groundsupportservices.net

Site Investigation Drillers log		Site: <u>Dewsbury Fire Station</u>		Sheet: <u>2 of 3</u>						
Rig: <u>Solmel 400</u>		Crew: <u>G Pilkington J Frogget</u>		Date: <u>20-10-17</u>						
Hours on site:			Travelling Time:							
Equipment used:										
BH	Depth	Strata Description	BH	Depth	Strata Description					
<u>23 cont</u>	<u>1-20 - 3-70</u>	<u>mudstone brown weathered</u>		<u>3-70 - 6-50</u>	<u>mudstone brown</u>					
	<u>3-70 - 6-50</u>	<u>mudstone brown</u>	<u>28</u>	<u>0-00 - 0-20</u>	<u>Tarmac</u>					
				<u>0-20 - 2-30</u>	<u>made ground</u>					
<u>24</u>	<u>0-00 - 0-20</u>	<u>Tarmac</u>		<u>2-30 - 3-60</u>	<u>mudstone brown weathered</u>					
	<u>0-20 - 0-60</u>	<u>made ground</u>								
	<u>0-60 - 1-00</u>	<u>Concrete</u>		<u>3-60 - 6-50</u>	<u>mudstone brown</u>					
	<u>1-00 - 6-50</u>	<u>Broken strata</u>								
			<u>29</u>	<u>0-00 - 0-20</u>	<u>Tarmac</u>					
<u>25</u>	<u>0-00 - 0-20</u>	<u>Tarmac</u>		<u>0-20 - 2-40</u>	<u>made ground</u>					
	<u>0-20 - 2-30</u>	<u>made ground</u>		<u>2-40 - 3-70</u>	<u>mudstone brown weathered</u>					
	<u>2-30 - 3-70</u>	<u>mudstone brown weathered</u>		<u>3-70 - 6-50</u>	<u>mudstone brown</u>					
	<u>3-70 - 6-50</u>	<u>mudstone brown</u>								
			<u>30</u>	<u>0-00 - 0-20</u>	<u>Tarmac</u>					
<u>26</u>	<u>0-00 - 0-20</u>	<u>Tarmac</u>		<u>0-20 - 2-40</u>	<u>made ground</u>					
	<u>0-20 - 0-80</u>	<u>made ground</u>		<u>2-40 - 3-70</u>	<u>mudstone brown weathered</u>					
	<u>0-80 - 1-10</u>	<u>Concrete</u>		<u>3-70 - 6-50</u>	<u>mudstone brown</u>					
	<u>1-10 - 6-50</u>	<u>Broken strata</u>								
<u>27</u>	<u>0-00 - 0-20</u>	<u>Tarmac</u>	<u>31</u>	<u>0-00 - 0-20</u>	<u>Tarmac</u>					
	<u>0-20 - 2-20</u>	<u>made ground</u>		<u>0-20 - 2-40</u>	<u>made ground</u>					
	<u>2-20 - 3-70</u>	<u>mudstone brown weathered</u>		<u>2-40 - 3-70</u>	<u>mudstone brown weathered</u>					
				<u>3-70 - 6-50</u>	<u>mudstone brown</u>					
Casing / Water level details			<u>3-70 - 6-50</u> (mudstone brown)							
BH	Casing Die	Casing Depth	Strike	Water Rise	Sealed	Totals	BH's	Drill	Case	Core
						Today				
						Previous				
						To date				

Signed:  Driller



GROUND SUPPORT SERVICES (UK) LTD
 GEOTECHNICAL AND GROUND SUPPORT FOUNDATION SPECIALISTS

Unit D2B Bryans Close, Harworth Industrial Estate, Harworth, South Yorkshire, DN11 8RY
 Phone: 01302 744 322 Email: thomas@groundsupportservices.net

Site Investigation Drillers log		Site: <i>Dewsbury fire station</i>			Sheet: <i>3 of 3</i>					
Rig: <i>Soilmec 400</i>		Crew: <i>G Pilkington J Frogget</i>			Date: <i>20-10-17</i>					
Hours on site:			Travelling Time:							
Equipment used:										
BH	Depth	Strata Description	BH	Depth	Strata Description					
<i>32</i>	<i>0.00-0.20</i>	<i>Tarmac</i>		<i>2.30-3.70</i>	<i>mudstone brown</i>					
	<i>0.20-1.50</i>	<i>made ground</i>			<i>weathered</i>					
	<i>1.50-1.80</i>	<i>Concrete</i>		<i>3.70-5.90</i>	<i>mudstone brown</i>					
	<i>1.80-6.50</i>	<i>Broken strata</i>		<i>5.90-11.50</i>	<i>mudstone grey</i>					
				<i>11.50-13.80</i>	<i>Sandstone grey</i>					
<i>33</i>	<i>0.00-0.20</i>	<i>Tarmac</i>		<i>13.80-15.20</i>	<i>mudstone grey</i>					
	<i>0.20-2.40</i>	<i>made ground</i>		<i>15.20-15.50</i>	<i>Coal</i>					
	<i>2.40-3.70</i>	<i>mudstone brown</i>		<i>15.50-30.00</i>	<i>mudstone grey</i>					
		<i>weathered</i>	<i>Gaswell 2</i>							
	<i>3.70-6.50</i>	<i>mudstone brown</i>		<i>0.00-0.20</i>	<i>Tarmac</i>					
				<i>0.20-2.30</i>	<i>made ground</i>					
<i>34</i>	<i>0.00-0.20</i>	<i>Tarmac</i>		<i>2.30-3.70</i>	<i>mudstone brown</i>					
	<i>0.20-1.60</i>	<i>made ground</i>			<i>weathered</i>					
	<i>1.60-1.90</i>	<i>Concrete</i>		<i>3.70-4.00</i>	<i>mudstone brown</i>					
	<i>1.90-6.50</i>	<i>Broken strata</i>								
				<i>Install 3.00 mt slotted pipe</i>						
<i>35</i>	<i>0.00-0.20</i>	<i>Tarmac</i>			<i>1.00 mt plain pipe</i>					
	<i>0.20-2.40</i>	<i>made ground</i>		<i>Gravel 4.00 mt to 1.00 mt</i>						
	<i>2.40-3.70</i>	<i>mudstone brown</i>		<i>Bentonite 1.00 mt to 0.00 mt</i>						
		<i>weathered</i>		<i>1 end cap 1 gas tap</i>						
	<i>3.70-6.50</i>	<i>mudstone brown</i>		<i>Concrete in 1 cover</i>						
<i>36</i>	<i>0.00-0.20</i>	<i>Tarmac</i>		<i>move rig from</i>						
	<i>0.20-2.30</i>	<i>made ground</i>		<i>Dewsbury fire station</i>						
Casing / Water level details										
BH	Casing Die	Casing Depth	Strike	Water Rise	Sealed	Totals	BH's	Drill	Case	Core
<i>36</i>			<i>15.00</i>			<i>Today</i>	<i>22</i>	<i>161.5</i>		
						<i>Previous</i>	<i>16</i>	<i>188.5</i>		
						<i>To date</i>	<i>38</i>	<i>343.00</i>		

Signed.....*[Signature]*.....Driller