

19th June 2018

Our Ref: AHB/JS/35267-Lt005

Gascoine Group Ltd
1 Church Street
Southwell
Nottinghamshire
NG25 0HQ

Dear Mrs. Gascoine

RE: Additional Geotechnical Ground Investigation at Land off Limestone Road, Burniston, North Yorkshire

Alan Wood & Partners (AWP) recently undertook an additional intrusive geotechnical ground investigation at land off Limestone Road, Burniston St, North Yorkshire YO13 0EF. A site location plan has been included as Figure 35267/001.

The purpose of the additional ground investigation is to ascertain the nature of the near surface soils and groundwater within an area susceptible to ponding water which was inaccessible during a site wide ground investigation undertaken in 2014. The previous site investigation was undertaken by AWP which resulted in their combined Phase I and Phase II Geo-Environmental report reference JS/AHB/35267-Rp001, dated April 2014. At the time of that investigation, this area was inaccessible due to ponded water.

The recent investigation was undertaken to investigate whether any near surface below ground groundwater bodies contribute to the ponding water to be present. Historically, the standing water is noted to dissipate over time and anecdotal evidence suggests that the water appears in the lowest part of the site on a regular basis.

Scope of Works

The recent additional ground investigation was undertaken on 18th July 2018 and comprised two mechanically excavated trial pits to a maximum depth of 3.30m below current ground level (bcgl). Also, a reconnaissance of the northern area of the site was undertaken in order to ascertain whether there are any additional potential sources of surface water which could contribute to the ponding water.

Given that Great Crested Newts have been observed on the site, an ecologist was present in order to guide the recent intrusive investigative works.

All site excavations were backfilled with arisings upon completion and under the guidance of the ecologist.

Sheffield Office
Hallamshire House
Meadow Court
Hayland Street
Sheffield
S9 1BY

Telephone
01142 440077

Email
eng@alanwood.co.uk

For details of our other offices please visit our website
www.alanwood.co.uk

Registered Office
341 Beverley Road
Hull HU5 1LD

Registered In
England 1988349
VAT 228 9543 75

AWP 2014 Site Investigation

The previous site investigation undertaken by AWP included a Phase I desk study and a Phase II ground investigation of the whole of the site, where accessible. The published geology for the area is noted to comprise superficial Glacial Till (Diamicton) which typically include interbedded layers of clay, silt, sand and gravel. The underlying bedrock is recorded as sandstone and limestone of the Scarborough Formation (Moor Grit Member). The northern portion of the site is noted to be underlain by sandstone, siltstone and mudstone of the Gristhorpe Member.

The superficial deposits are classified as an 'unproductive' aquifer. These are soils of low permeability having a negligible significance for water supply or river base flow. The underlying bed rock is indicated to be a 'Secondary A' aquifer which can support water supplied at a local, rather than strategic scale, and in some cases, form an important source of base flow to rivers.

The nearest surface water feature to the site is an unnamed stream, 47m to the northwest. This is culverted 77m to the northwest. There are reported groundwater (superficial deposits) flooding susceptible areas within 50m of the site.

The previous intrusive ground investigation comprised the excavation of 9 no. trial pits using a JCB 3CX and to a maximum depth of 4.00m bcgl. These encountered topsoil to between 0.20m and 0.40m depth which is underlain by 1.50m to 3.80m of glacial deposits. It should be noted that the base of the glacial deposit was not proved within any of the exploratory excavations. No groundwater was encountered within any of the exploratory holes. In-situ percolation tests were carried out in two of the trial pits which confirmed the cohesive near surface soils to have a low permeability.

Given that the lower northern portion of the site was inaccessible at the time of the previous intrusive site works, recommendations were made within the AWP Phase I and Phase II report for additional investigative works to be undertaken within the area of ponding water once accessible.

The historical maps presented in the Phase I and Phase II report do not show a surface water feature within the northern portion of the site. However, the most recent 2012 map extract shows the area subject to ponding water to be marsh land.

It should be noted that the previous investigation was undertaken at a time of prolonged heavy rain and the near surface soils were soft and saturated. This resulted in the excavator sinking to its axles on numerous occasions during the intrusive site works.

AWP 2018 Additional Investigation

The ground and groundwater conditions encountered within the 2 no. additional trial pits are summarised below and presented in full on the attached trial pit logs. The location of the exploratory holes is presented on the enclosed exploratory holes location plan.

Table 1.0 – Summary of Encountered Ground Conditions

Lithology	Exploration Location	Depth (m) to base from existing ground level	Approximate Thickness (m)	Allowable Safe Bearing Capacity (kN/m²)
Topsoil	101 & 102	0.30	0.30	N/A
Glacial Deposits – Stiff sandy, slightly gravelly CLAY	101	2.80+	2.50 Proven	154
Recent Deposits – slightly clayey amorphous and pseudo-fibrous PEAT	102	2.20	1.90	Nil
Recent Deposits -	102	3.30+	1.10 Proven	Nil
Groundwater	Slight localised seepage in 102 at 1.00m depth.			

Topsoil was encountered in both locations and typically comprised slightly sandy slightly gravelly clay with frequent rootlets.

Peat was encountered below the topsoil in TP102. This was noted to be slightly clayey and amorphous to 2.20m depth. However, a 200mm thick layer of pseudo fibrous and fibrous peat was encountered at 1.00m depth.

Recent Deposits comprising grey very soft sandy clay was encountered below the peat in trial pit 102 at 2.20m depth. This became slightly stronger with depth. However, the trial pit was terminated at 3.30m bcgl as the sides of the trial pit were unstable due to the presence of cohesive soils with very low strength.

Glacial Deposits were encountered below the topsoil in additional trial pit 101 only. As with the glacial deposits encountered in the previous investigation, this comprised stiff becoming firm slightly sandy slightly gravelly CLAY. The gravel fraction comprised fine and medium angular and sub-angular weathered sandstone.

Groundwater was not encountered within additional TP101 or within any of the trial pits excavated during the previous investigation. However a slight localised water seepage was encountered at 1.00m depth within TP102. This is coincident with the pseudo-fibrous and fibrous peat band encountered at between 1.00m and 1.20m bcgl. It is not unusual for peat deposits such as this to be saturated given their open structure and 'sponge like' properties.

No other seepages of groundwater were encountered within TP102.

No significant groundwater bodies were encountered within the previous or recent phases of ground investigation.

Anecdotal evidence suggests that a spring is located in the north-western corner of the site. No evidence of this was noted during the recent site reconnaissance. The alleged location is at the base of the steeply inclined neighbouring open land which suggests that the spring may result from surface waters percolating through the topsoil deposits from the elevated land. This then flows down on the surface of the cohesive glacial deposits below the topsoil to the natural low point in the north-western portion of the site. The percolating waters then issue at the surface at a lower elevation just to the west of where water is noted to pond on the site's surface.

A drainage headwall was noted below the termination of The Limes road which is adjacent to the north-eastern portion of the site. This allows for the discharge of waters from the neighbouring land onto the site at its lowest elevation. Although no water was seen to be discharging from the head wall at the time of the recent site works, the ground level in front of it was noted to have been lowered locally by excavation to enable it to discharge effectively. Standing water was noted to be present within the excavation in front of the headwall. The alignment of vegetation and debris around the grate indicates flow is from the headwall onto the site.

No other potential source of water were noted to discharge onto the site during the recent additional site works.

The peat encountered within additional TP102 is considered to be a localised feature which is not recorded in the published geology or historical maps for the area. Given its depth and its limited lateral extents, this is interpreted as a 'paleochannel' possibly formed during the last ice age.

We trust that the above is satisfactory, but should you have any queries or wish clarification of the above please do not hesitate to contact us.

Yours sincerely,



A. H. Borthwick, *BSc(Hons) FGS IAEG*
Associate
For and on behalf of Alan Wood & Partners

Copy: Luke Sewell – Gascoine Group

James Gibson – Alan Wood & Partners

19th July 2018
Our Ref: AHB/JMS/35267-Lt005

Encl:

Site Location Plan

Exploratory Hole Location Plan

Trial Pit Logs



Sheffield Office AMP Technology Park Brunel Way Sheffield S60 5WG T: 01142 541307 www.alanwood.co.uk		Consulting Civil & Structural Engineers Project Managers Building Surveyors Also at: York T.01904 611594 Scarborough T.01723 865484 Louth T.01507 610784 Hull T.01482 442138	
Client. The Gascoine Group Ltd			
Project. Limestone Road, Burniston			
Drawing. Site Location Plan			
Date. 01.04.14		Scale. NTS	
Drawn by. AHB	Check by.	Approved by.	
Status: FINAL			
Job no. 35267	Fig. no. 001	Rev.	



Key

 Trial Pit Locations
18th July 2018

AWP 2014 Investigation

-  AWP Percolation Test
-  AWP trial pit location
-  Approximate red line site boundary
-  Inaccessible area due to ponding surface water

DO NOT SCALE



Client.		Gascoine Group Ltd	
Project.		Limestone Road, Burniston	
Drawing.		Exploratory Hole Location Plan	
Date.	23.07.18	Scale.	NTS
Drawn by.	AHB	Check by.	JS
		Approved by.	JS
Status:	FINAL		
Job no.	Fig. no.	Rev.	
35267	002	A	



Trial Pit Log

Trialpit No
TP101
Sheet 1 of 1

Project Name: Limestone Road	Project No. 35267	Co-ords: 500421.00 - 493458.00 Level: 52.00	Date 18/07/2018
Location: Limestone Road, Burniston, Scarborough, YO13		Dimensions (m): Depth 2.80	Scale 1:25 Logged AHB
Client: Gascoine Group		3 0.6	

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
			HVP=42 HVR=42 HVP=69 HVR=69	0.30	51.70		TOPSOIL: Brown, slightly sandy, slightly gravelly, CLAY with frequent rootlets. Gravel is fine and medium, angular and sub-angular, weathered sandstone.
			HVP=28 HVR=28				Stiff, brown, sandy, slightly gravelly, CLAY. Gravel is fine and medium, angular and sub-angular, weathered sandstone. (GLACIAL DEPOSITS)
			HVP=31 HVR=31				<i>Becoming more sandy and damp between 1.10 and 1.60m bgl.</i>
			HVP=31 HVR=31	2.80	49.20		End of pit at 2.80 m

Remarks: No Groundwater Encountered.

Stability: All sides stable.





Trial Pit Log

Trialpit No
TP102
Sheet 1 of 1

Project Name: Limestone Road Project No. 35267 Co-ords: 500407.00 - 493426.00 Date 18/07/2018
Level: 49.00

Location: Limestone Road, Burniston, Scarborough, YO13 Dimensions (m): 3 Scale 1:25

Client: Gascoine Group Depth 3.30 Logged AHB

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.30	48.70		TOPSOIL: Brown, slightly sandy, slightly gravelly, CLAY with frequent rootlets. Gravel is fine and medium, angular and sub-angular, weathered sandstone.
							Dark brown, slightly clayey, amorphous, PEAT. (RECENT DEPOSITS)
							<i>Pseudo fibrous and fibrous peat between 1.00 and 1.20m bgl.</i>
				2.20	46.80		Very soft, grey, sandy, CLAY.
							<i>Becoming soft between 3.00 and 3.30m bgl.</i>
				3.30	45.70		End of pit at 3.30 m

Remarks: Slight localised seepage 1.00m bgl.

Stability: Unstable below 2.20m bgl.





Alan Wood and Partners
 AMP Technology Park, Brunel Way
 Sheffield, South Yorkshire
 S60 5WG
 Tel: 0114 254 1307

Trialpit No
1
 Sheet 1 of 1

Project Name Limestone Road	Project No. 35267	Co-ords: - Level: 67.34 m AOD	Date 14/03/2014
Location: Burniston		Dimensions: 3.00m Depth 1.70m	Scale 1:25
Client: Gascoine Group Limited			Logged By AHB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.20	D		0.20	67.14		TOPSOIL: Soft brown slightly sandy slightly gravelly CLAY. Gravel is fine and medium sandstone.
0.50 0.50	IVN 1 D	90				Firm brown-orange sandy slightly gravelly CLAY. Gravel is fine to coarse angular to rounded sandstone, siltone and coal. (GLACIAL TILL)
1.00	IVN 2	100				
			1.70	65.64		Trialpit Complete at 1.70 m

Remarks: Percolation test.

Groundwater: None Encountered





Alan Wood and Partners
 AMP Technology Park, Brunel Way
 Sheffield, South Yorkshire
 S60 5WG
 Tel: 0114 254 1307

Trialpit No
2
 Sheet 1 of 1

Project Name Limestone Road	Project No. 35267	Co-ords: - Level: 64.58 m AOD	Date 14/03/2014
Location: Burniston		Dimensions: 3.00m Depth 3.50m	Scale 1:25
Client: Gascoine Group Limited		0.60m	Logged By AHB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.10	D		0.40	64.18		TOPSOIL: Soft brown slightly sandy slightly gravelly CLAY. Gravel is fine and medium angular sandstone.
0.50 0.60	D IVN 1	70				Firm becoming stiff brown-orange sandy gravelly bouldery CLAY. Gravel is fine to coarse angular to rounded sandstone, siltstone and coal. Boulders are subrounded sandstone. (GLACIAL TILL)
			3.50	61.08	Trialpit Complete at 3.50 m	

Remarks:

Groundwater: None Encountered





Alan Wood and Partners
 AMP Technology Park, Brunel Way
 Sheffield, South Yorkshire
 S60 5WG
 Tel: 0114 254 1307

Trialpit No
3
 Sheet 1 of 1

Project Name Limestone Road	Project No. 35267	Co-ords: - Level: 59.68 m AOD	Date 14/03/2014
Location: Burniston		Dimensions: 3.00m Depth 3.50m	Scale 1:25
Client: Gascoine Group Limited		0.60m	Logged By AHB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.20	D		0.20	59.48		TOPSOIL: Soft brown slightly sandy slightly gravelly CLAY. Gravel is fine and medium angular sandstone.
0.60	D					Firm becoming stiff red/brown mottled grey sandy gravelly cobbly CLAY. Gravel is fine to coarse angular to rounded sandstone, siltstone and coal. Cobbles are rounded sandstone. (GLACIAL TILL)
1.00	IVN 1	92				
			3.50	56.18		Trialpit Complete at 3.50 m

Remarks:

Groundwater: None Encountered





Alan Wood and Partners
 AMP Technology Park, Brunel Way
 Sheffield, South Yorkshire
 S60 5WG
 Tel: 0114 254 1307

Trialpit No
4
 Sheet 1 of 1

Project Name Limestone Road	Project No. 35267	Co-ords: - Level: 68.70 m AOD	Date 14/03/2014
Location: Burniston		Dimensions: 3.00m Depth 3.80m	Scale 1:25
Client: Gascoine Group Limited		0.60m	Logged By AHB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.30	D		0.20	68.50		TOPSOIL: Soft brown slightly sandy slightly gravelly CLAY. Gravel is fine and medium angular sandstone.
0.80 0.80	IVN 1 D	120				Stiff brown/red mottled grey sandy gravelly cobbly CLAY. Gravel is angular to rounded sandstone, siltstone, quartzite and coal. Cobbles are rounded sandstone. (GLACIAL TILL)
			3.80	64.90		Trialpit Complete at 3.80 m

Remarks: Percolation test.

Groundwater: None Encountered





Alan Wood and Partners
 AMP Technology Park, Brunel Way
 Sheffield, South Yorkshire
 S60 5WG
 Tel: 0114 254 1307

Trialpit No
5
 Sheet 1 of 1

Project Name Limestone Road	Project No. 35267	Co-ords: - Level: 62.35 m AOD	Date 14/03/2014
Location: Burniston		Dimensions: 3.00m Depth 3.50m	Scale 1:25
Client: Gascoine Group Limited		0.60m	Logged By AHB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.20	D		0.30	62.05		TOPSOIL: Soft brown slightly sandy slightly gravelly CLAY. Gravel is fine and medium angular sandstone.
0.80	IVN 1	60				Firm becoming stiff sandy gravelly cobbly CLAY. Gravel is fine to coarse angular to rounded sandstone, siltstone and coal. Cobbles are angular to rounded sandstone and siltstone. (GLACIAL TILL)
1.00	D					Less gravelly.
			3.50	58.85		Trialpit Complete at 3.50 m

Remarks:

Groundwater: None Encountered





Alan Wood and Partners
 AMP Technology Park, Brunel Way
 Sheffield, South Yorkshire
 S60 5WG
 Tel: 0114 254 1307

Trialpit No
6
 Sheet 1 of 1

Project Name Limestone Road	Project No. 35267	Co-ords: - Level: 58.50 m AOD	Date 14/03/2014
Location: Burniston		Dimensions: 3.00m Depth 4.00m	Scale 1:25
Client: Gascoine Group Limited			Logged By AHB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.30	D		0.30	58.20		TOPSOIL: Soft brown slightly sandy slightly gravelly CLAY. Gravel is fine and medium angular sandstone.
0.90 0.90	IVN 1 D	64				Firm becoming stiff brown/red mottled grey sandy gravelly cobbly bouldery CLAY. Gravel is fine to coarse angular to rounded sandstone, siltstone, coal and quartzite. Cobbles and boulders are rounded and subrounded sandstone. (GLACIAL TILL)
			4.00	54.50		Trialpit Complete at 4.00 m

Remarks:

Groundwater: None Encountered





Alan Wood and Partners
 AMP Technology Park, Brunel Way
 Sheffield, South Yorkshire
 S60 5WG
 Tel: 0114 254 1307

Trialpit No
7
 Sheet 1 of 1

Project Name Limestone Road	Project No. 35267	Co-ords: - Level: 59.03 m AOD	Date 14/03/2014
Location: Burniston		Dimensions: 3.00m Depth 3.50m	Scale 1:25
Client: Gascoine Group Limited		0.60m	Logged By AHB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.40	D		0.40	58.63		TOPSOIL: Soft brown slightly sandy slightly gravelly CLAY. Gravel is fine and medium angular sandstone.
0.70	D					Firm becoming stiff brown/red mottled grey sandy gravelly cobbly bouldery CLAY. Gravel is fine to coarse angular to rounded sandstone, siltstone, coal and quartzite. Cobbles and boulders are subrounded and rounded sandstone. (GLACIAL TILL)
1.00	IVN 1	28				
			3.50	55.53		Trialpit Complete at 3.50 m

Remarks:

Groundwater: None Encountered





Alan Wood and Partners
 AMP Technology Park, Brunel Way
 Sheffield, South Yorkshire
 S60 5WG
 Tel: 0114 254 1307

Trialpit No
8
 Sheet 1 of 1

Project Name Limestone Road	Project No. 35267	Co-ords: - Level: 54.56 m AOD	Date 14/03/2014
Location: Burniston		Dimensions: 3.00m Depth 3.80m	Scale 1:25
Client: Gascoine Group Limited		0.60m	Logged By AHB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.30	D		0.30	54.26		TOPSOIL: Soft brown slightly sandy slightly gravelly CLAY. Gravel is fine and medium angular sandstone.
0.80 0.90	IVN 1 D	80				Firm brown/red mottled grey sandy gravelly cobbly CLAY. Gravel is fine to coarse angular to rounded sandstone, siltstone and coal. Cobbles are rounded sandstone. (GLACIAL TILL)
1.20	IVN 2	68				
			3.80	50.76		Trialpit Complete at 3.80 m

Remarks:

Groundwater: None Encountered





Alan Wood and Partners
 AMP Technology Park, Brunel Way
 Sheffield, South Yorkshire
 S60 5WG
 Tel: 0114 254 1307

Trialpit No
9
 Sheet 1 of 1

Project Name Limestone Road	Project No. 35267	Co-ords: - Level: 54.80 m AOD	Date 14/03/2014
Location: Burniston		Dimensions: 3.00m Depth 4.00m	Scale 1:25
Client: Gascoine Group Limited			Logged By AHB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.20	D		0.20	54.60		TOPSOIL: Soft brown slightly sandy slightly gravelly CLAY. Gravel is fine and medium angular sandstone.
0.50	IVN 1	84				Firm brown/red mottled grey sandy gravelly cobbly CLAY. Gravel is fine to coarse angular to rounded sandstone, siltstone and coal. Cobbles are rounded sandstone. (GLACIAL TILL)
1.00 1.00	IVN 2 D	70				
			4.00	50.80	Trialpit Complete at 4.00 m	

Remarks:

Groundwater: None Encountered

