



Solum House, Unit 1 Elliott Court  
 St Johns Road, Meadowfield  
 Durham, DH7 8PN  
 Telephone: 01913786380

## BOREHOLE LOG

Project Proposed Development, Harrogate Street, Hendon				BOREHOLE No  <b>WS04</b>	
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.11-0.97	B				(1.30)	Grass over dark brown sandy gravelly clayey soil with fragments of concrete brick and limestone with some wood ash and glass noted (MADE GROUND).		
0.77-1.30	B				1.30			
1.25-1.70	SPT	N=8			(0.30)	Stiff dark brown sandy gravelly CLAY. Gravels comprise medium to coarse limestone (GLACIOLACUSTRINE DEPOSITS).		
1.30-1.60	B				1.60			
1.60-2.00	B				(1.31)	Medium dense becoming dense light brown sandy GRAVEL of limestone. Possible highly weathered limestone.		
2.00-2.70	B							
2.00-2.45	SPT	N=17						
2.70-2.91	SPT	75 Blows			2.91			
Borehole terminated at 2.91m due to refusal.								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Borehole remained dry on completion.

All dimensions in metres Scale 1:37.5	Client Engie	Method/ Plant Used Windowless Sampling	Logged By SW
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## BOREHOLE LOG

Project Proposed Development, Harrogate Street, Hendon				BOREHOLE No <b>WS05</b>	
Job No 20-794	Date 20-05-21	Ground Level (m)	Co-Ordinates ( )	Sheet 1 of 1	
Contractor Arc Environmental Limited					

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.22-0.88	B	N=8			(1.40)	Grass over dark brown sandy gravelly clayey soil with concrete brick and ash and some wood pottery coal and glass noted (MADE GROUND).			
0.88-1.20	B								
1.20-1.65	SPT								1.40
1.40	B	75 Blows			(0.99)	Buff LIMESTONE with honeycomb weathering and occasional clay infilling (ROKER FORMATION)			
2.00	B								
2.00-2.39	SPT					2.39			
							Borehole terminated at 2.39m due to refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Borehole remained dry on completion.

All dimensions in metres Scale 1:37.5	Client Engie	Method/ Plant Used Windowless Sampling	Logged By SW
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## BOREHOLE LOG

Project Proposed Development, Harrogate Street, Hendon				BOREHOLE No  <b>WS06</b>	
Job No 20-794	Date 20-05-21	Ground Level (m)	Co-Ordinates ( )		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.28-0.71	B				(1.02)	Grass over dark brown sandy gravelly clayey soil with brick coal sandstone and concrete and some wood and glass noted (MADE GROUND).			
0.71-1.02	B				1.02				
1.02-1.20	B				(1.38)	Firm becoming stiff (high strength) brown and grey sandy gravelly CLAY. Gravels comprise medium to coarse limestone (GLACIOLACUSTRINE DEPOSITS).			
1.20-1.65	SPT	N=14							
1.40	B								
1.60	V	77kN/m <sup>2</sup>							
2.00	B				2.40	Dense light brown sandy GRAVEL of limestone. Possible highly weathered limestone.			
2.00	V	81kN/m <sup>2</sup>							
2.40-2.65	B				2.65	Borehole terminated at 2.65m due to refusal.			
2.65-2.65	SPT	50 Blows							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Borehole remained dry on completion.

All dimensions in metres Scale 1:37.5	Client Engie	Method/ Plant Used Windowless Sampling	Logged By SW
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## BOREHOLE LOG

Project Proposed Development, Harrogate Street, Hendon				BOREHOLE No <b>WS07</b>	
Job No 20-794	Date 20-05-21	Ground Level (m)	Co-Ordinates ( )		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-0.43	B					Grass over dark brown sandy gravelly clayey soil with brick ash and concrete and some wood slate pottery and coal noted (MADE GROUND).			
0.43-0.78	B				(1.20)				
0.78-1.20	B				1.20				
1.20-1.50	B	N=5			(0.30)	Firm dark brown sandy CLAY with some fine gravel (GLACIOLACUSTRINE DEPOSITS).			
1.20-1.65	SPT					1.50			
1.50-2.00	B				(0.75)	Loose light brown fine SAND (GLACIOLACUSTRINE DEPOSITS).			
2.00-2.45	SPT	N=9			2.25				
2.25-2.40	B						Firm becoming stiff (high strength) brown and grey sandy gravelly CLAY. Gravels comprise medium to coarse limestone (GLACIOLACUSTRINE DEPOSITS).		
2.40	B								
2.70	V	110kN/m <sup>2</sup>							
3.00	B	120kN/m <sup>2</sup>							
3.00	V					(2.35)			
3.70	B	120kN/m <sup>2</sup>							
3.70	V								
4.20	B	75 Blows							
4.20-4.60	SPT					4.60			
							Borehole terminated at 4.60m due to refusal.		

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Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Borehole remained dry on completion.

All dimensions in metres Scale 1:37.5	Client Engie	Method/ Plant Used Windowless Sampling	Logged By SW
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## BOREHOLE LOG

Project Proposed Development, Harrogate Street, Hendon				BOREHOLE No <b>WS08</b>	
Job No 20-794	Date 20-05-21	Ground Level (m)	Co-Ordinates ( )		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.21-0.47	J/D				(0.47) 0.47	Grass over dark brown sandy gravelly clayey soil with brick concrete and some wood noted (MADE GROUND).			
0.47-0.85	B				(0.38) 0.85	Firm dark brown very sandy CLAY with some fine gravel (GLACIOLACUSTRINE DEPOSITS).			
0.85-1.30 0.90-1.29	B SPT	75 Blows			(0.45) 1.30	Dense light brown sandy GRAVEL of limestone. Possible highly weathered limestone.			
1.30-1.38	SPT	75 Blows	↓			Borehole terminated at 1.30m due to refusal.			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Borehole remained dry on completion.

All dimensions in metres Scale 1:37.5	Client Engie	Method/ Plant Used Windowless Sampling	Logged By SW
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## BOREHOLE LOG

Project Proposed Development, Harrogate Street, Hendon				BOREHOLE No <b>WS09</b>	
Job No 20-794	Date 20-05-21	Ground Level (m)	Co-Ordinates ( )		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-0.40	B	N=12			1.30	Grass over dark brown sandy gravelly clayey soil with brick concrete slate and some glass ash and coal noted (MADE GROUND).			
0.40-1.00	B								
1.00-1.30 1.00-1.45	B SPT								
1.30	B	75 Blows			1.10	Buff LIMESTONE with honeycomb weathering and occasional clay infilling (ROKER FORMATION)			
2.00	B								
2.00-2.40	SPT								
Borehole terminated at 2.40m due to refusal.									

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Borehole remained dry on completion.

All dimensions in metres Scale 1:37.5	Client Engie	Method/ Plant Used Windowless Sampling	Logged By SW
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## BOREHOLE LOG

Project Proposed Development, Harrogate Street, Hendon				BOREHOLE No <b>WS10</b>	
Job No 20-794	Date 20-05-21	Ground Level (m)	Co-Ordinates ( )		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-0.37	B				(1.20)	Grass over dark brown sandy gravelly clayey soil with concrete slate and brick and some glass wood and coal noted (MADE GROUND).			
0.37-0.70	B								
0.70-1.20	B								
1.00-1.45	SPT	N=7			1.20				
1.20	B	75 Blows			(0.70)	Stiff brown and grey sandy gravelly CLAY. Gravels comprise medium to coarse limestone (GLACIOLACUSTRINE DEPOSITS).			
1.65-1.90	B								
1.90-2.41	B								
2.00-2.41	SPT								
					(0.51)	Buff LIMESTONE with honeycomb weathering and occasional clay infilling (ROKER FORMATION)			
									2.41

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Borehole remained dry on completion.

All dimensions in metres Scale 1:37.5	Client Engie	Method/ Plant Used Windowless Sampling	Logged By SW
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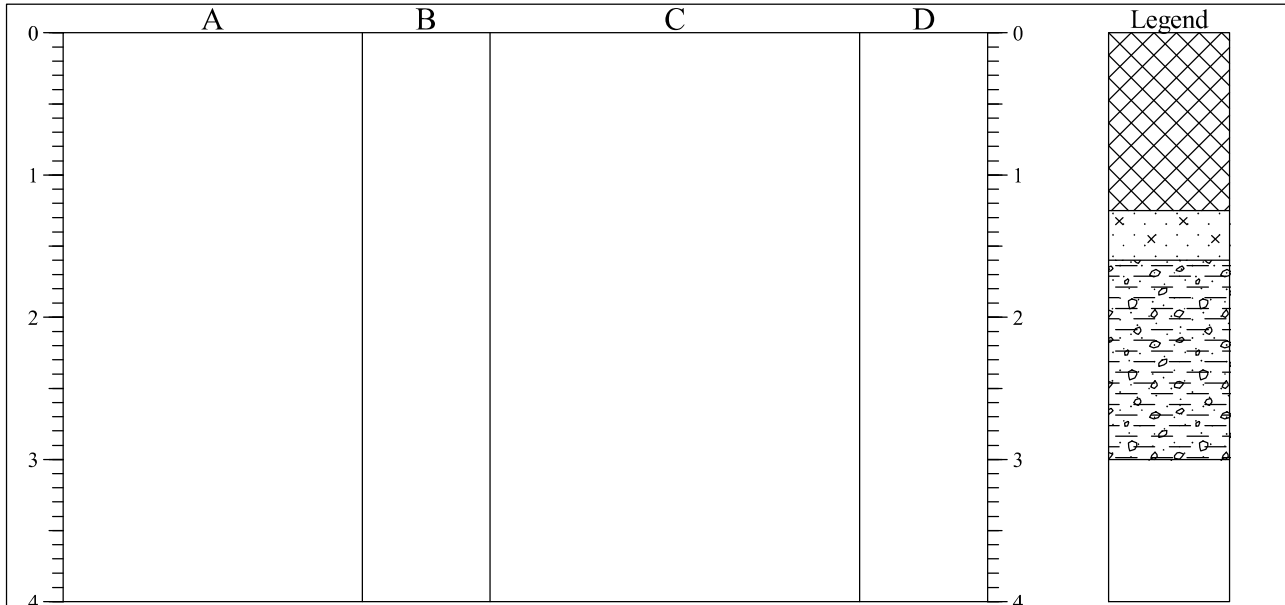
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP01</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.25		Grass overlying dark brown sandy gravelly clayey soil with broken bricks, timber, insulation and ceramic tile fragments (MADE GROUND)	0.20-0.30	B	120kN/m <sup>2</sup>
1.25-1.60		Orangish brown very clayey slightly silty SAND (GLACIOLACUSTRINE DEPOSITS)	0.80	J/D	
1.60-3.00		Stiff (high strength) brown and grey mottled slightly sandy slightly gravelly CLAY. Gravels comprise medium to coarse subangular sandstone (GLACIOLACUSTRINE DEPOSITS)	1.50	B	
			1.80	V	
2.50		Recovered as a friable gravel from 2.50m	2.40	B	

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Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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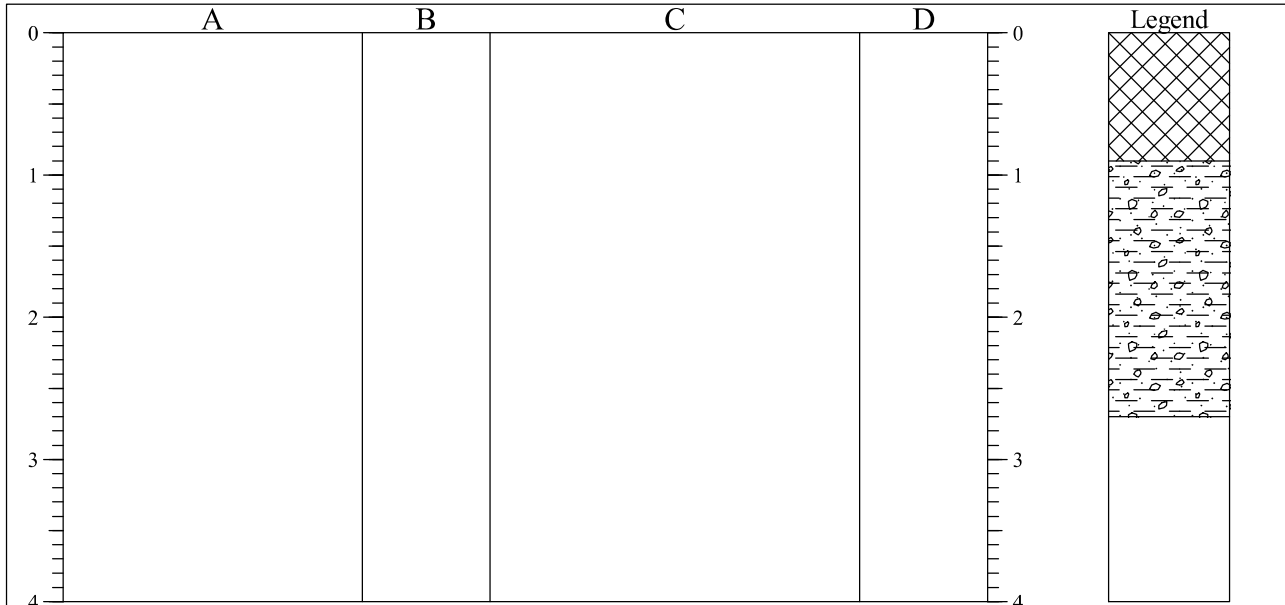
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP02</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.90		Grass overlying dark brown sandy gravelly clayey soil with broken bricks and timber (MADE GROUND)	0.30-0.50	B	78kN/m <sup>2</sup>
0.90-2.70		Stiff (high strength) brown and grey mottled slightly sandy slightly gravelly CLAY. Gravels comprise medium to coarse subangular sandstone (GLACIOLACUSTRINE DEPOSITS)	0.60	J/D	
1.40		Bricks extend to 1.40m in eastern face of trial pit	1.00	V	
			2.00	B	

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Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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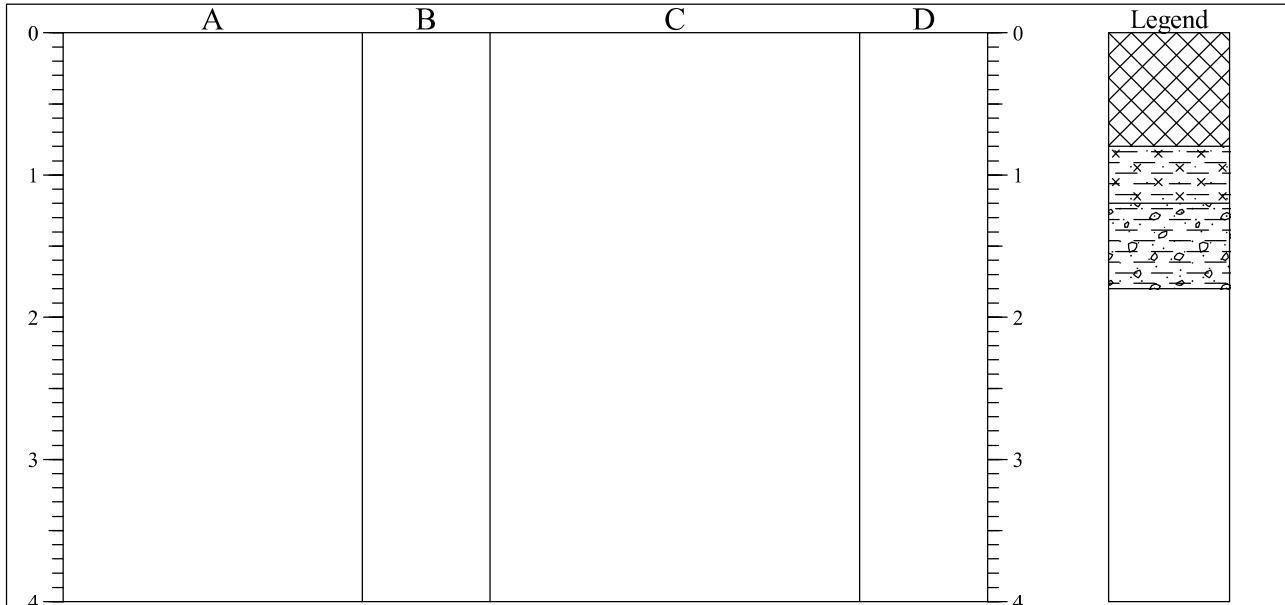
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP03</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.80		Grass overlying dark brown sandy gravelly clayey soil with broken bricks and timber (MADE GROUND)	0.30-0.50	B	100kN/m <sup>2</sup>
0.80-1.20		Firm orangish / greyish brown very sandy slightly silty CLAY (GLACIOLACUSTRINE DEPOSITS)	0.50	J/D	
1.20-1.80		Stiff (high strength) brown and grey mottled slightly sandy gravelly CLAY. Gravels comprise medium to coarse subangular sandstone (GLACIOLACUSTRINE DEPOSITS)	1.00	B	
1.80		Trial pit terminated at 1.80m due to water ingress from possible relic drain	1.50	V	
			1.60	B	

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<p>Shoring/Support: Stability:</p> <div style="text-align: center;"> </div>	<p style="text-align: center;"><b>GENERAL REMARKS</b></p> <p>Slight water ingress from possible relic drain. Trial pit remained stable on completion.</p>
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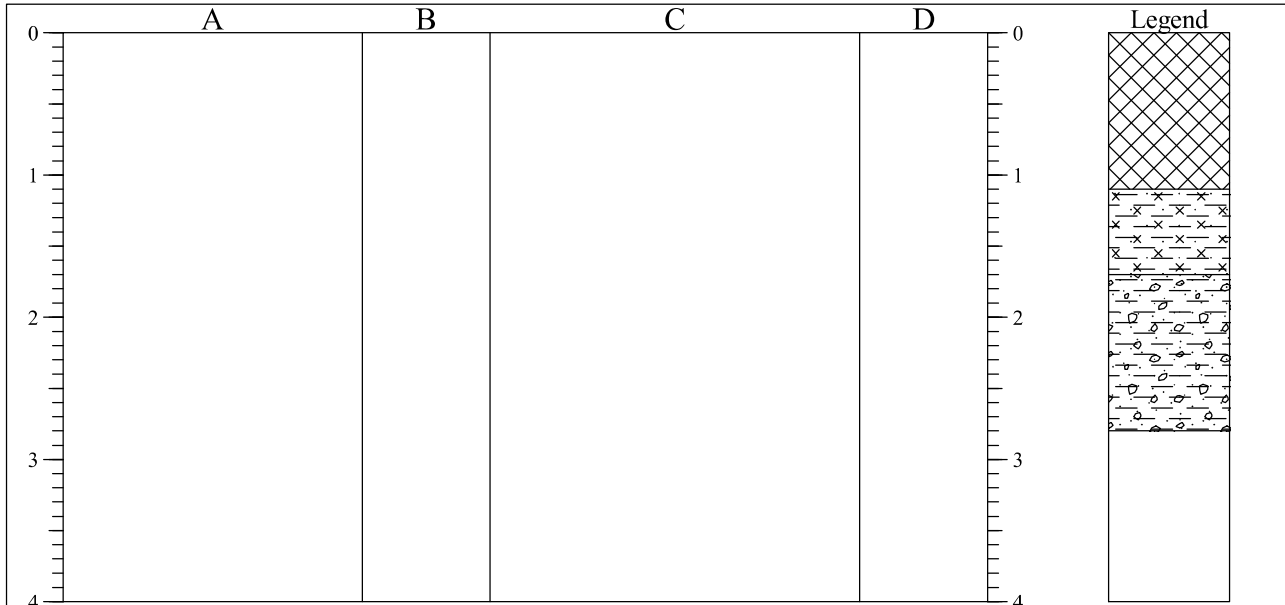
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP04</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.10		Grass overlying dark brown sandy gravelly clayey soil with broken bricks and timber (MADE GROUND)			
1.10-1.70		Firm (medium strength) orangish / greyish brown slightly sandy slightly silty CLAY (GLACIOLACUSTRINE DEPOSITS)	1.00	J/D	
1.70-2.80		Stiff (high strength) brown and grey mottled slightly sandy slightly gravelly CLAY. Gravels comprise medium to coarse subangular sandstone (GLACIOLACUSTRINE DEPOSITS)	1.50	B	70kN/m <sup>2</sup>
			1.50	V	
			2.00	V	>120kN/m <sup>2</sup>
			2.50	B	

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Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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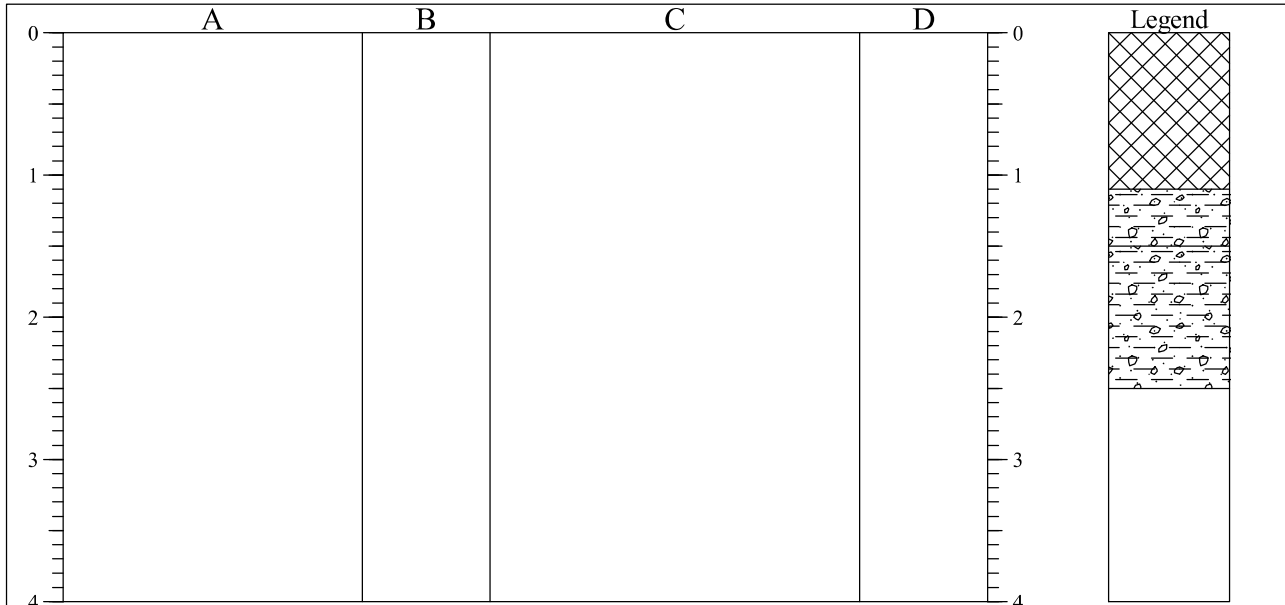
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP05</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.10		Grass overlying dark brown sandy gravelly clayey soil with broken bricks, timber and coal fragments (MADE GROUND)	0.75	J/D	
1.10-1.50		Soft locally firm (medium strength) orangish brown very sandy slightly gravelly CLAY. Gravels comprise medium to coarse subangular sandstone with occasional sandstone cobbles (GLACIOLACUSTRINE DEPOSITS)	1.20	B	40kN/m <sup>2</sup>
1.50-2.50			1.40	V	
		Stiff (high strength) brown and grey mottled slightly sandy slightly gravelly CLAY. Gravels comprise medium to coarse subangular sandstone (GLACIOLACUSTRINE DEPOSITS)	1.80	B	>120kN/m <sup>2</sup>
			2.00	V	

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Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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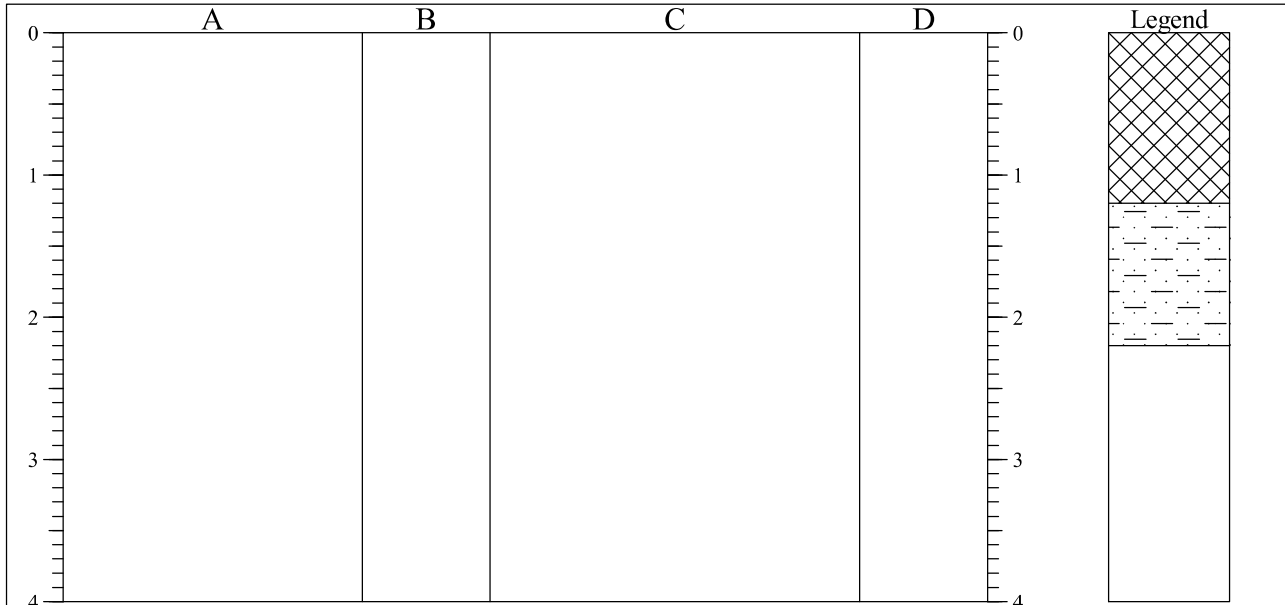




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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP06</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.20		Grass overlying dark brown sandy gravelly clayey soil with broken bricks, concrete, timber, relic services and coal fragments (MADE GROUND)	0.60	J/D	
1.20-2.20		Orangish brown slightly gravelly very clayey SAND with pockets of soft very sandy clay. Gravels comprise medium to coarse subangular sandstone with occasional sandstone cobbles (GLACIOLACUSTRINE DEPOSITS)	2.00	B	

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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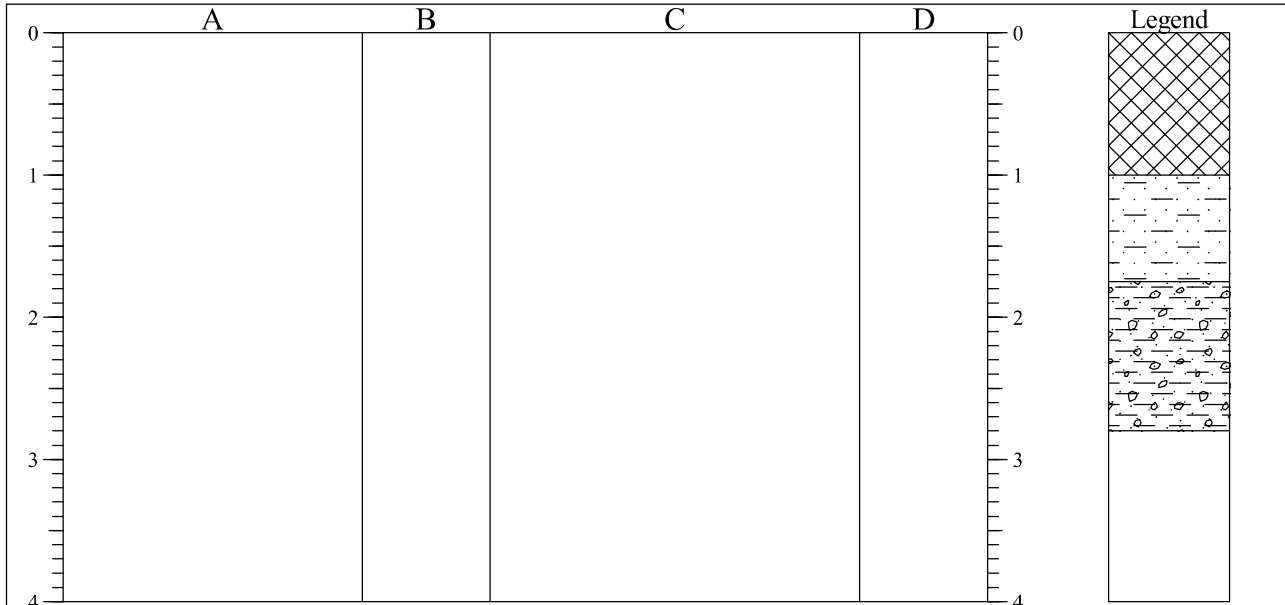
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP07</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.00		Grass overlying dark brown sandy gravelly clayey soil with broken bricks, concrete, timber and coal fragments (MADE GROUND)			
1.00-1.75		Orangish brown slightly gravelly very clayey SAND with pockets of soft very sandy clay. Gravels comprise medium to coarse subangular sandstone with occasional sandstone cobbles (GLACIOLACUSTRINE DEPOSITS)	0.90	J/D	
1.75-2.80		Stiff (high strength) greyish brown slightly sandy slightly gravelly CLAY with occasional coal fragments. Gravels comprise medium to coarse subangular sandstone (GLACIOLACUSTRINE DEPOSITS)	2.00	V	>120kN/m <sup>2</sup>
			2.50	B	

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Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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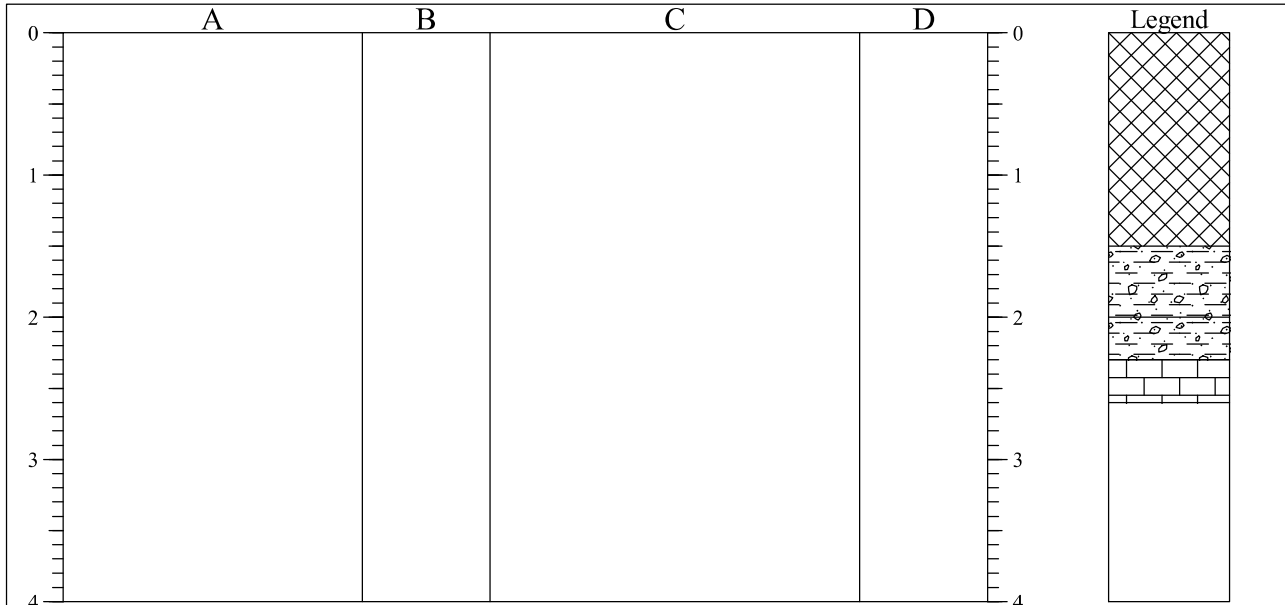
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP08</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.50		Grass overlying dark brown sandy gravelly clayey soil with whole bricks, large timber beams and plastic fragments (MADE GROUND)			
1.50-2.00		Stiff (high strength) greyish brown slightly sandy slightly gravelly CLAY with occasional coal fragments and pockets of very clayey sand. Gravels comprise medium to coarse subangular sandstone (GLACIOLACUSTRINE DEPOSITS)	1.20	J/D	
2.00-2.30		Stiff (high strength) brown slightly sandy slightly gravelly CLAY. Gravels comprise medium to coarse subangular sandstone (GLACIOLACUSTRINE DEPOSITS)	1.80	B	80kN/m <sup>2</sup>  >120kN/m <sup>2</sup>
2.30-2.60		Completely weathered LIMESTONE recovered as a buff very sandy clayey gravel. Gravels comprise medium to coarse limestone with occasional subrounded limestone cobbles (ROKER FORMATION)	1.80	V	
			2.20	V	
			2.50	B	

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Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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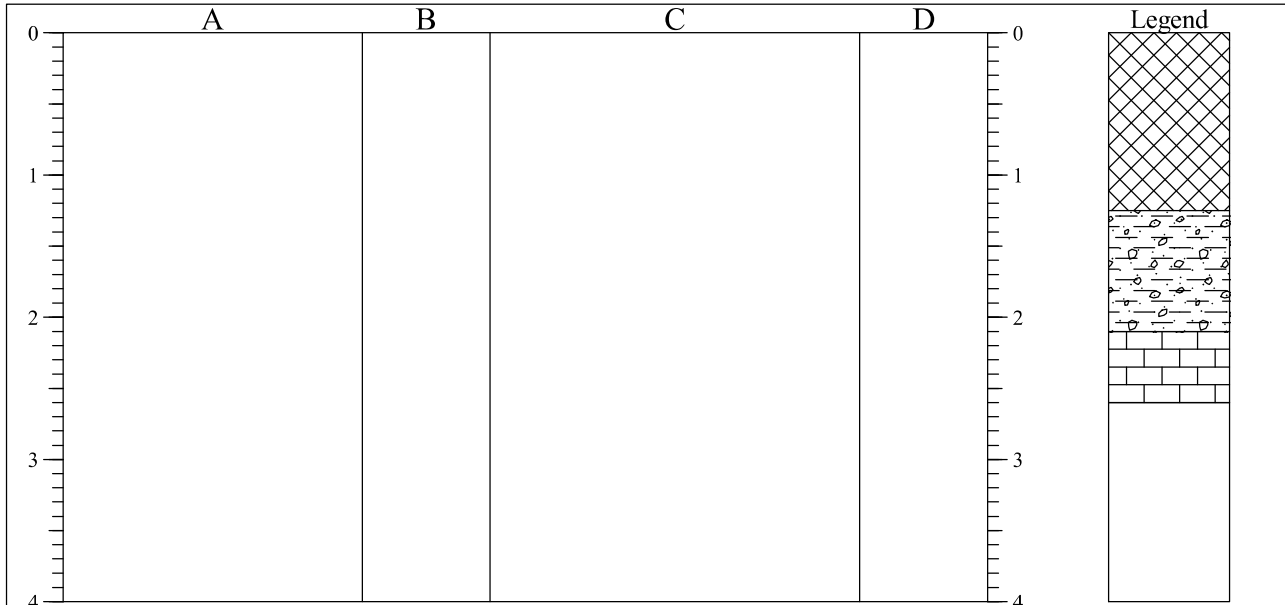
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP09</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.25		Grass overlying dark brown sandy gravelly clayey soil with broken bricks and timber (MADE GROUND)			
1.25-2.10		Stiff (high strength) greyish brown slightly sandy slightly gravelly CLAY with occasional coal fragments and pockets of very clayey sand. Gravels comprise medium to coarse subangular sandstone (GLACIOLACUSTRINE DEPOSITS)	1.00	J/D	
2.10-2.60		Completely weathered LIMESTONE recovered as a buff sandy gravel. Gravels comprise medium to coarse limestone with occasional subrounded limestone cobbles (ROKER FORMATION)	2.00 2.20	V B	95kN/m <sup>2</sup>

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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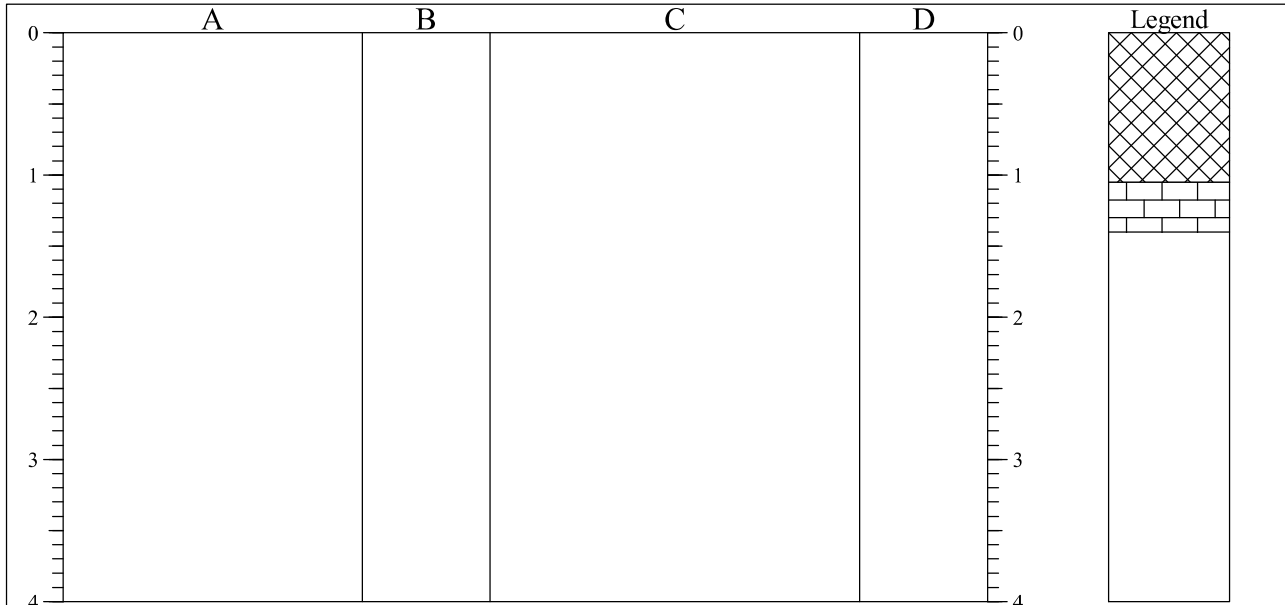
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP10</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.05		Grass overlying dark brown sandy gravelly clayey soil with broken bricks, timber, large concrete blocks, metal fragments and coal fragments (MADE GROUND)	0.80	J/D	
1.05-1.40		Buff LIMESTONE with honeycomb weathering and occasional clay infilling (ROKER FORMATION)	1.20	B	

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability: <div style="text-align: center; margin-top: 20px;"> </div>	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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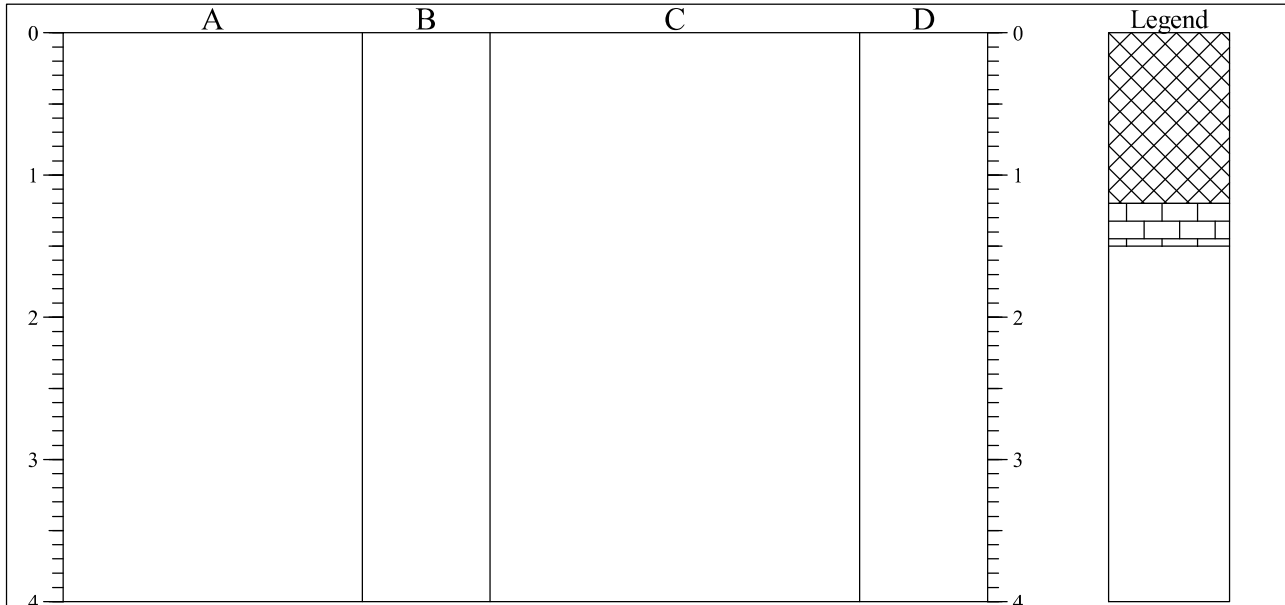
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP11</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.20		Grass overlying dark brown sandy gravelly clayey soil with occasional brick and sandstone fragments, ceramic tiles and concrete (MADE GROUND)	0.30	J/D	
1.20-1.50		Buff LIMESTONE with honeycomb weathering and occasional clay infilling (ROKER FORMATION)	1.30	B	

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability: <div style="text-align: center; margin-top: 20px;"> </div>	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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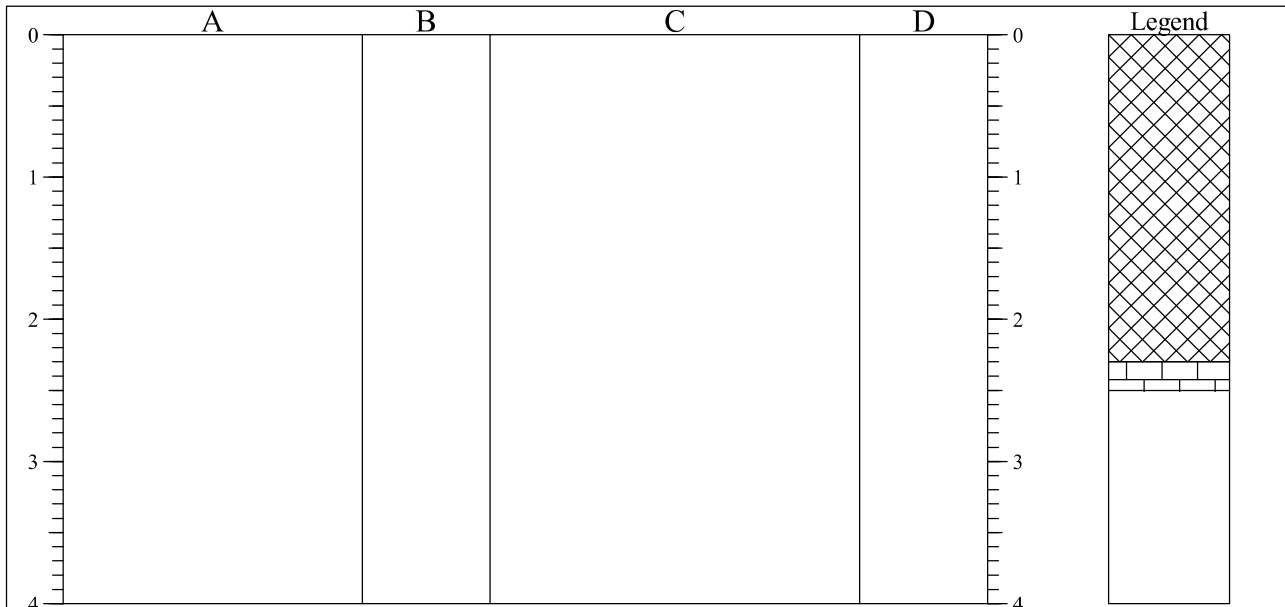
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP12</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-2.30		Grass overlying dark brown sandy gravelly clayey soil with broken bricks, concrete, timber, relic services and coal fragments (MADE GROUND)	1.50	J/D	
2.30-2.50		Buff LIMESTONE with honeycomb weathering and occasional clay infilling (ROKER FORMATION)			

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  Trial pit remained dry on completion. Unstable and partially collapsing within the made ground materials.
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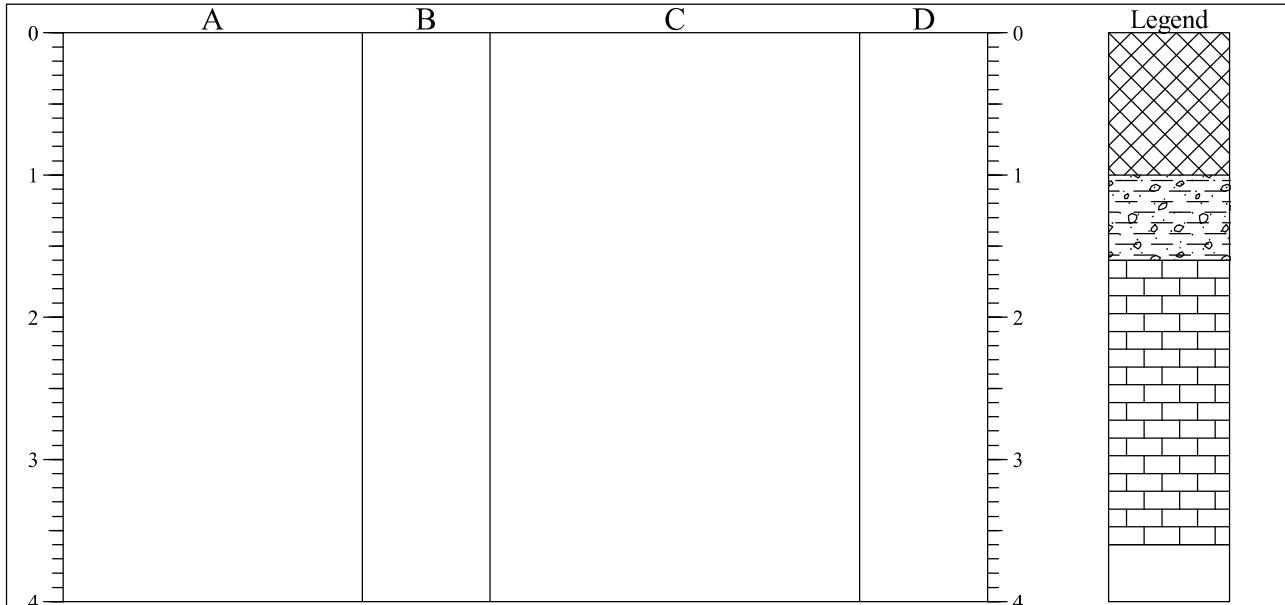
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP13</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.00		Grass overlying dark brown sandy gravelly clayey soil with broken bricks, concrete, timber and metal (MADE GROUND)	0.60	J/D	70kN/m <sup>2</sup>
1.00-1.60		Firm (medium strength) dark brown sandy slightly gravelly CLAY. Gravels comprise medium to coarse subangular sandstone (GLACIOLACUSTRINE DEPOSITS)	1.20	V	
1.60-3.60		Completely weathered LIMESTONE recovered as a buff slightly clayey sandy gravel. Gravels comprise medium to coarse limestone with occasional subrounded limestone cobbles (ROKER FORMATION)	3.00	B	

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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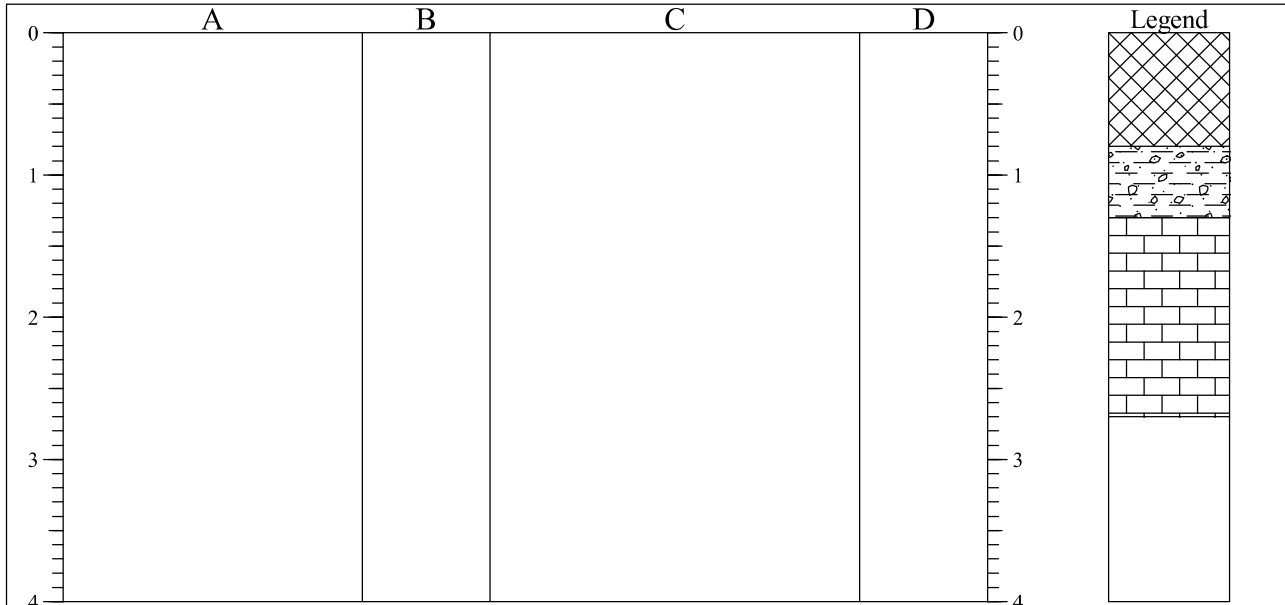




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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP14</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.80		Grass overlying dark brown sandy gravelly clayey soil with sandy dolostone gravel (MADE GROUND)	0.30	J/D	
0.80-1.30		Firm dark brown sandy gravelly CLAY. Gravels comprise medium to coarse subangular sandstone (GLACIOLACUSTRINE DEPOSITS)			
1.20		Brick foundation to 1.20m in south face of trial pit			
1.30-2.70		Completely weathered LIMESTONE recovered as a buff slightly clayey sandy gravel. Gravels comprise medium to coarse limestone with occasional subrounded limestone cobbles (ROKER FORMATION)	1.50	J/D	
2.70		Limestone becoming more competent at base of trial pit			

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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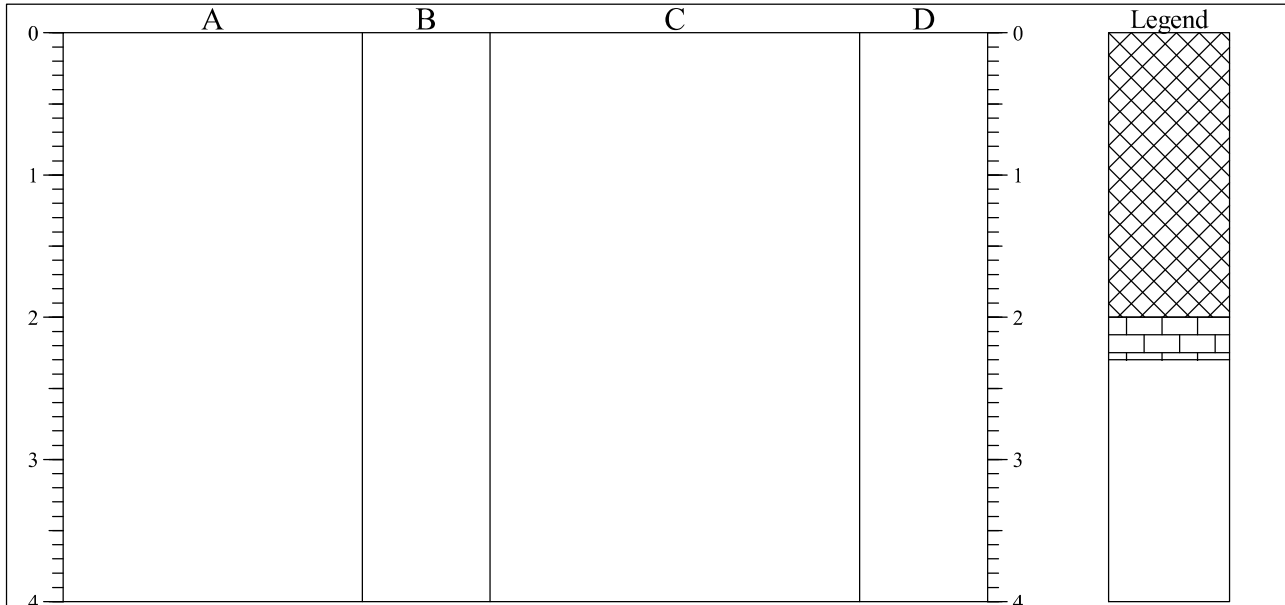
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP15</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-2.00		Grass overlying brown sandy gravelly clayey soil with broken bricks, concrete, timber, metal and pockets of sandy gravelly reworked clay (MADE GROUND)	1.00	J/D	
2.00-2.30		Completely weathered LIMESTONE recovered as a buff slightly clayey sandy gravel. Gravels comprise medium to coarse limestone with occasional subrounded limestone cobbles (ROKER FORMATION)	2.20	B	

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

<p>Shoring/Support: Stability:</p> <div style="text-align: center;"> </div>	<p><b>GENERAL REMARKS</b></p> <p>Trial pit remained dry and stable on completion.</p>
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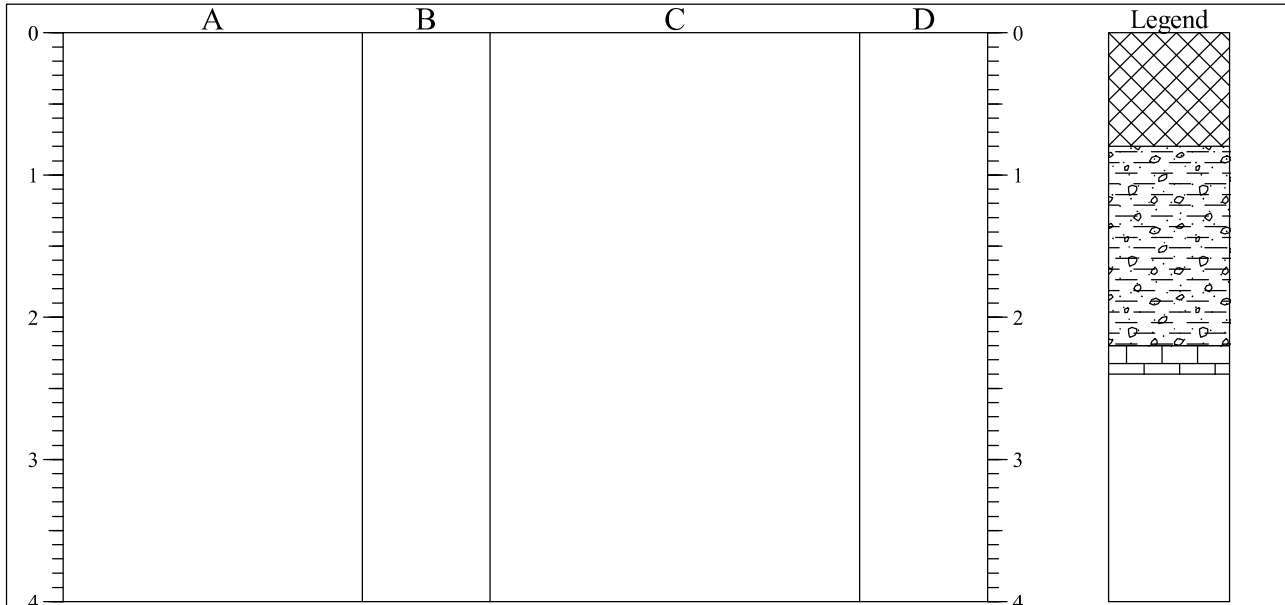
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP16</b>
Job No 20-794	Date 20-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.80		Grass overlying dark brown sandy gravelly clayey soil with broken bricks and concrete. Relic wall noted on western face of trial pit (MADE GROUND)	0.30-0.50	J/D	
0.80-2.20		Stiff (medium & high strength) brown and grey mottled slightly sandy slightly gravelly CLAY. Gravels comprise medium to coarse subangular limestone (GLACIOLACUSTRINE DEPOSITS)	1.00-1.20	B	68kN/m <sup>2</sup>
			1.00	V	
2.20-2.40		Buff weathered clayey LIMESTONE (ROKER FORMATION)	1.80-2.00	B	112kN/m <sup>2</sup>
			1.80	V	
			2.20-2.40	B	

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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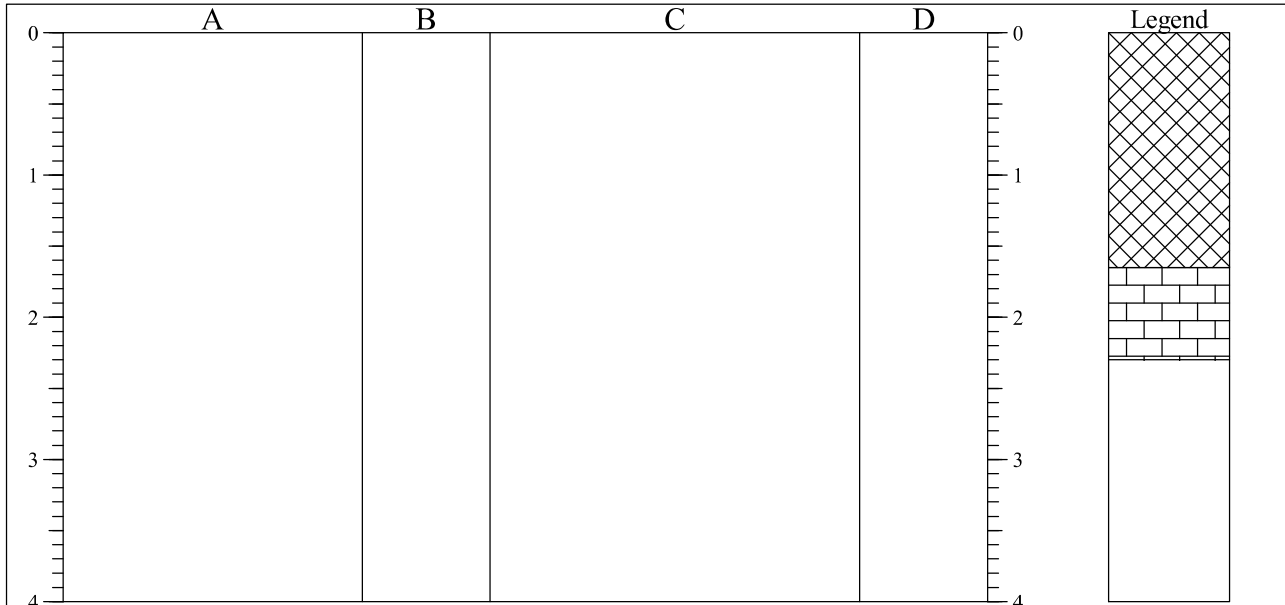
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By DMC
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP17</b>
Job No 20-794	Date 20-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.65		Grass overlying dark brown sandy gravelly clayey soil with broken bricks, concrete and timber (MADE GROUND)	0.20-0.20	J/D	
			0.80-1.00	J/D	
			1.40-1.60	J/D	
1.65-2.30		Buff weathered LIMESTONE (ROKER FORMATION)	2.00-2.20	B	

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability:  <div style="text-align: center;"> </div>	<b>GENERAL REMARKS</b>  Trial pit dry. Collapse of trial pit walls noted.
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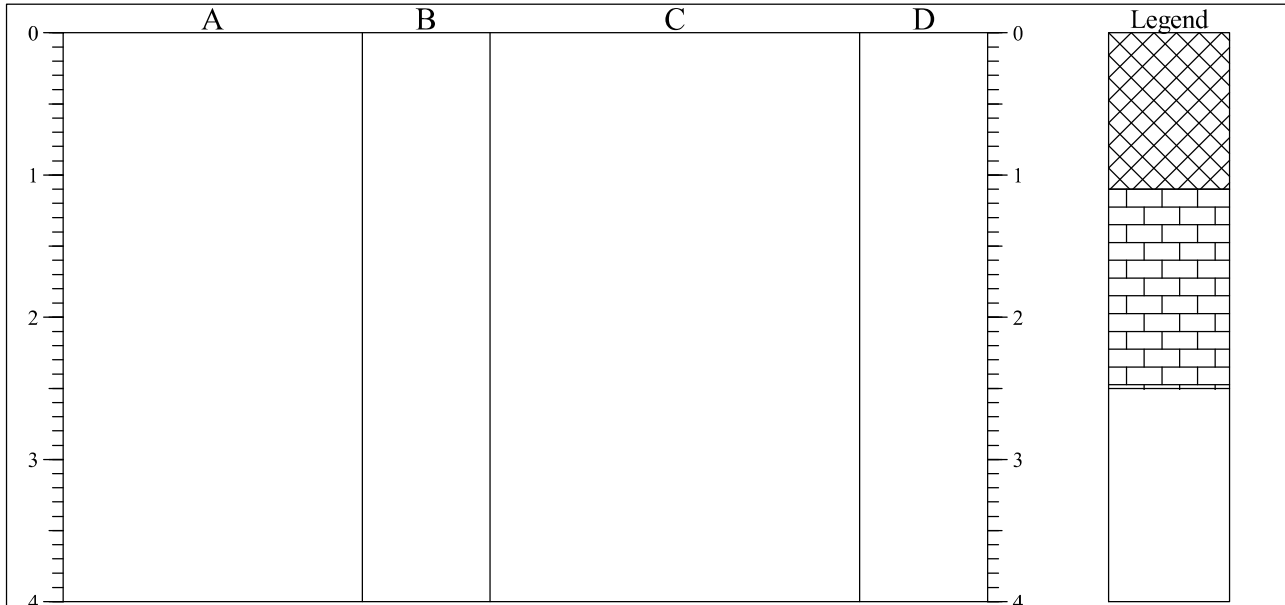
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By DMC
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP18</b>
Job No 20-794	Date 20-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.10		Grass overlying dark brown sandy gravelly clayey soil with broken bricks and timber (MADE GROUND)	0.00-0.20	J/D	
0.40		Concrete noted on southern portion of trial pit c.0.40m to c.0.60m. Possible relic floor slab / foundation.	0.60-0.80	J/D	
1.10-2.50		Buff completely weathered LIMESTONE recovered as very sandy clayey gravel. Gravels comprise medium to coarse limestone with occasional subrounded limestone cobbles (ROKER FORMATION)	1.40-1.60	B	

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability:  <div style="text-align: center;"> </div>	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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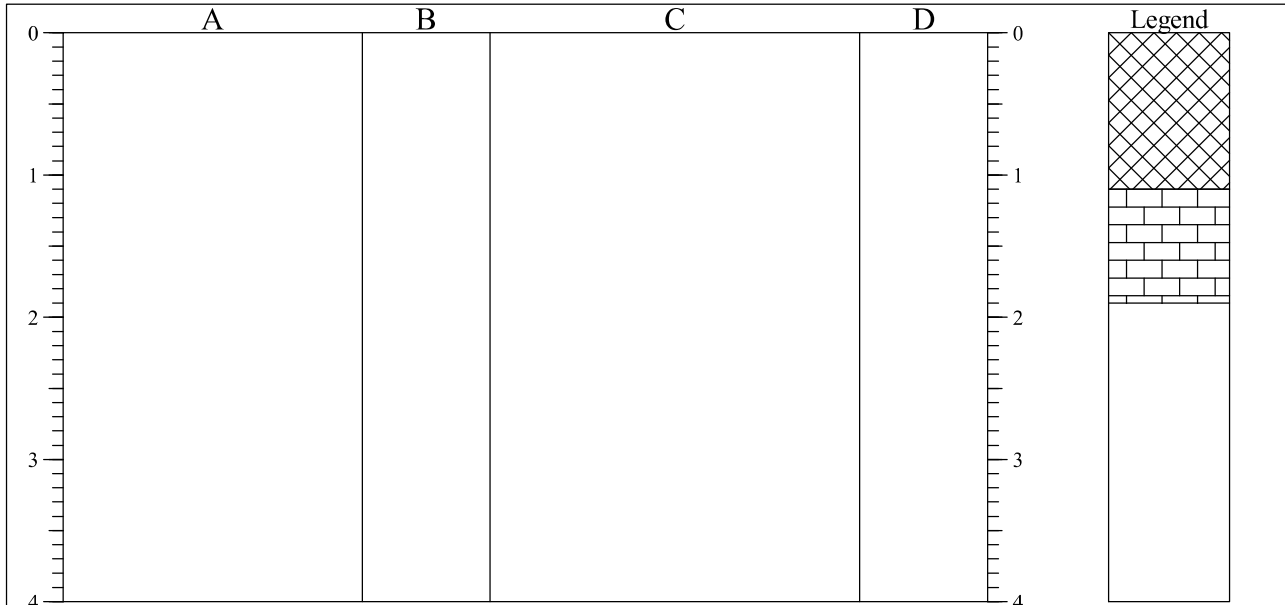
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By DMC
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP19</b>
Job No 20-794	Date 20-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.10		Grass overlying dark brown sandy gravelly clayey soil with broken bricks, wire and fragments of limestone (MADE GROUND)	0.00-0.25	J/D	
1.00		Black cable (electric) noted c.1.00m bgl.	0.80-1.00	J/D	
1.10-1.90		Buff highly weathered LIMESTONE. Becoming more competent with depth (ROKER FORMATION)	1.50-1.70	B	

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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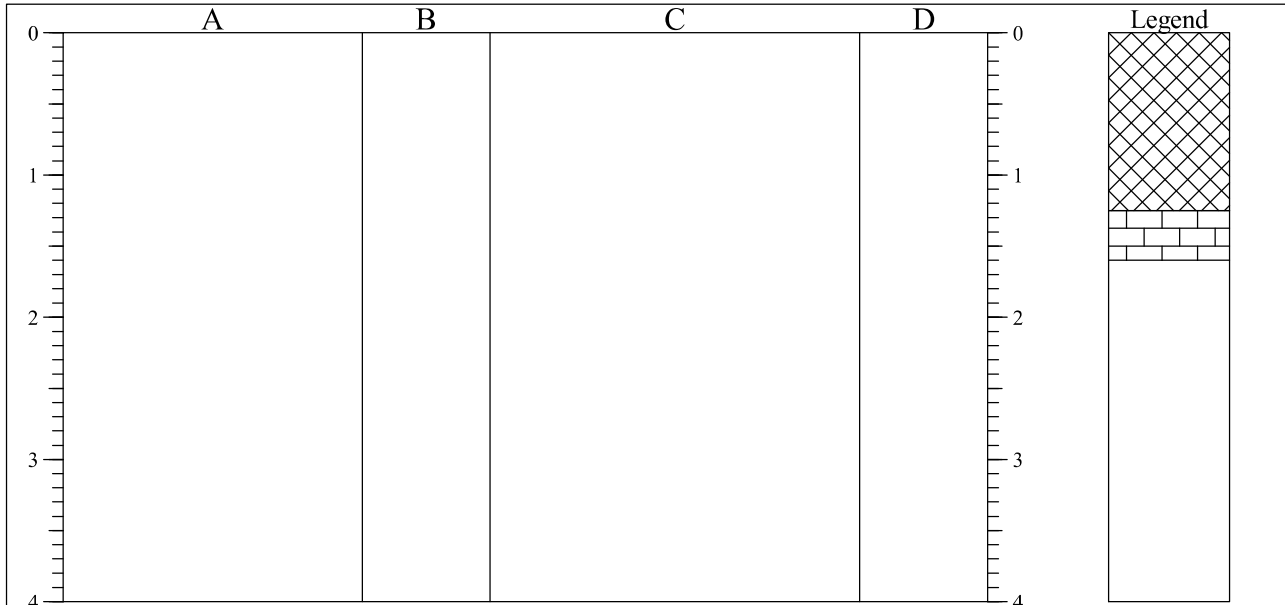
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By DMC
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### TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No <b>TP20</b>
Job No 20-794	Date 20-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.25		Grass overlying dark brown sandy gravelly clayey soil with broken bricks, slate and concrete (MADE GROUND)	0.00-0.30	J/D	
			0.70-0.90	J/D	
1.25-1.60		Buff weathered LIMESTONE (ROKER FORMATION)	1.30-1.50	B	

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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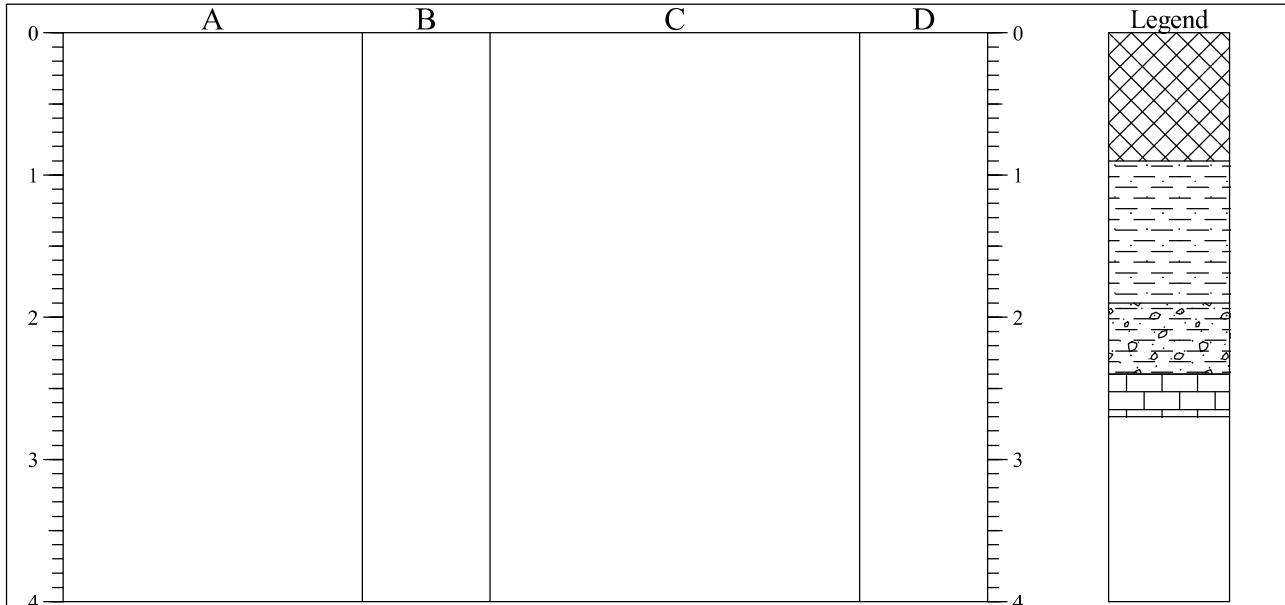
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By DMC
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP21</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.90		Grass overlying dark brown sandy gravelly clayey soil broken bricks, concrete, timber and metal (MADE GROUND)			
0.90-1.90		Firm (medium strength) yellowish brown very sandy CLAY with pockets of very clayey sand (GLACIOLACUSTRINE DEPOSITS)	0.70	J/D	44kN/m <sup>2</sup>
			1.20	V	
			1.50	B	
1.90-2.40		Stiff brown sandy gravelly CLAY. Gravels comprise medium to coarse subangular sandstone (GLACIOLACUSTRINE DEPOSITS)	2.20	B	
2.40-2.70		Completely weathered LIMESTONE recovered as a buff slightly clayey sandy gravel. Gravels comprise medium to coarse limestone with occasional subrounded limestone cobbles (ROKER FORMATION)	2.50	B	

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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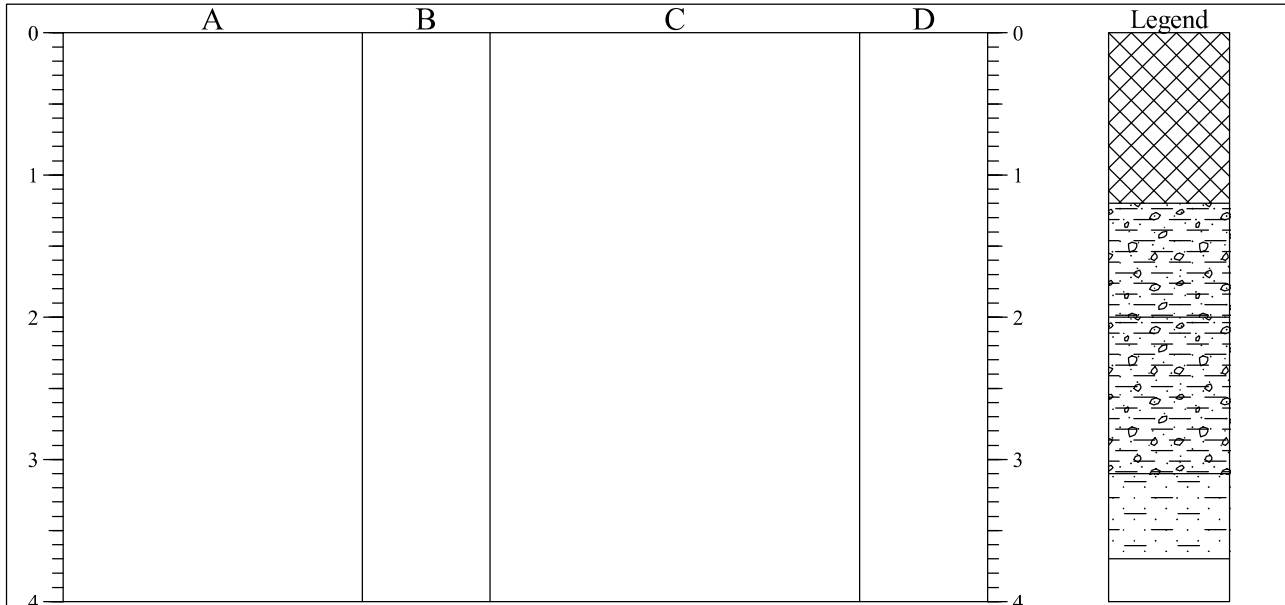




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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TP22</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.20		Grass overlying dark brown sandy gravelly clayey soil with broken bricks, concrete, timber and metal (MADE GROUND)	0.60	J/D	
			1.00	J/D	
1.20-2.00		Stiff (high strength) orangish brown sandy gravelly CLAY with occasional pockets of very clayey sand and coal fragments. Gravels comprise medium to coarse limestone with occasional subrounded limestone cobbles (GLACIOLACUSTRINE DEPOSITS)	1.50	B	80kN/m <sup>2</sup>
			1.50	V	
2.00-3.10		Stiff (high strength) greyish brown slightly sandy gravelly CLAY with occasional coal fragments. Gravels comprise medium to coarse limestone with occasional subrounded limestone cobbles (GLACIOLACUSTRINE DEPOSITS)	2.50	B	>120kN/m <sup>2</sup>
			2.50	V	
3.10-3.70		Light brown very clayey fine to medium SAND with laminations of stiff dark grey very sandy clay (GLACIOLACUSTRINE DEPOSITS)	3.50	B	

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
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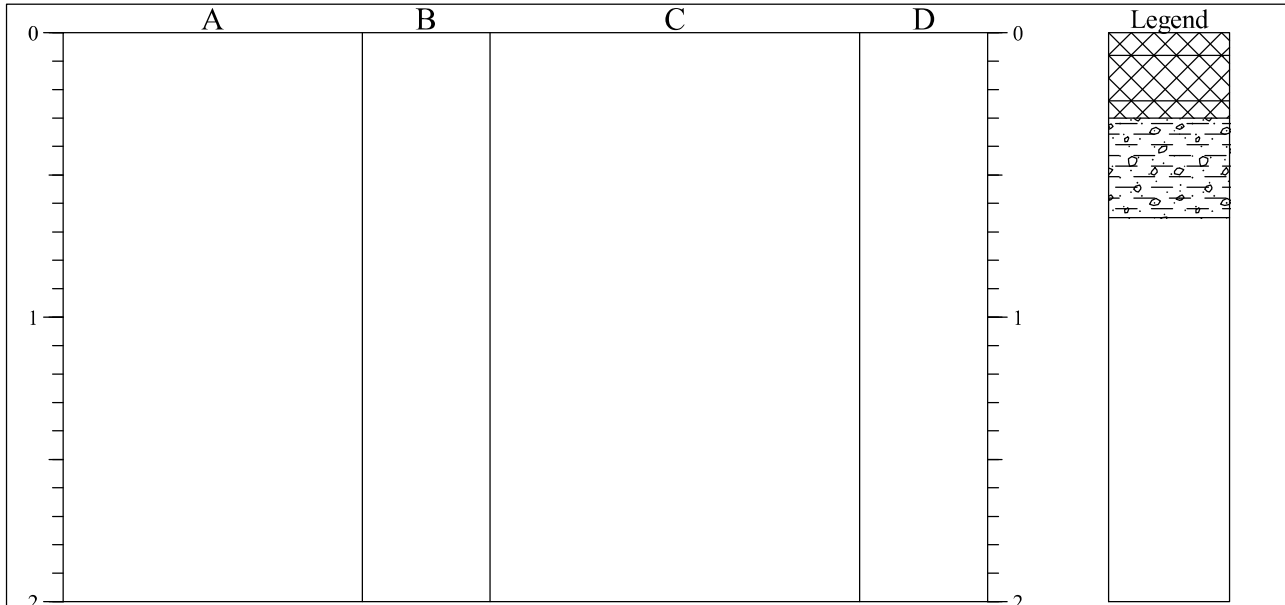
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TPA</b>
Job No 20-794	Date 20-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.08		Black asphalt (MADE GROUND)	0.20-0.30	B	
0.08-0.24		Dark grey granite cobbles, remnant cobbled road (MADE GROUND)			
0.24-0.30		Yellowish brown sandy dolostone gravel sub base (MADE GROUND)			
0.30-0.65		Firm dark brown sandy gravelly CLAY. Gravels comprise medium to coarse subangular sandstone (GLACIOLACUSTRINE DEPOSITS)			
0.52		Trial pit terminated at c.0.52m in natural deposits.			

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

<p>Shoring/Support: Stability:</p> <div style="text-align: center;"> </div>	<p style="text-align: center;"><b>GENERAL REMARKS</b></p> <p>WATER: Trial pit remained dry and stable during exploratory period.</p>
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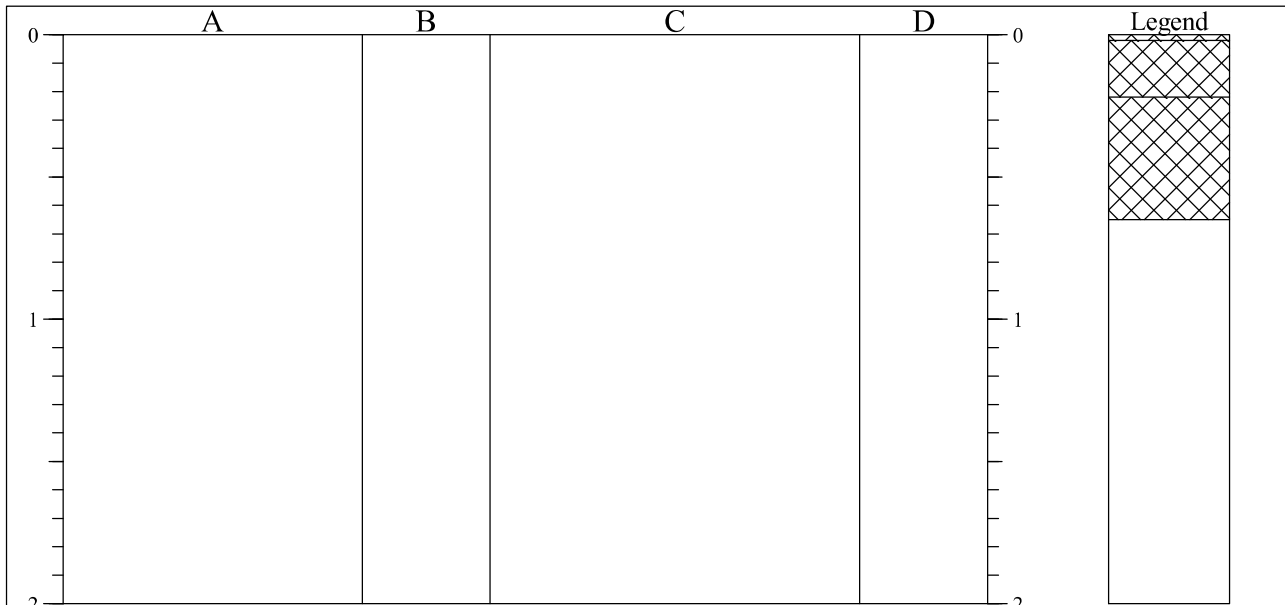
All dimensions in metres Scale 1:25	Client Engie	Method/ Plant Used Manually Excavated	Logged By AB
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TPB</b>
Job No 20-794	Date 20-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.02		Black asphalt (MADE GROUND)	0.30-0.50	B	
0.02-0.22		Grey concrete (MADE GROUND)			
0.22-0.65		Yellowish brown sandy dolostone gravel sub base (MADE GROUND)			
0.65		Trial pit terminated at c.0.65m due to sidewall collapse.			

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability:  <div style="text-align: center;"> </div>	<b>GENERAL REMARKS</b>  WATER: Trial pit remained dry, sidewalls collapsing below c.0.25m bgl.
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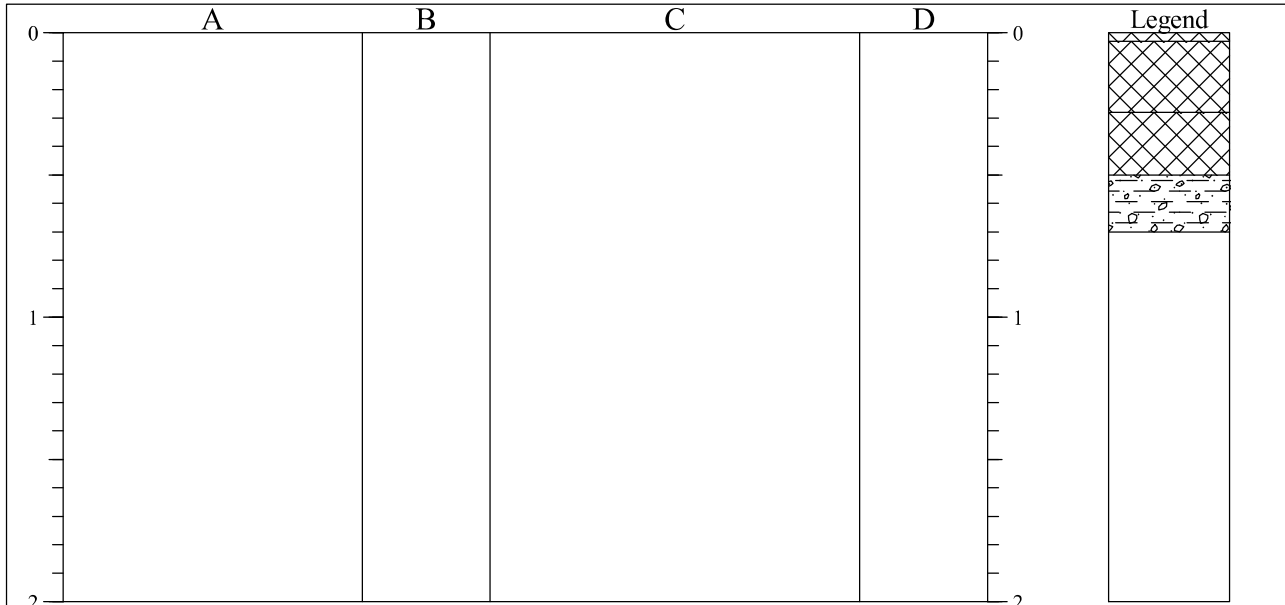
All dimensions in metres Scale 1:25	Client Engie	Method/ Plant Used Manually Excavated	Logged By AB
--	--------------	--	-----------------



Solum House, Unit 1 Elliott Court  
 St Johns Road, Meadowfield  
 Durham, DH7 8PN  
 Telephone: 01913786380

### TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No <b>TPC</b>
Job No 20-794	Date 20-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.03		Black asphalt (MADE GROUND)	0.30-0.50	B	
0.03-0.28		Grey concrete (MADE GROUND)			
0.28-0.50		Yellowish brown sandy dolostone gravel sub base (MADE GROUND)			
0.50-0.70		Firm dark brown sandy gravelly CLAY. Gravels comprise medium to coarse subangular sandstone (GLACIOLACUSTRINE DEPOSITS)			
0.70		Trial pit terminated at c.0.70m in natural deposits.			

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  WATER: Trial pit remained dry, sidewalls collapsing below c.0.30m bgl.
--	--

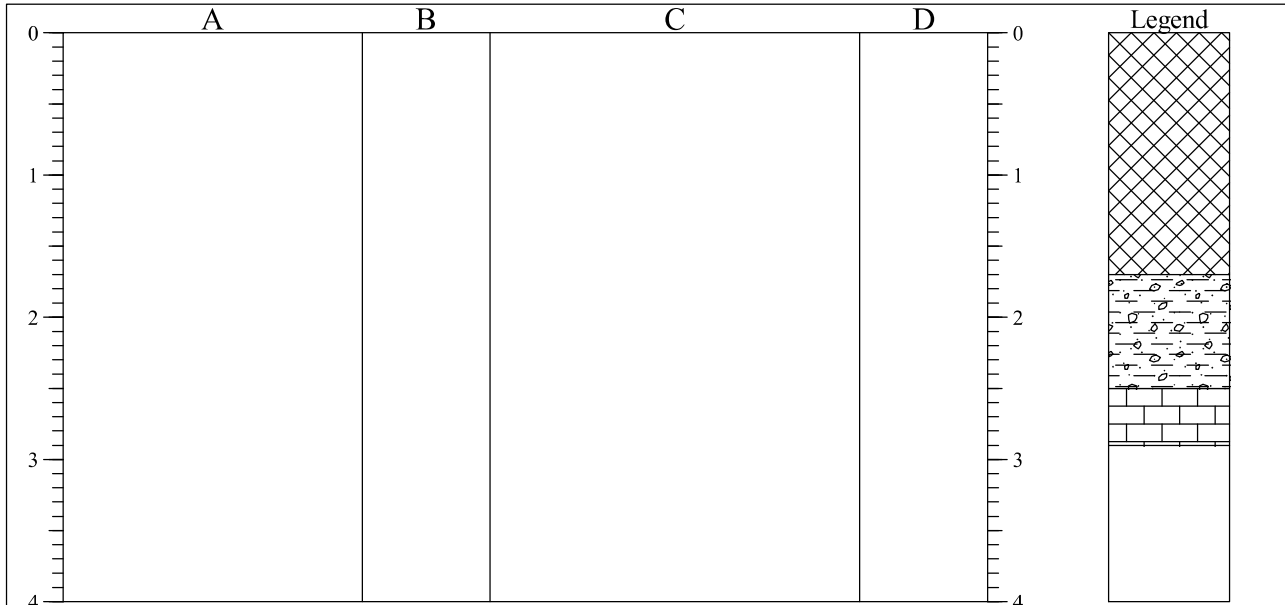
All dimensions in metres Scale 1:25	Client Engie	Method/ Plant Used Manually Excavated	Logged By AB
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Solum House, Unit 1 Elliott Court  
 St Johns Road, Meadowfield  
 Durham, DH7 8PN  
 Telephone: 01913786380

## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TT01</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.70		Grass overlying dark brown sandy gravelly clayey soil with broken bricks, concrete, timber and metal (MADE GROUND)			
1.30		Brick foundation to 1.30m in northern 5m of trial trench	1.00	J/D	
1.70-2.50		Stiff (high strength) orangish brown sandy gravelly CLAY with occasional pockets of very clayey sand. Gravels comprise medium to coarse limestone with occasional subrounded limestone cobbles (GLACIOLACUSTRINE DEPOSITS)	1.60	B	
			2.00	B	
			2.00	V	100kN/m <sup>2</sup>
2.50-2.90		Buff LIMESTONE with honeycomb weathering and occasional clay infilling (ROKER FORMATION)			

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability:  	<b>GENERAL REMARKS</b>  Trial trench remained dry and stable on completion.
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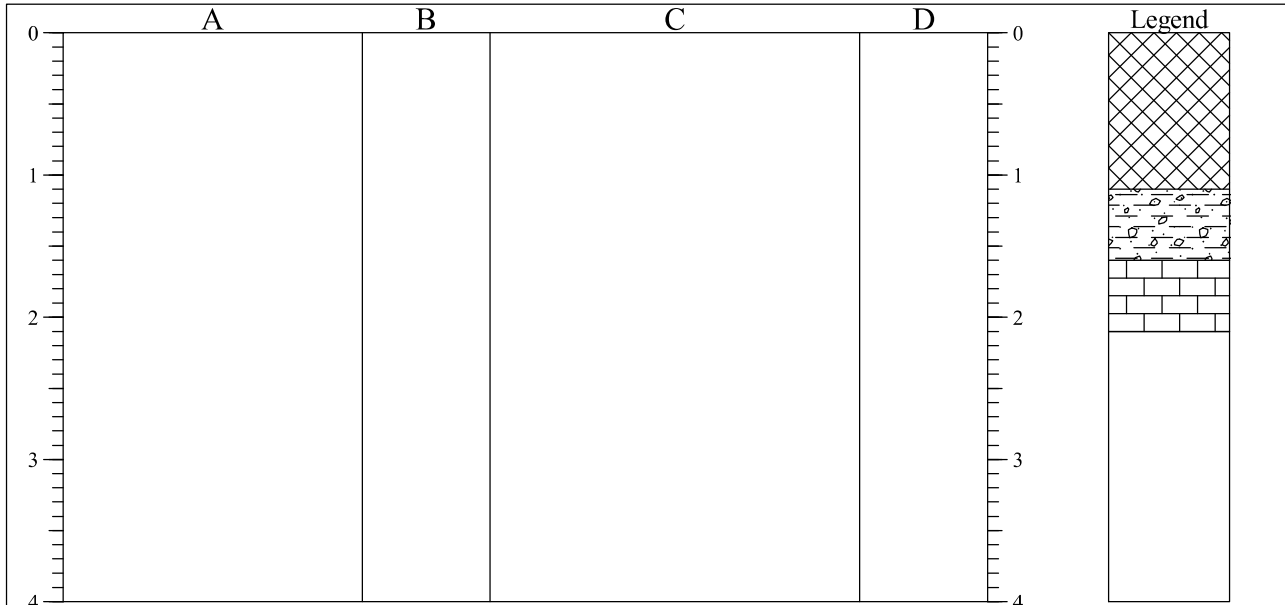
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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 St Johns Road, Meadowfield  
 Durham, DH7 8PN  
 Telephone: 01913786380

## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TT02</b>
Job No 20-794	Date 19-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.10		Grass overlying dark brown sandy gravelly clayey soil with broken bricks, concrete, timber and metal (MADE GROUND)	0.75	J/D	
1.10-1.60		Firm (locally soft) orangish brown very sandy slightly gravelly CLAY with pockets of very clayey sand. Gravels comprise medium to coarse subangular sandstone (GLACIOLACUSTRINE DEPOSITS)	1.20	B	
1.60-2.10		Buff LIMESTONE with honeycomb weathering and occasional clay infilling (ROKER FORMATION)	2.00	B	

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

<p>Shoring/Support: Stability:</p> <div style="text-align: center;"> </div>	<p><b>GENERAL REMARKS</b></p> <p>Trial trench remained dry and stable on completion.</p>
---	--

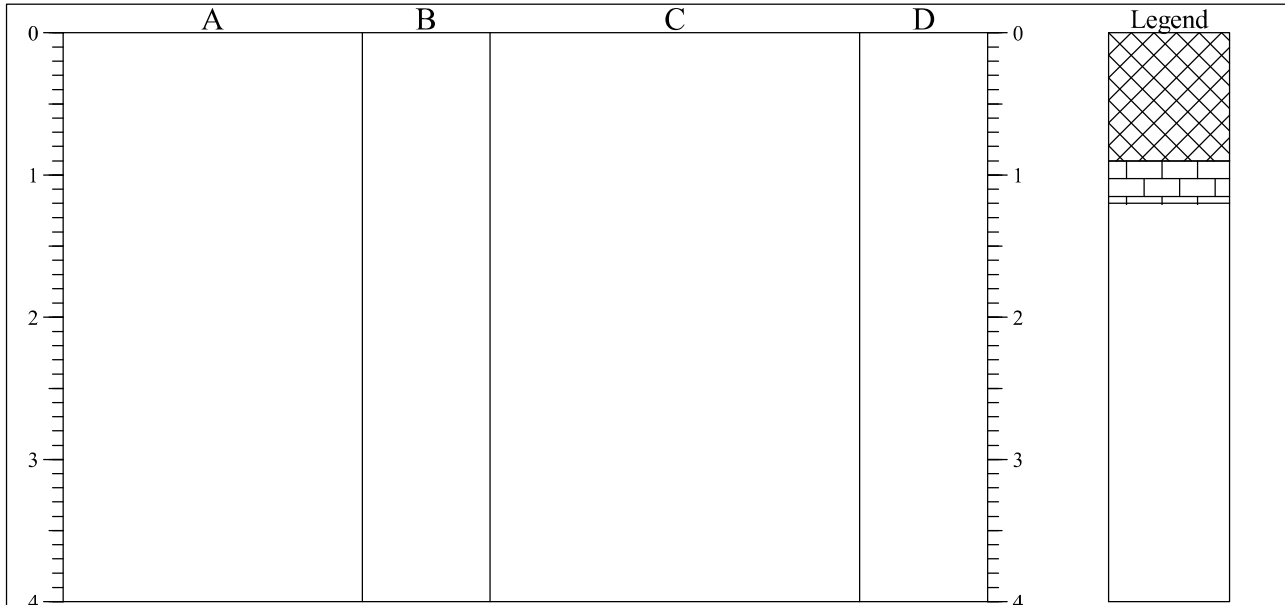
All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By LJ
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## TRIAL PIT LOG

Project Proposed Development, Harrogate Street				TRIAL PIT No  <b>TT03</b>
Job No 20-794	Date 20-05-21	Ground Level (m)	Co-Ordinates ( )	
Contractor Arc Environmental Limited				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.90		Grass overlying dark brown sandy gravelly clayey soil with broken bricks and occasional large concrete boulders (MADE GROUND)			
0.90-1.20		Buff weathered LIMESTONE (ROKER FORMATION)			

AGS3 UK TP 20-794 BH & TP LOGS.GPJ AGS3 ALL.GDT 20/7/21

Shoring/Support: Stability: <div style="text-align: center; margin-top: 20px;"> </div>	<b>GENERAL REMARKS</b>  Trial pit remained dry and stable on completion.
---	--

All dimensions in metres Scale 1:50	Client Engie	Method/ Plant Used JCB 3CX	Logged By DMC
--	--------------	-------------------------------	------------------

**Appendix H**  
**Greenfield Run Off Calculation**



Calculated by:

Site name:

Site location:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

## Site Details

Latitude:

Longitude:

Reference:

Date:

Runoff estimation approach

## Site characteristics

Total site area (ha):

## Methodology

$Q_{BAR}$  estimation method:

SPR estimation method:

Soil characteristics	Default	Edited
SOIL type:	<input type="text" value="2"/>	<input type="text" value="2"/>
HOST class:	<input type="text" value="N/A"/>	<input type="text" value="N/A"/>
SPR/SPRHOST:	<input type="text" value="0.3"/>	<input type="text" value="0.3"/>

## Hydrological characteristics

	Default	Edited
SAAR (mm):	<input type="text" value="619"/>	<input type="text" value="619"/>
Hydrological region:	<input type="text" value="3"/>	<input type="text" value="3"/>
Growth curve factor 1 year:	<input type="text" value="0.86"/>	<input type="text" value="0.86"/>
Growth curve factor 30 years:	<input type="text" value="1.75"/>	<input type="text" value="1.75"/>
Growth curve factor 100 years:	<input type="text" value="2.08"/>	<input type="text" value="2.08"/>
Growth curve factor 200 years:	<input type="text" value="2.37"/>	<input type="text" value="2.37"/>

## Notes

### (1) Is $Q_{BAR} < 2.0$ l/s/ha?

When  $Q_{BAR}$  is  $< 2.0$  l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

### (2) Are flow rates $< 5.0$ l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

### (3) Is $SPR/SPRHOST \leq 0.3$ ?

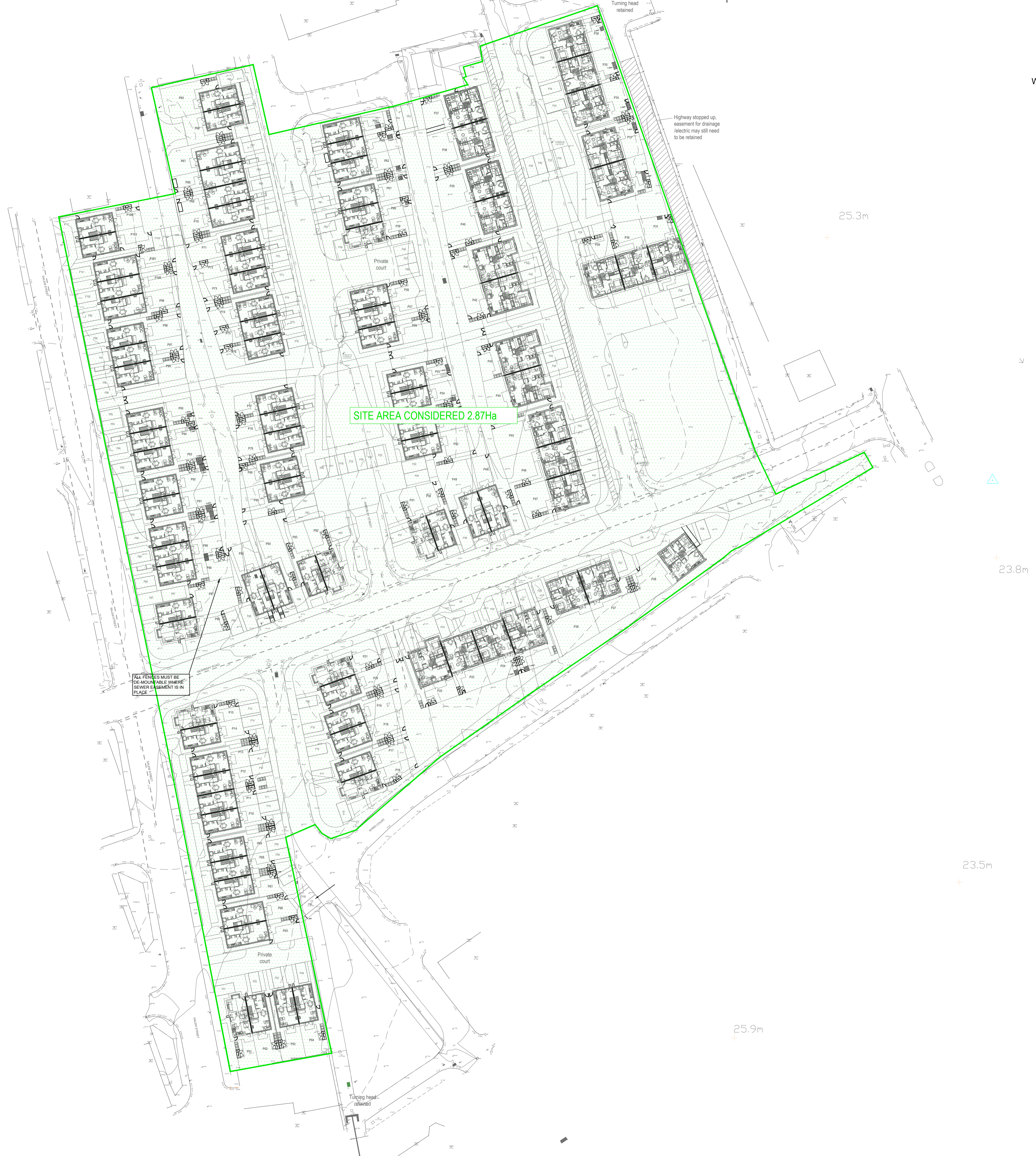
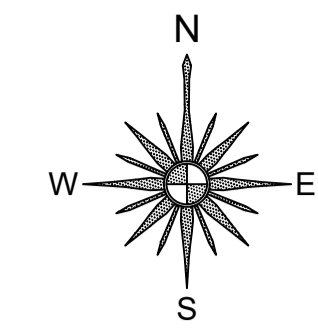
Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
$Q_{BAR}$ (l/s):	<input type="text" value="4.53"/>	<input type="text" value="4.53"/>
1 in 1 year (l/s):	<input type="text" value="3.9"/>	<input type="text" value="3.9"/>
1 in 30 years (l/s):	<input type="text" value="7.93"/>	<input type="text" value="7.93"/>
1 in 100 year (l/s):	<input type="text" value="9.42"/>	<input type="text" value="9.42"/>
1 in 200 years (l/s):	<input type="text" value="10.73"/>	<input type="text" value="10.73"/>

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at [www.uksuds.com](http://www.uksuds.com). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at [www.uksuds.com/terms-and-conditions.htm](http://www.uksuds.com/terms-and-conditions.htm). The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.



NOTE  
FINISHED FLOOR LEVELS ARE PRELIMINARY  
AND ARE SUBJECT TO CHANGE AT  
DETAILED DESIGN STAGE



SITE AREA CONSIDERED 2.87Ha

ALL FENCES MUST BE DEMOUNTABLE WHERE SEWER LAYOUT IS IN PLACE

Highway stopped up, easement for drainage electric may still need to be retained

Rev.	Description	By	Chk	App	Date
A	Updated to suit current architects layout	MT	SH	LRB	29/04/22
0	Initial issue	MT	SH	LRB	25/03/22

**Portland**  
consulting engineers

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Client: **Thirteen**

Project: **Amberly & Harrogate Street  
Sunderland**

Drawing Title: **Areas For Greenfield Runoff**

Scale	1:500	Sheet Size	A1
Drawn By	MT	Checked By	SH
Approved By	LBR	Date	24/03/22

Drawing Status		
Project No.	Drawing No.	Revision
2020060	013-03	A

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30.8m

25.9m


23.5m

23.8m

25.3m



**Appendix I**  
**Proposed Hydraulic Calculations**

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10 Bankside The Watermark Gateshead Tyne & Wear NE11 9SY	Amberley & Harrogate Street	
Date 29/04/2022 File AMBERLEY - 29.04.22.MDX	Designed by MDT Checked by	
Innovyze	Network 2020.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for AMBERLEY - 22.03.22.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD








FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	17.200	Add Flow / Climate Change (%)	0
Ratio R	0.350	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	200	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits


Network Design Table for AMBERLEY - 22.03.22.SWS

« - Indicates pipe capacity < flow














PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	9.055	0.054	167.7	0.110	5.00	0.0	0.600		o	225	Pipe/Conduit	
S2.000	10.681	0.044	242.8	0.040	5.00	0.0	0.600		o	375	Pipe/Conduit	
S1.001	30.770	0.063	488.4	0.000	0.00	0.0	0.600		o	900	Pipe/Conduit	
S1.002	47.800	0.096	497.9	0.035	0.00	0.0	0.600		o	900	Pipe/Conduit	
S1.003	78.111	0.160	488.2	0.245	0.00	0.0	0.600		o	900	Pipe/Conduit	
S1.004	12.770	0.026	491.2	0.000	0.00	0.0	0.600		o	525	Pipe/Conduit	
S1.005	46.767	0.123	380.2	0.166	0.00	0.0	0.600		o	525	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	55.73	5.15	27.010	0.110	0.0	0.0	0.0	1.01	40.0	16.6
S2.000	55.72	5.15	26.610	0.040	0.0	0.0	0.0	1.16	127.9	6.0
S1.001	54.16	5.52	26.566	0.150	0.0	0.0	0.0	1.41	897.6	22.0
S1.002	51.93	6.09	26.503	0.185	0.0	0.0	0.0	1.40	888.9	26.0
S1.003	48.73	7.01	26.407	0.430	0.0	0.0	0.0	1.41	897.8	56.7
S1.004	48.06	7.22	26.247	0.430	0.0	0.0	0.0	1.00	217.3	56.7
S1.005	46.05	7.90	26.221	0.596	0.0	0.0	0.0	1.14	247.4	74.3


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Innovyze	Network 2020.1	

Network Design Table for AMBERLEY - 22.03.22.SWS




PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S3.000	62.580	1.122	55.8	0.130	5.00	0.0	0.600		o	225	Pipe/Conduit	
S4.000	40.171	0.285	140.9	0.136	5.00	0.0	0.600		o	300	Pipe/Conduit	
S5.000	29.198	1.921	15.2	0.064	5.00	0.0	0.600		o	150	Pipe/Conduit	
S3.001	24.440	0.195	125.4	0.040	0.00	0.0	0.600		o	300	Pipe/Conduit	
S3.002	36.901	0.269	137.2	0.025	0.00	0.0	0.600		o	300	Pipe/Conduit	
S6.000	55.193	0.113	488.4	0.088	5.00	0.0	0.600		o	900	Pipe/Conduit	
S3.003	6.784	0.014	484.6	0.072	0.00	0.0	0.600		o	900	Pipe/Conduit	
S1.006	10.313	0.021	491.1	0.000	0.00	0.0	0.600		o	900	Pipe/Conduit	
S1.007	11.042	0.023	480.1	0.041	0.00	0.0	0.600		o	525	Pipe/Conduit	
S1.008	21.094	0.105	200.9	0.074	0.00	0.0		0.035 →\_/			Pond/Tank	
S1.009	8.676	0.174	50.0	0.079	0.00	0.0	0.600		o	300	Pipe/Conduit	
S1.010	5.665	0.472	12.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S1.011	21.422	2.142	10.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S3.000	53.85	5.59	28.375	0.130	0.0	0.0	0.0	1.75	69.8	19.0
S4.000	54.21	5.51	27.463	0.136	0.0	0.0	0.0	1.32	93.5	20.0
S5.000	55.57	5.19	29.250	0.064	0.0	0.0	0.0	2.60	45.9	9.6
S3.001	52.70	5.88	27.178	0.370	0.0	0.0	0.0	1.40	99.2	52.8
S3.002	50.99	6.34	26.983	0.395	0.0	0.0	0.0	1.34	94.8	54.5
S6.000	53.61	5.65	26.227	0.088	0.0	0.0	0.0	1.41	897.6	12.8
S3.003	50.71	6.42	26.114	0.555	0.0	0.0	0.0	1.42	901.2	76.2
S1.006	45.71	8.03	26.089	1.151	0.0	0.0	0.0	1.41	895.1	142.5
S1.007	45.21	8.21	26.068	1.192	0.0	0.0	0.0	1.02	219.8	146.0
S1.008	44.74	8.38	26.045	1.266	0.0	0.0	0.0	1.99	69132.4	153.4
S1.009	44.57	8.45	25.940	1.345	0.0	0.0	0.0	2.23	157.5«	162.4
S1.010	44.52	8.47	25.766	1.345	0.0	0.0	0.0	4.56	322.5	162.4
S1.011	44.34	8.54	25.294	1.345	0.0	0.0	0.0	5.00	353.4	162.4

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10 Bankside The Watermark Gateshead Tyne & Wear NE11 9SY	Amberley & Harrogate Street	
Date 29/04/2022 File AMBERLEY - 29.04.22.MDX	Designed by MDT Checked by	
Innovyze	Network 2020.1	

Network Design Table for AMBERLEY - 22.03.22.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S7.000	5.000	0.020	250.0	0.000	5.00	0.0	0.600		o	300	Pipe/Conduit	
S7.001	5.000	0.020	250.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S7.002	4.500	0.018	250.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S7.000	56.03	5.08	26.800	0.000	0.0	0.0	0.0	0.99	70.0	0.0
S7.001	55.65	5.17	26.780	0.000	0.0	0.0	0.0	0.99	70.0	0.0
S7.002	55.32	5.24	26.760	0.000	0.0	0.0	0.0	0.99	70.0	0.0

Free Flowing Outfall Details for AMBERLEY - 22.03.22.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.011	SC1	26.469	23.152	0.000	1200	0


Free Flowing Outfall Details for AMBERLEY - 22.03.22.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S7.002	S2105	27.435	26.742	0.000	1800	0

Simulation Criteria for AMBERLEY - 22.03.22.SWS


Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m <sup>3</sup> /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Offline Controls	1
Number of Online Controls	2	Number of Time/Area Diagrams	0
		Number of Storage Structures	2
		Number of Real Time Controls	0

Synthetic Rainfall Details

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Date 29/04/2022 File AMBERLEY - 29.04.22.MDX	Designed by MDT Checked by	
Innovyze	Network 2020.1	

Simulation Criteria for AMBERLEY - 22.03.22.SWS

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	17.200	Storm Duration (mins)	30
Ratio R	0.350		

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Date 29/04/2022 File AMBERLEY - 29.04.22.MDX	Designed by MDT Checked by	
Innovyze	Network 2020.1	

Online Controls for AMBERLEY - 22.03.22.SWS

Hydro-Brake® Optimum Manhole: S11, DS/PN: S1.010, Volume (m³): 2.6

```

Unit Reference MD-SHE-0086-3900-1530-3900
Design Head (m) 1.530
Design Flow (l/s) 3.9
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 86
Invert Level (m) 25.766
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

```

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.530	3.9	Kick-Flo®	0.769	2.8
Flush-Flo™	0.379	3.5	Mean Flow over Head Range	-	3.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.6	1.200	3.5	3.000	5.3	7.000	7.9
0.200	3.3	1.400	3.7	3.500	5.7	7.500	8.2
0.300	3.5	1.600	4.0	4.000	6.1	8.000	8.5
0.400	3.5	1.800	4.2	4.500	6.4	8.500	8.7
0.500	3.5	2.000	4.4	5.000	6.8	9.000	9.0
0.600	3.4	2.200	4.6	5.500	7.1	9.500	9.2
0.800	2.9	2.400	4.8	6.000	7.4		
1.000	3.2	2.600	5.0	6.500	7.7		


Hydro-Brake® Optimum Manhole: S22, DS/PN: S7.001, Volume (m³): 1.2

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Unit Reference MD-SHE-0107-4500-0530-4500
Design Head (m) 0.530
Design Flow (l/s) 4.5
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 107
Invert Level (m) 26.780
Minimum Outlet Pipe Diameter (mm) 150

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Hydro-Brake® Optimum Manhole: S22, DS/PN: S7.001, Volume (m³): 1.2

Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.530	4.5	Kick-Flo®	0.386	3.9
Flush-Flo™	0.178	4.5	Mean Flow over Head Range	-	3.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated


Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.7	1.200	6.6	3.000	10.1	7.000	15.2
0.200	4.5	1.400	7.1	3.500	10.9	7.500	15.8
0.300	4.3	1.600	7.5	4.000	11.6	8.000	16.3
0.400	4.0	1.800	8.0	4.500	12.3	8.500	16.8
0.500	4.4	2.000	8.4	5.000	12.9	9.000	17.3
0.600	4.8	2.200	8.7	5.500	13.5	9.500	17.7
0.800	5.4	2.400	9.1	6.000	14.1		
1.000	6.0	2.600	9.5	6.500	14.7		

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Offline Controls for AMBERLEY - 22.03.22.SWS

Pipe Manhole: S13, DS/PN: S2.000, Loop to PN: S7.000

Diameter (m)	0.300	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	200.0	Coefficient of Contraction	0.600
Length (m)	21.700	Upstream Invert Level (m)	26.690

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Storage Structures for AMBERLEY - 22.03.22.SWS

Tank or Pond Manhole: S13, DS/PN: S2.000


Invert Level (m) 26.610

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	107.0	0.700	303.0	1.000	404.0

Tank or Pond Pipe: S1.008

Manning's N 0.035 Invert Level (m) 26.045

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	194.0	1.300	619.4	1.600	744.0

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for AMBERLEY - 22.03.22.SWS

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000  
Hot Start (mins) 0 MADD Factor \* 10m<sup>3</sup>/ha Storage 2.000  
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800  
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000  
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 1 Number of Time/Area Diagrams 0  
Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0


Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.350  
Region England and Wales Cv (Summer) 0.750  
M5-60 (mm) 17.200 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0  
Analysis Timestep 2.5 Second Increment (Extended)  
DTS Status OFF  
DVD Status ON  
Inertia Status ON


Profile(s) Summer and Winter  
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440  
Return Period(s) (years) 1, 30, 100  
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	1	+0%	100/15 Summer			
S2.000	S13	60 Winter	1	+0%	100/120 Summer		30/180 Winter	35
S1.001	S2	15 Winter	1	+0%				
S1.002	S3	15 Winter	1	+0%				
S1.003	S4	15 Winter	1	+0%	100/720 Winter			
S1.004	S5	480 Winter	1	+0%	30/180 Winter			
S1.005	S6	480 Winter	1	+0%	30/120 Winter			
S3.000	S14	15 Winter	1	+0%	100/15 Summer			
S4.000	S18	15 Winter	1	+0%	100/15 Summer			
S5.000	S19	15 Winter	1	+0%				
S3.001	S15	15 Winter	1	+0%	30/15 Summer			
S3.002	S16	15 Winter	1	+0%	30/15 Summer			
S6.000	S20	480 Winter	1	+0%	100/180 Winter			
S3.003	S17	480 Winter	1	+0%	100/120 Summer			

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for  
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PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m <sup>3</sup> )	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	27.107	-0.128	0.000	0.38		12.5	OK	
S2.000	S13	26.633	-0.352	0.000	0.01	0.0	1.2	OK	
S1.001	S2	26.661	-0.805	0.000	0.02		11.8	OK	
S1.002	S3	26.608	-0.795	0.000	0.02		14.5	OK	
S1.003	S4	26.548	-0.759	0.000	0.04		33.5	OK	
S1.004	S5	26.478	-0.294	0.000	0.05		6.6	OK	
S1.005	S6	26.478	-0.268	0.000	0.04		9.1	OK	
S3.000	S14	28.447	-0.153	0.000	0.21		14.5	OK	
S4.000	S18	27.548	-0.215	0.000	0.18		15.2	OK	
S5.000	S19	29.291	-0.109	0.000	0.17		7.3	OK	
S3.001	S15	27.321	-0.157	0.000	0.46		40.7	OK	
S3.002	S16	27.131	-0.152	0.000	0.49		42.8	OK	
S6.000	S20	26.478	-0.649	0.000	0.00		1.3	OK	
S3.003	S17	26.478	-0.536	0.000	0.02		7.8	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for  
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PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.006	S7	480	Winter	1	+0%	100/60	Winter		26.478
S1.007	S8	480	Winter	1	+0%	30/60	Summer		26.478
S1.008	S9	480	Winter	1	+0%				26.477
S1.009	S10	480	Winter	1	+0%	1/15	Winter		26.477
S1.010	S11	480	Winter	1	+0%	1/15	Summer		26.495
S1.011	S12	360	Summer	1	+0%				25.309
S7.000	S21	15	Summer	1	+0%	100/120	Winter		26.800
S7.001	S22	15	Summer	1	+0%	100/120	Winter		26.780
S7.002	S23	15	Summer	1	+0%				26.760

PN	US/MH Name	Surcharged Flooded			Half Drain Pipe		Status	Level Exceeded
		Depth (m)	Volume (m <sup>3</sup> )	Flow / Cap.	Overflow (l/s)	Time (mins)		
S1.006	S7	-0.511	0.000	0.04		15.9	OK	
S1.007	S8	-0.115	0.000	0.14		16.2	OK	
S1.008	S9	-1.123	0.000	0.00		17.0	OK	
S1.009	S10	0.237	0.000	0.04		3.9	SURCHARGED	
S1.010	S11	0.429	0.000	0.02		3.4	SURCHARGED	
S1.011	S12	-0.285	0.000	0.01		3.4	OK	
S7.000	S21	-0.300	0.000	0.00		0.0	OK	
S7.001	S22	-0.300	0.000	0.00		0.0	OK	
S7.002	S23	-0.300	0.000	0.00		0.0	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)  
for AMBERLEY - 22.03.22.SWS

Simulation Criteria

Areal Reduction Factor 1.000    Additional Flow - % of Total Flow 0.000  
Hot Start (mins) 0    MADD Factor \* 10m<sup>3</sup>/ha Storage 2.000  
Hot Start Level (mm) 0    Inlet Coeffiecient 0.800  
Manhole Headloss Coeff (Global) 0.500    Flow per Person per Day (l/per/day) 0.000  
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0    Number of Offline Controls 1    Number of Time/Area Diagrams 0  
Number of Online Controls 2    Number of Storage Structures 2    Number of Real Time Controls 0


Synthetic Rainfall Details

Rainfall Model    FSR    Ratio R 0.350  
Region England and Wales Cv (Summer) 0.750  
M5-60 (mm)    17.200 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)    300.0  
Analysis Timestep 2.5 Second Increment (Extended)  
DTS Status    OFF  
DVD Status    ON  
Inertia Status    ON

Profile(s)    Summer and Winter  
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720,  
960, 1440  
Return Period(s) (years)    1, 30, 100  
Climate Change (%)    0, 0, 40


PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	30	+0%	100/15 Summer			
S2.000	S13	600 Winter	30	+0%	100/120 Summer		30/180 Winter	35
S1.001	S2	600 Winter	30	+0%				
S1.002	S3	600 Winter	30	+0%				
S1.003	S4	600 Winter	30	+0%	100/720 Winter			
S1.004	S5	600 Winter	30	+0%	30/180 Winter			
S1.005	S6	600 Winter	30	+0%	30/120 Winter			
S3.000	S14	15 Winter	30	+0%	100/15 Summer			
S4.000	S18	15 Winter	30	+0%	100/15 Summer			
S5.000	S19	15 Winter	30	+0%				
S3.001	S15	15 Winter	30	+0%	30/15 Summer			
S3.002	S16	15 Winter	30	+0%	30/15 Summer			
S6.000	S20	600 Winter	30	+0%	100/180 Winter			
S3.003	S17	600 Winter	30	+0%	100/120 Summer			

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)  
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PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m <sup>3</sup> )	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	27.183	-0.052	0.000	0.93		30.4	OK	
S2.000	S13	26.876	-0.109	0.000	0.01	2.5	0.8	OK	
S1.001	S2	26.879	-0.587	0.000	0.01		3.8	OK	
S1.002	S3	26.879	-0.524	0.000	0.01		4.6	OK	
S1.003	S4	26.879	-0.428	0.000	0.01		10.4	OK	
S1.004	S5	26.879	0.107	0.000	0.07		8.5	SURCHARGED	
S1.005	S6	26.879	0.133	0.000	0.06		13.1	SURCHARGED	
S3.000	S14	28.493	-0.107	0.000	0.52		35.4	OK	
S4.000	S18	27.602	-0.161	0.000	0.43		37.1	OK	
S5.000	S19	29.317	-0.083	0.000	0.41		17.8	OK	
S3.001	S15	27.535	0.057	0.000	1.04		91.6	SURCHARGED	
S3.002	S16	27.323	0.040	0.000	1.09		95.7	SURCHARGED	
S6.000	S20	26.879	-0.248	0.000	0.00		2.6	OK	
S3.003	S17	26.879	-0.135	0.000	0.04		16.5	OK	




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PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.006	S7	600	Winter	30	+0%	100/60	Winter		26.879
S1.007	S8	600	Winter	30	+0%	30/60	Summer		26.879
S1.008	S9	600	Winter	30	+0%				26.878
S1.009	S10	600	Winter	30	+0%	1/15	Winter		26.878
S1.010	S11	720	Winter	30	+0%	1/15	Summer		26.892
S1.011	S12	240	Summer	30	+0%				25.309
S7.000	S21	600	Winter	30	+0%	100/120	Winter		26.873
S7.001	S22	600	Winter	30	+0%	100/120	Winter		26.871
S7.002	S23	600	Winter	30	+0%				26.802

PN	US/MH Name	Surcharged Flooded			Half Drain Pipe			Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)			
S1.006	S7	-0.110	0.000	0.08		29.1		OK	
S1.007	S8	0.286	0.000	0.26		30.2	SURCHARGED		
S1.008	S9	-0.722	0.000	0.00		32.0		OK	
S1.009	S10	0.638	0.000	0.04		4.2	SURCHARGED		
S1.010	S11	0.826	0.000	0.02		3.4	SURCHARGED		
S1.011	S12	-0.285	0.000	0.01		3.4		OK	
S7.000	S21	-0.227	0.000	0.05		2.3		OK	
S7.001	S22	-0.209	0.000	0.05		2.3		OK	
S7.002	S23	-0.258	0.000	0.05		2.3		OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)  
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Simulation Criteria

Areal Reduction Factor 1.000    Additional Flow - % of Total Flow 0.000  
Hot Start (mins) 0    MADD Factor \* 10m³/ha Storage 2.000  
Hot Start Level (mm) 0    Inlet Coeffiecient 0.800  
Manhole Headloss Coeff (Global) 0.500    Flow per Person per Day (l/per/day) 0.000  
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0    Number of Offline Controls 1    Number of Time/Area Diagrams 0  
Number of Online Controls 2    Number of Storage Structures 2    Number of Real Time Controls 0


Synthetic Rainfall Details

Rainfall Model    FSR    Ratio R 0.350  
Region England and Wales Cv (Summer) 0.750  
M5-60 (mm)    17.200 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)    300.0  
Analysis Timestep 2.5 Second Increment (Extended)  
DTS Status    OFF  
DVD Status    ON  
Inertia Status    ON


Profile(s)    Summer and Winter  
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720,  
960, 1440  
Return Period(s) (years)    1, 30, 100  
Climate Change (%)    0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	100	+40%	100/15 Summer			
S2.000	S13	720 Winter	100	+40%	100/120 Summer		30/180 Winter	35
S1.001	S2	720 Winter	100	+40%				
S1.002	S3	720 Winter	100	+40%				
S1.003	S4	720 Winter	100	+40%	100/720 Winter			
S1.004	S5	720 Winter	100	+40%	30/180 Winter			
S1.005	S6	720 Winter	100	+40%	30/120 Winter			
S3.000	S14	15 Winter	100	+40%	100/15 Summer			
S4.000	S18	15 Winter	100	+40%	100/15 Summer			
S5.000	S19	15 Winter	100	+40%				
S3.001	S15	15 Winter	100	+40%	30/15 Summer			
S3.002	S16	15 Winter	100	+40%	30/15 Summer			
S6.000	S20	720 Winter	100	+40%	100/180 Winter			
S3.003	S17	720 Winter	100	+40%	100/120 Summer			

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)  
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PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m <sup>3</sup> )	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	27.329	0.094	0.000	1.68		54.9	SURCHARGED	
S2.000	S13	27.306	0.321	0.000	0.01	11.6	0.7	FLOOD RISK	
S1.001	S2	27.309	-0.157	0.000	0.01		3.7	OK	
S1.002	S3	27.309	-0.094	0.000	0.01		4.5	OK	
S1.003	S4	27.312	0.005	0.000	0.01		10.7	SURCHARGED	
S1.004	S5	27.312	0.540	0.000	0.07		8.4	SURCHARGED	
S1.005	S6	27.313	0.567	0.000	0.06		13.3	SURCHARGED	
S3.000	S14	29.167	0.567	0.000	0.79		53.1	SURCHARGED	
S4.000	S18	28.584	0.821	0.000	0.64		55.9	SURCHARGED	
S5.000	S19	29.346	-0.054	0.000	0.73		32.1	OK	
S3.001	S15	28.460	0.982	0.000	1.70		150.4	SURCHARGED	
S3.002	S16	27.884	0.601	0.000	1.80		157.7	SURCHARGED	
S6.000	S20	27.313	0.186	0.000	0.01		4.1	SURCHARGED	
S3.003	S17	27.313	0.299	0.000	0.06		25.7	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)  
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PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.006	S7	720	Winter	100	+40%	100/60	Winter		27.313
S1.007	S8	720	Winter	100	+40%	30/60	Summer		27.313
S1.008	S9	720	Winter	100	+40%				27.313
S1.009	S10	720	Winter	100	+40%	1/15	Winter		27.312
S1.010	S11	720	Winter	100	+40%	1/15	Summer		27.331
S1.011	S12	720	Winter	100	+40%				25.312
S7.000	S21	720	Winter	100	+40%	100/120	Winter		27.434
S7.001	S22	720	Winter	100	+40%	100/120	Winter		27.457
S7.002	S23	720	Winter	100	+40%				26.823

PN	US/MH Name	Surcharged Flooded			Half Drain Pipe		Status	Level Exceeded
		Depth (m)	Volume (m <sup>3</sup> )	Flow / Overflow Cap.	Time (mins)	Flow (l/s)		
S1.006	S7	0.324	0.000	0.09		33.4	SURCHARGED	
S1.007	S8	0.720	0.000	0.29		34.6	SURCHARGED	
S1.008	S9	-0.287	0.000	0.00		37.8	FLOOD RISK	
S1.009	S10	1.072	0.000	0.04		4.4	FLOOD RISK	
S1.010	S11	1.265	0.000	0.02		3.9	FLOOD RISK	
S1.011	S12	-0.282	0.000	0.01		3.9	OK	
S7.000	S21	0.334	0.000	0.17		8.1	FLOOD RISK	
S7.001	S22	0.377	0.000	0.10		4.5	FLOOD RISK	
S7.002	S23	-0.237	0.000	0.10		4.5	OK	

**Appendix J**  
**Drainage Strategy Drawing**