

Appendix 4

Particle Size Distribution Analyses

from 20 bulk samples

Laboratory Results

provided by

M & B Geotechnical Services

of

Barnwall, Near Peterborough

March 2008

Samlesbury Estate - Preston

ASSESSMENT

Borehole No.	Depth (m)	<u>40+</u>	<u>20/40^b</u>	<u>10/20^b</u>	<u>4/10^b</u>	<u>Gravel</u>	<u>Sand</u>	<u>Silt</u>
S/01/1	2.00-3.00	18.5	19.7	15.4	13.9	67.6	26.1	6.4
S/01/2	3.50-4.50	0.0	1.0	5.0	3.5	9.5	80.9	9.6
S/02/1	1.70-3.00	2.9	18.1	19.5	14.4	54.9	37.7	7.4
S/02/2	3.50-6.00	0.0	4.8	3.9	6.5	15.2	70.7	14.2
S/03/1	1.70-3.00	3.8	10.6	11.8	11.0	37.3	57.8	4.8
S/03/2	3.00-4.50	36.1	13.4	9.3	10.1	68.9	25.6	5.5
S/04/1	0.70-1.50	6.5	27.4	20.4	11.2	65.5	32.7	1.8
S/04/2	1.50-3.00	14.9	5.4	8.5	8.8	37.5	55.4	7.1
S/04/3	3.00-4.50	10.4	22.7	14.5	8.3	55.9	39.6	4.5
S/05/1	4.00-5.50	13.1	13.0	22.7	18.3	67.1	30.3	2.6
S/05/2	5.50-7.00	2.3	21.8	14.2	15.0	53.3	42.6	4.1
S/07/1	0.50-3.00	0.0	0.0	0.0	0.0	0.0	85.1	14.9
S/07/2	3.00-4.50	0.0	0.0	0.0	0.0	0.0	81.9	18.1
S/08/1	1.90-2.90	0.0	0.0	0.0	0.0	0.0	75.5	24.5
S/08/2	3.00-4.00	9.1	9.4	10.1	7.6	36.2	59.8	4.0
S/09/1	0.80-1.50	10.9	17.5	14.4	11.4	54.2	34.3	11.5
S/09/2	2.00-3.00	26.3	12.9	11.9	11.1	62.2	30.7	7.1
S/09/3	4.50-6.00	0.0	7.1	5.2	5.1	17.4	62.4	20.2
S/10/1	1.50-2.80	0.0	0.0	0.0	0.0	0.0	81.7	18.3

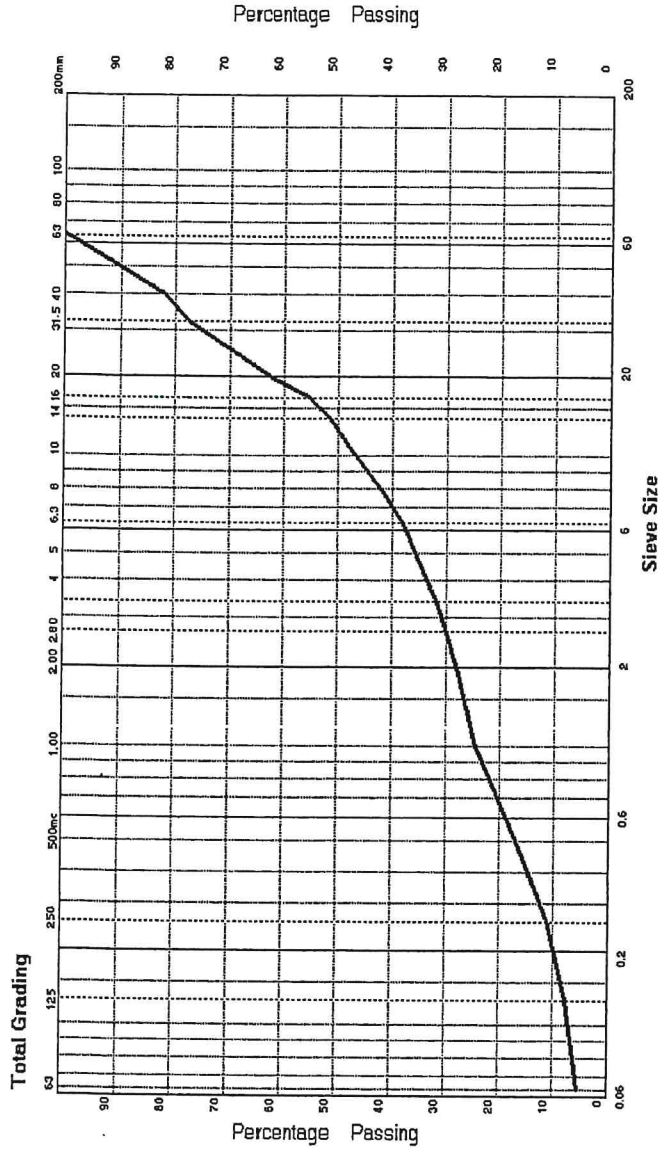
LOCATION : Samesbury Estate - Preston
 Borehole No. : S/01/1
 Depth (m) : 2.00-3.00

GRADING ANALYSES

Sieve Size	% Passing	Theoretical Sand	
		Inc Silt % Passing	ex Silt % Passing
80mm	100.0	100.0	100.0
63mm	100.0	92.3	90.4
40mm	81.5	85.9	82.5
31.5mm	77.9	73.2	66.6
20mm	61.8	52.9	41.4
16mm	55.0	34.2	18.1
14mm	51.8	23.7	5.0
10mm	46.4	19.7	0.0
8mm	41.6		
6.3mm	38.0		
4mm	32.4		
2.80mm	29.9		
2.00mm	27.9		
1.00mm	23.8		
500mc	17.2		
250mc	11.1		
125mc	7.7		
63mc	6.4		

Compliance
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PARTICLE SIZE DISTRIBUTION



ASSESSMENT

Grading	% Gravel	% Sand	% Silt
40+	18.5		
20/40 ^b	19.7		
10/20 ^b	15.4		
4/10 ^b	13.9		
		67.6	
		26.0	
			6.4

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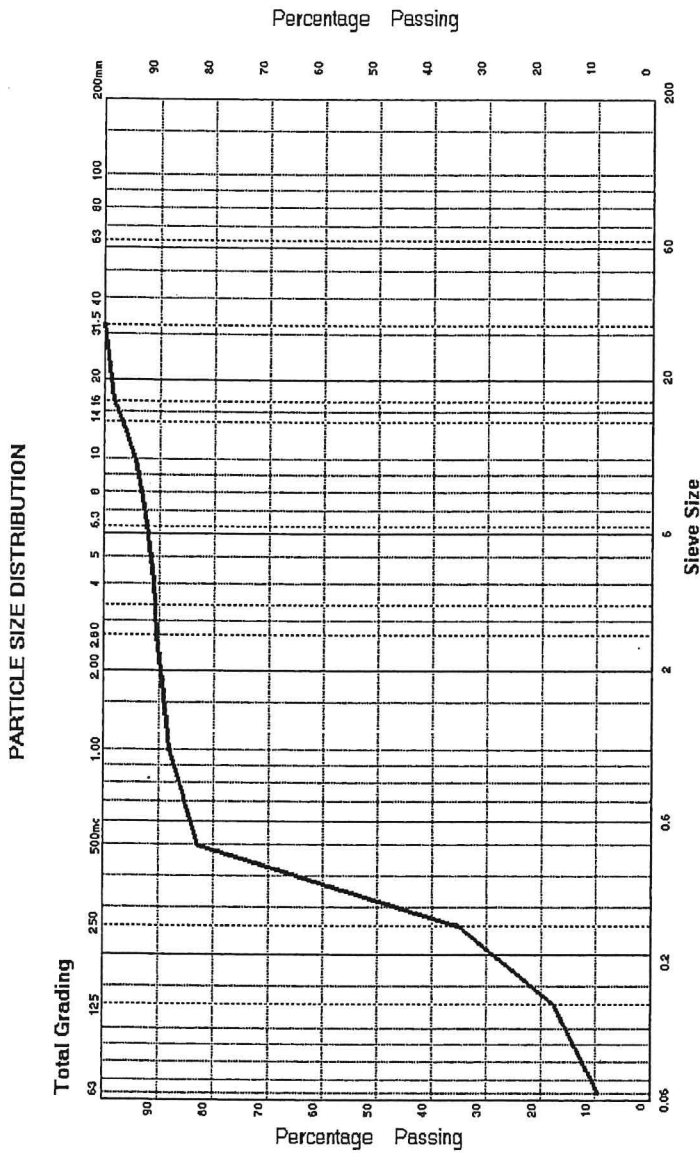
Tel (01832) 273079

LOCATION : Samlesbury Estate - Preston
 Borehole No. : S/01/2
 Depth (m) : 3.50-4.50

GRADING ANALYSES

Sieve Size	% Passing	Theoretical Sand	
		Inc Silt	ex Silt
80mm	100.0	100.0	100.0
63mm	100.0	99.6	99.5
40mm	100.0	99.2	99.1
31.5mm	100.0	97.3	97.0
20mm	99.0	92.1	91.1
16mm	98.2	38.5	31.3
14mm	96.6	18.5	8.9
10mm	94.0	10.6	0.0
8mm	92.5		
6.3mm	91.7		

Compliance
 EN12620 : FP



ASSESSMENT

40+	0.0	% Gravel	9.5
20/40 ^b	1.0	% Sand	80.9
10/20 ^b	5.0	% Silt	9.6
4/10 ^b	3.5		

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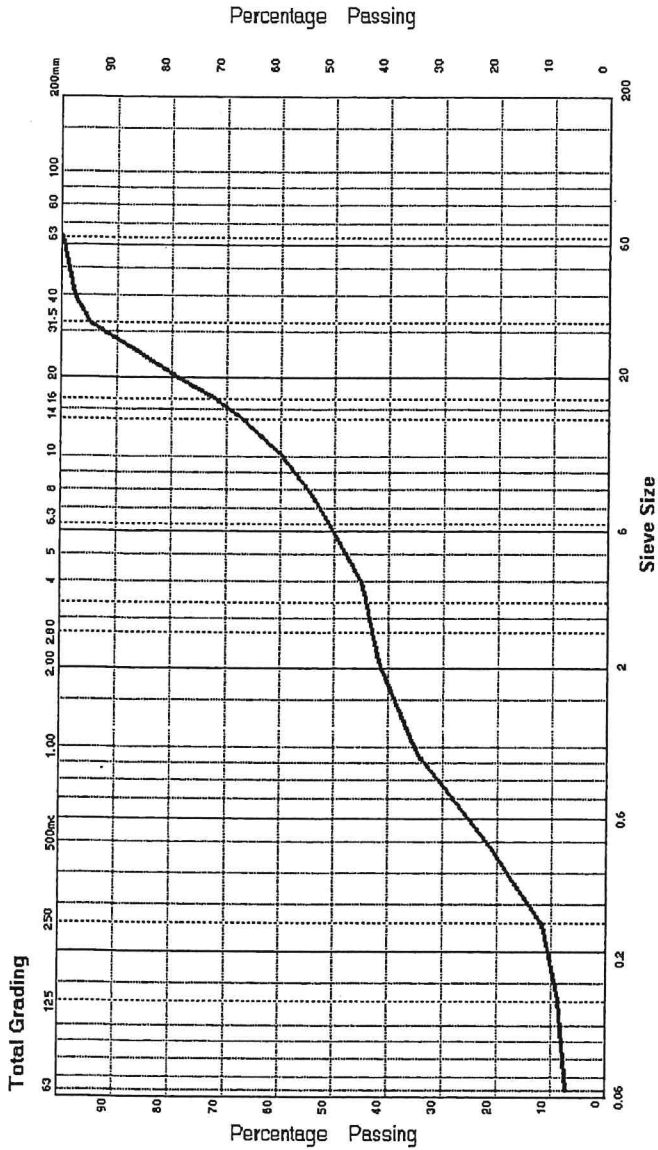
LOCATION : Samlesbury Estate - Preston
 Borehole No. : S/02/1
 Depth (m) : 1.70-3.00

GRADING ANALYSES

Sieve Size	% Passing	Theoretical Sand	
		Inc Silt % Passing	ex Silt % Passing
80mm	100.0	100.0	100.0
63mm	100.0	94.8	93.8
40mm	97.1	89.8	87.8
31.5mm	94.2	77.1	72.6
20mm	79.0	48.0	37.7
16mm	71.8	26.8	12.5
14mm	67.8	19.4	3.5
10mm	59.5	16.4	0.0

Compliance
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PARTICLE SIZE DISTRIBUTION



ASSESSMENT

	% Gravel	% Sand	% Silt
40+	2.9	18.1	19.5
20/40 ^b	18.1	19.5	14.4
10/20 ^p	19.5	14.4	54.9
4/10 ^b	14.4	37.7	7.4

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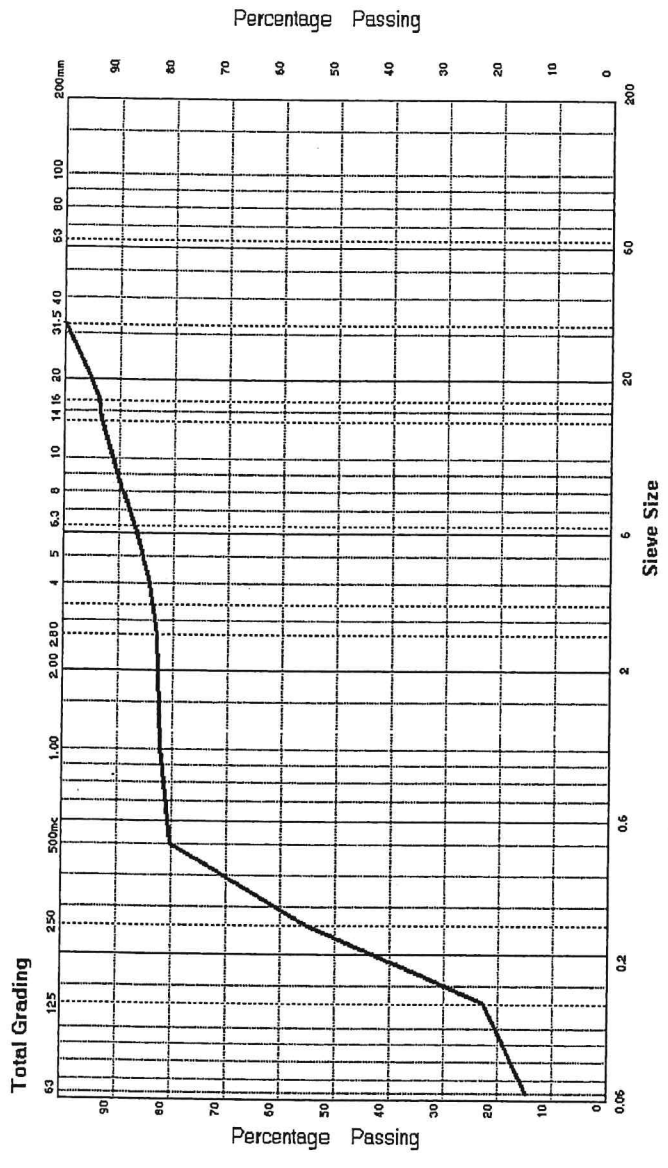
LOCATION : Samlesbury Estate - Preston
Borehole No. : S/02/2
Depth (m) : 3.50-6.00

GRADING ANALYSES

Sieve Size	% Passing	Theoretical Sand	
		Inc Silt % Passing	ex Silt % Passing
80mm	100.0	100.0	100.0
63mm	100.0	99.1	99.0
40mm	100.0	98.1	97.8
31.5mm	100.0	96.6	95.9
20mm	95.2	93.7	92.4
16mm	94.0	64.5	57.3
14mm	93.9	27.5	13.0
10mm	91.3	16.7	0.0
8mm	89.3		
6.3mm	87.4		
4mm	84.8		
2.80mm	84.1		
2.00mm	83.3		
1.00mm	82.0		
500mc	79.5		
250mc	54.7		
125mc	23.3		
63mc	14.2		

Compliance
 EN12620 : FP

PARTICLE SIZE DISTRIBUTION



ASSESSMENT

	% Gravel	% Sand	% Silt
40+	0.0	4.8	3.9
20/40 ^b	0.0	4.8	3.9
10/20 ^b	0.0	4.8	3.9
4/10 ^b	0.0	4.8	3.9
	15.2	17.6	14.2

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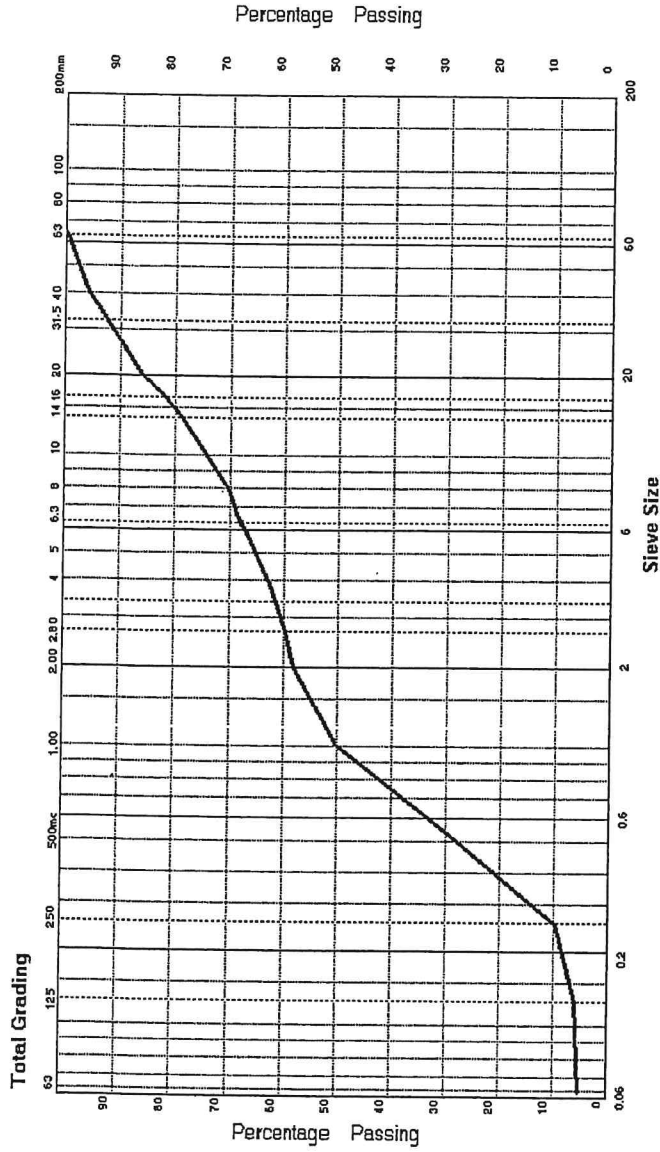
LOCATION : Samsbury Estate - Preston
 Borehole No. : S/03/1
 Depth (m) : 1.70-3.00

GRADING ANALYSES

Sieve Size	Theoretical Sand	
	Inc Silt	ex Silt
Sieve Size	% Passing	% Passing
80mm	100.0	100.0
63mm	100.0	96.1
40mm	96.2	92.0
31.5mm	92.0	78.7
20mm	85.5	40.4
16mm	82.3	9.2
14mm	79.2	1.9
10mm	73.7	0.0
8mm	70.4	
6.3mm	67.5	
4mm	62.7	
2.80mm	60.3	
2.00mm	58.0	
1.00mm	50.3	
500mc	28.2	
250mc	10.1	
125mc	5.9	
63mc	4.8	

Compliance
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PARTICLE SIZE DISTRIBUTION



ASSESSMENT

40+	3.8	% Gravel	37.3
20/40 ^b	10.6	% Sand	57.9
10/20 ^b	11.8	% Silt	4.8
4/10 ^b	11.0		

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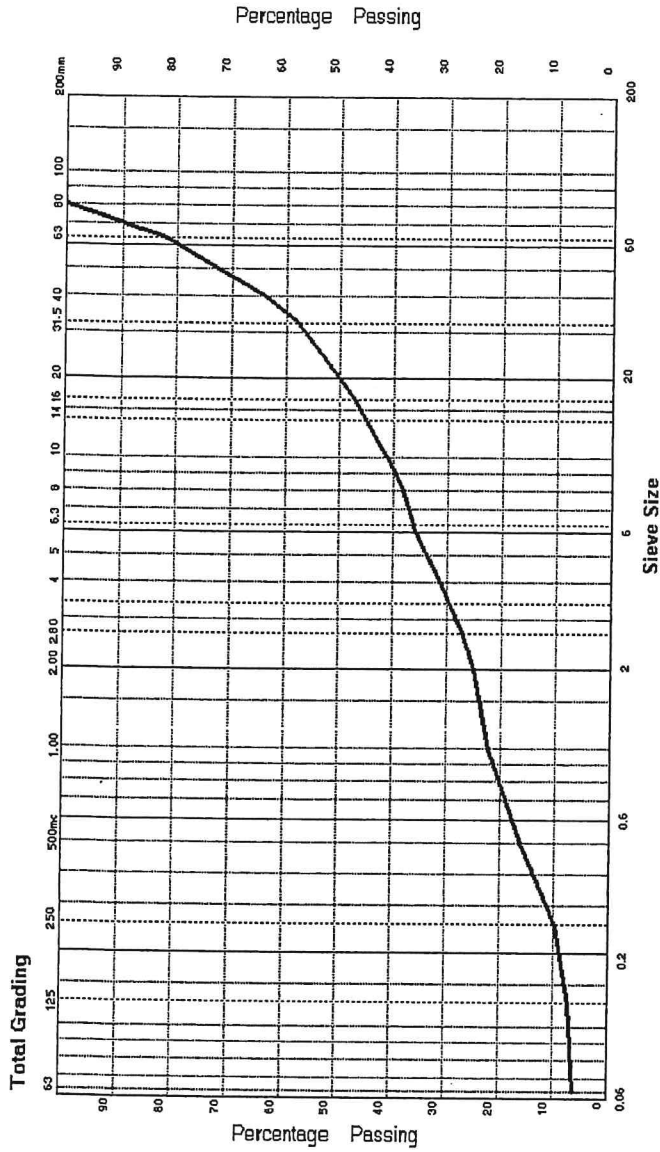
LOCATION : Samesbury Estate - Preston
 Borehole No. : S/03/2
 Depth (m) : 3.00-4.50

GRADING ANALYSES

Total Grading	Theoretical Sand	
	Incl Silt	ex Silt
Sieve Size	% Passing	% Passing
80mm	100.0	100.0
63mm	82.0	88.1
40mm	63.9	77.9
31.5mm	58.3	64.7
20mm	50.4	42.2
16mm	46.7	16.2
14mm	45.0	4.6
10mm	41.2	0.0
8mm	38.2	
6.3mm	35.6	

Compliance
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PARTICLE SIZE DISTRIBUTION



ASSESSMENT

40+	36.1	% Gravel	68.9
20/40 ^b	13.4	% Sand	25.6
10/20 ^b	9.3	% Silt	5.5
4/10 ^b	10.1		

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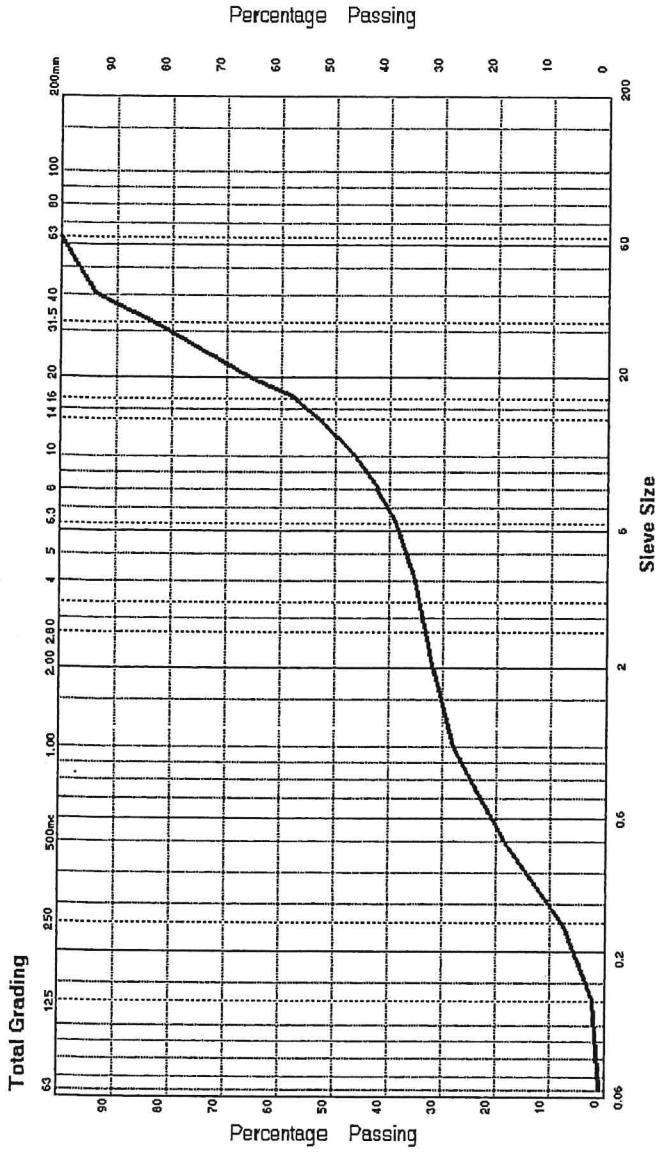
LOCATION : Samesbury Estate - Preston
 Borehole No. : S/04/1
 Depth (m) : 0.70-1.50

GRADING ANALYSES

Sieve Size	% Passing	Theoretical Sand	
		Inc Silt	ex Silt
80mm	100.0	100.0	100.0
63mm	100.0	94.4	94.1
40mm	93.5	89.4	88.9
31.5mm	82.5	79.0	77.8
20mm	66.0	53.8	51.3
16mm	56.8	20.2	16.0
14mm	52.7	8.4	3.5
10mm	45.7	5.1	0.0
8mm	41.7		
6.3mm	38.5		
4mm	34.5		
2.80mm	32.6		
2.00mm	30.8		
1.00mm	27.2		
500mc	18.5		
250mc	7.0		
125mc	2.9		
63mc	1.8		

Compliance
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PARTICLE SIZE DISTRIBUTION



ASSESSMENT

	% Gravel	% Sand	% Silt
40+	6.5	27.4	20.4
20/40 ^b	65.5	32.7	1.8
10/20 ^b			
4/10 ^b			

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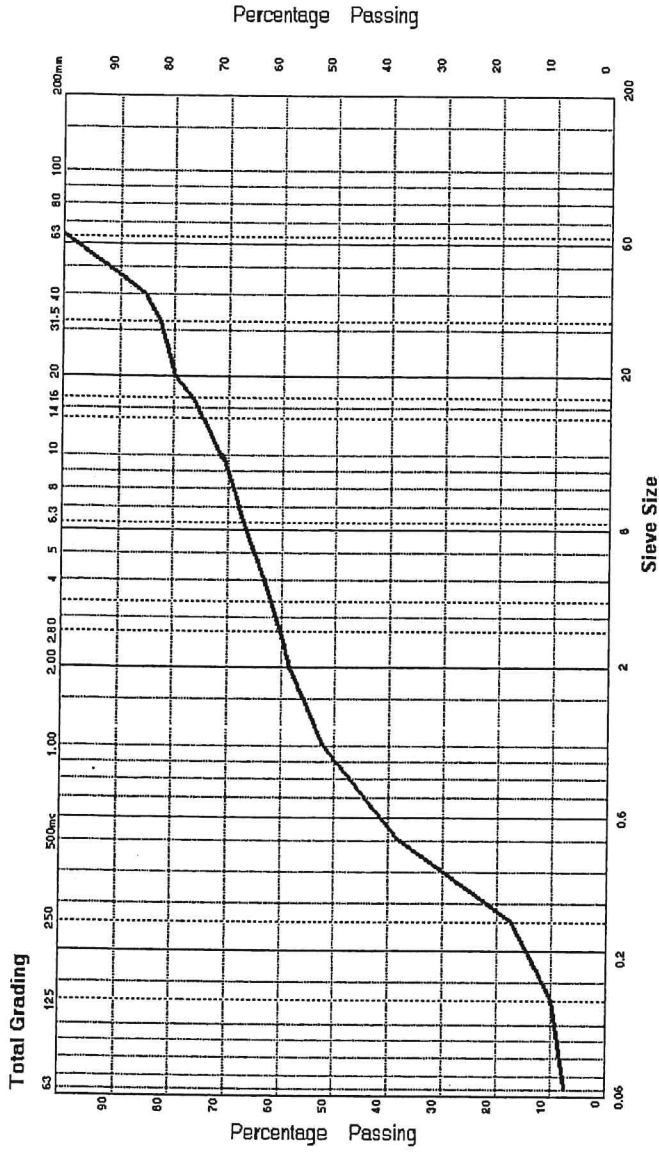
LOCATION : Samlesbury Estate - Preston
 Borehole No. : S/04/2
 Depth (m) : 1.50-3.00

GRADING ANALYSES

Sieve Size	% Passing	Theoretical Sand	
		Inc Silt % Passing	ex Silt % Passing
80mm	100.0	100.0	100.0
63mm	100.0	96.5	96.1
40mm	85.1	92.4	91.4
31.5mm	82.9	82.5	80.3
20mm	79.7	60.9	55.9
16mm	75.9	27.7	18.5
14mm	74.6	16.1	5.4
10mm	71.3	11.3	0.0
8mm	68.8		
6.3mm	66.6		

Compliance
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PARTICLE SIZE DISTRIBUTION



ASSESSMENT

40+	14.9	% Gravel	37.5
20/40 ^b	5.4	% Sand	55.4
10/20 ^b	8.5	% Silt	7.1
4/10 ^b	8.8		

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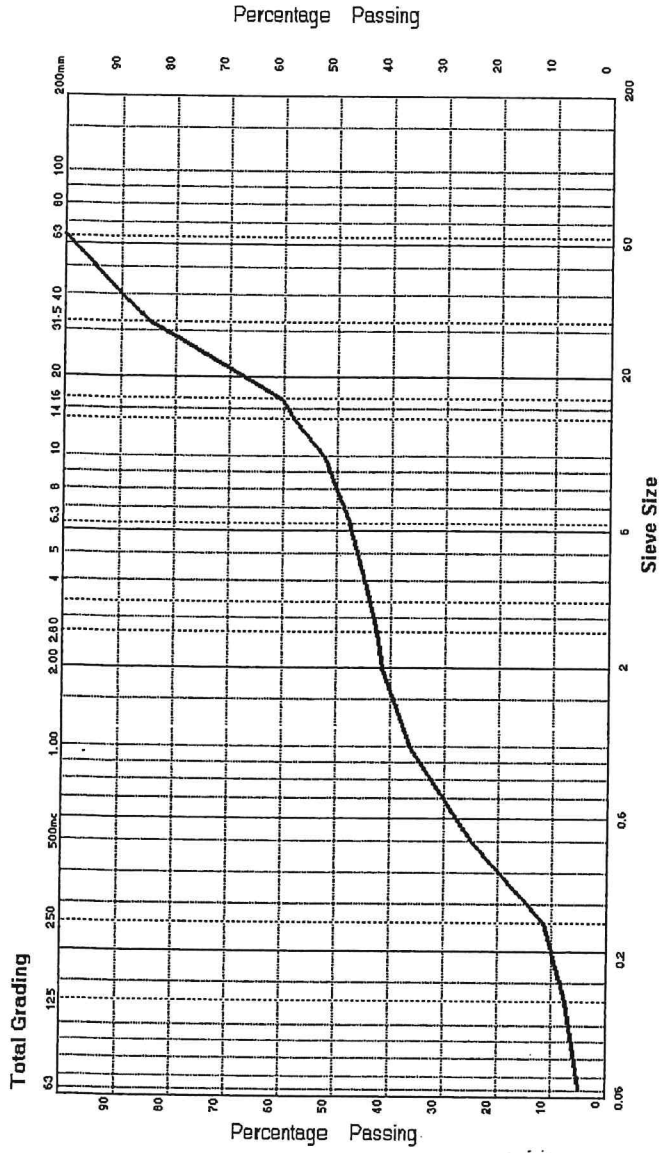
Tel (01832) 273079

LOCATION : Samesbury Estate - Preston
 Borehole No. : S/04/3
 Depth (m) : 3.00-4.50

GRADING ANALYSES

Total Grading	Theoretical Sand		ex Silt
	Sieve Size	% Passing	
80mm	100.0	100.0	100.0
63mm	100.0	96.2	95.8
40mm	89.6	92.1	91.2
31.5mm	84.2	81.4	79.2
20mm	66.9	57.4	52.5
16mm	60.4	25.6	17.1
14mm	57.7	15.2	5.6
10mm	52.4	10.2	0.0
8mm	49.8		
6.3mm	47.6		
4mm	44.1		
2.80mm	42.4		
2.00mm	40.6		
1.00mm	35.9		
500mc	25.3		
250mc	11.3		
125mc	6.7		
63mc	4.5		
Compliance			
EN12620 :MP			

PARTICLE SIZE DISTRIBUTION



ASSESSMENT

	% Gravel	% Sand	% Silt
40+	10.4	22.7	14.5
20/40 ^b	22.7	14.5	8.3
10/20 ^b	14.5	8.3	
4/10 ^b	8.3		
	55.9	39.6	4.5

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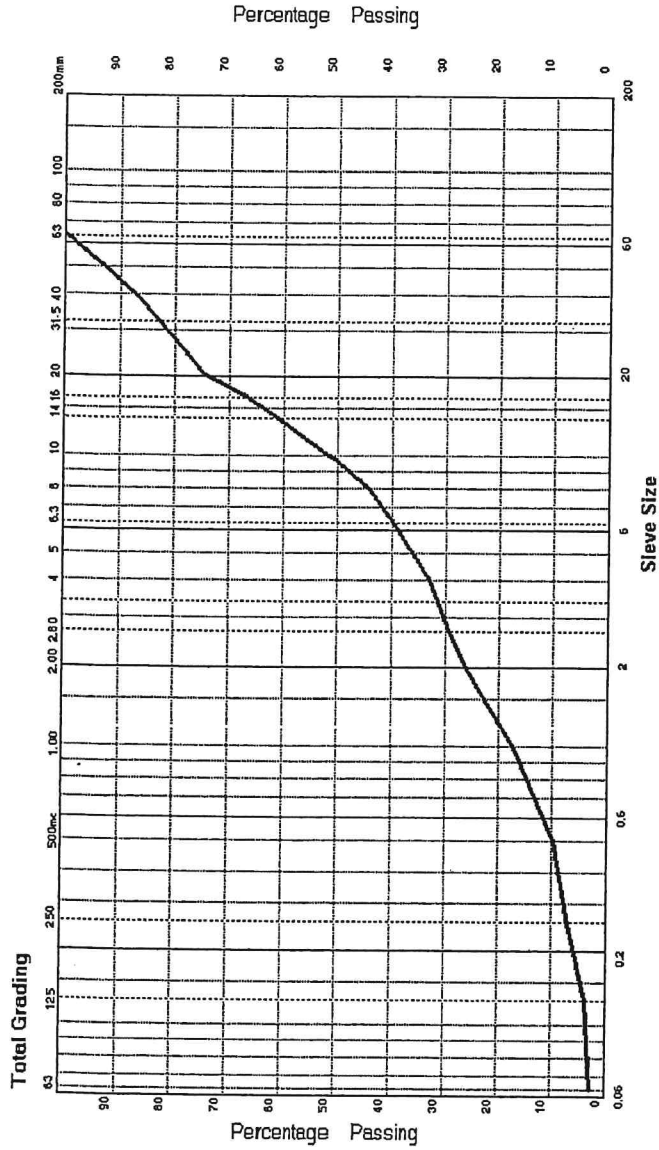
LOCATION : Samesbury Estate - Preston
 Borehole No. : S/05/1
 Depth (m) : 4.00-5.50

GRADING ANALYSES

Sieve Size	% Passing	Theoretical Sand	
		Inc Silt	ex Silt
80mm	100.0	100.0	100.0
63mm	100.0	89.5	88.6
40mm	86.9	77.7	75.9
31.5mm	83.3	52.7	48.7
20mm	73.9	31.1	25.2
16mm	66.4	19.8	13.0
14mm	60.9	12.1	4.7
10mm	51.2	7.8	0.0
8mm	44.4		
6.3mm	39.6		
4mm	32.9		
2.80mm	29.4		
2.00mm	25.6		
1.00mm	17.3		
500mc	10.2		
250mc	6.5		
125mc	4.0		
63mc	2.6		

Compliance
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PARTICLE SIZE DISTRIBUTION



ASSESSMENT

	% Gravel	% Sand	% Silt
40+	13.1	67.1	19.8
20/40 ^b	13.0	30.3	56.7
10/20 ^b	22.7	2.6	74.7
4/10 ^b	18.3	2.6	79.1

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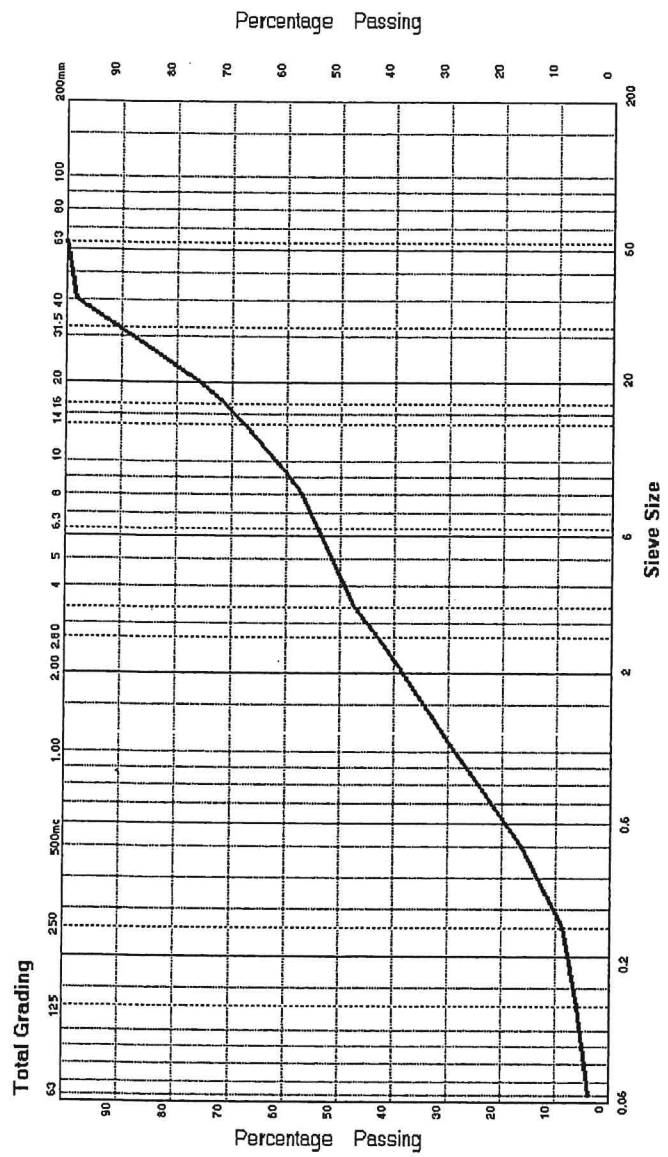
LOCATION : Samesbury Estate - Preston
 Borehole No. : S/05/2
 Depth (m) : 5.50-7.00

GRADING ANALYSES

Total Grading	Sieve Size	% Passing	Theoretical Sand		% Passing	ex Silt
			% Passing	% Passing		
	80mm	100.0	100.0	100.0	100.0	
	63mm	100.0	91.2	90.3	90.3	
	40mm	97.7	82.8	81.1	81.1	
	31.5mm	90.1	61.8	58.1	58.1	
	20mm	75.8	33.3	26.9	26.9	
	16mm	71.2	19.7	11.9	11.9	
	14mm	68.2	12.2	3.7	3.7	
	10mm	61.7	8.8	0.0	0.0	
	8mm	57.0				
	6.3mm	53.5				
	4mm	46.7				
	2.80mm	42.6				
	2.00mm	38.7				
	1.00mm	28.9				
	500mc	15.6				
	250mc	9.2				
	125mc	5.7				
	63mc	4.1				

Compliance
 EN12620 :CP

PARTICLE SIZE DISTRIBUTION



ASSESSMENT

	% Gravel	% Sand	% Silt
40+	2.3	21.8	14.2
20/40 ^b	2.3	21.8	14.2
10/20 ^b	2.3	21.8	14.2
4/10 ^b	2.3	21.8	14.2
	53.3	42.6	4.1

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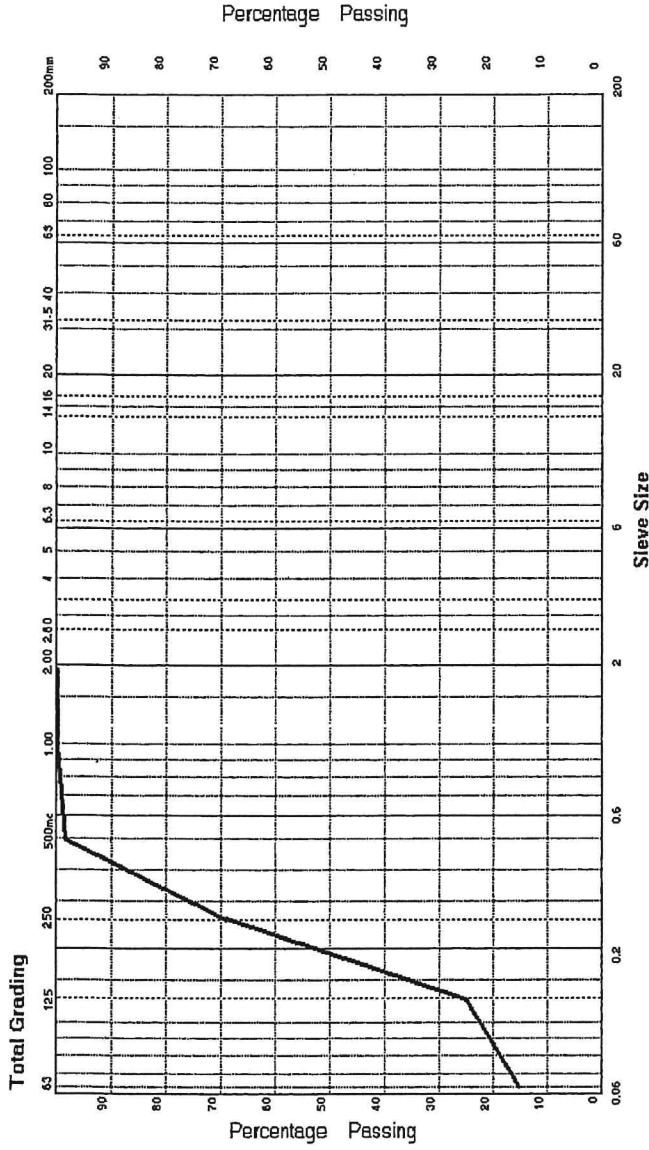
LOCATION : Samlesbury Estate - Preston
Borehole No. : S/07/1
Depth (m) : 0.50-3.00

GRADING ANALYSES

Total Grading	Sieve Size	% Passing	Theoretical Sand	
			Inc Silt % Passing	ex Silt % Passing
	80mm	100.0	100.0	100.0
	63mm	100.0	100.0	100.0
	40mm	100.0	100.0	100.0
	31.5mm	100.0	99.9	99.9
	20mm	100.0	98.0	97.6
	16mm	100.0	68.5	63.0
	14mm	100.0	25.2	12.2
	10mm	100.0	14.9	0.0
	8mm	100.0		
	6.3mm	100.0		
	4mm	100.0		
	2.80mm	100.0		
	2.00mm	100.0		
	1.00mm	99.9		
	500mc	98.0		
	250mc	68.5		
	125mc	25.2		
	63mc	14.9		

Compliance
 EN12620 : FP

PARTICLE SIZE DISTRIBUTION



ASSESSMENT

	% Gravel	% Sand	% Silt
40+	0.0	85.1	14.9
20/40 ^b	0.0	85.1	14.9
10/20 ^b	0.0	85.1	14.9
4/10 ^b	0.0	85.1	14.9

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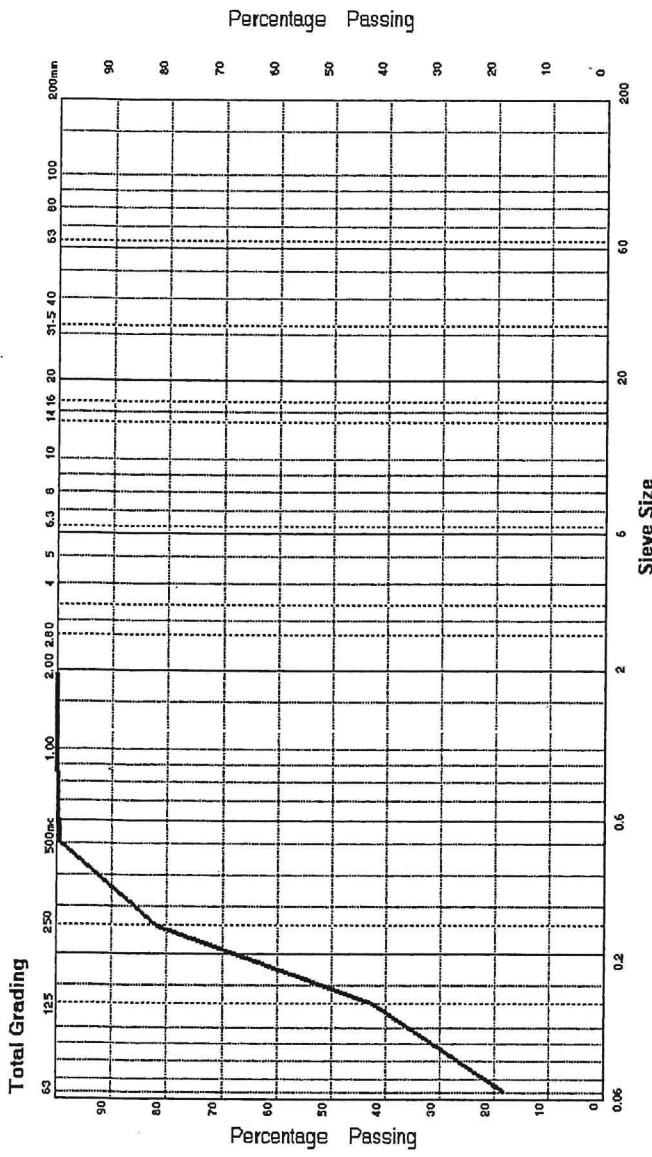
LOCATION : Samesbury Estate - Preston
 Borehole No. : S/07/2
 Depth (m) : 3.00-4.50

GRADING ANALYSES

Sieve Size	% Passing	Theoretical Sand	
		Inc Silt % Passing	ex Silt % Passing
80mm	100.0	100.0	100.0
63mm	100.0	100.0	100.0
40mm	100.0	100.0	100.0
31.5mm	100.0	99.9	99.9
20mm	100.0	99.0	98.7
16mm	100.0	82.3	78.4
14mm	100.0	41.7	28.8
10mm	100.0	18.1	0.0
8mm	100.0		
6.3mm	100.0		
4mm	100.0		
2.80mm	100.0		
2.00mm	100.0		
1.00mm	99.9		
500mc	99.0		
250mc	82.3		
125mc	41.7		
63mc	18.1		

Compliance
 EN12620 : FP

PARTICLE SIZE DISTRIBUTION



ASSESSMENT

40+	0.0	% Gravel	0.0
20/40 ^b	0.0	% Sand	81.9
10/20 ^b	0.0	% Silt	18.1
4/10 ^b	0.0		

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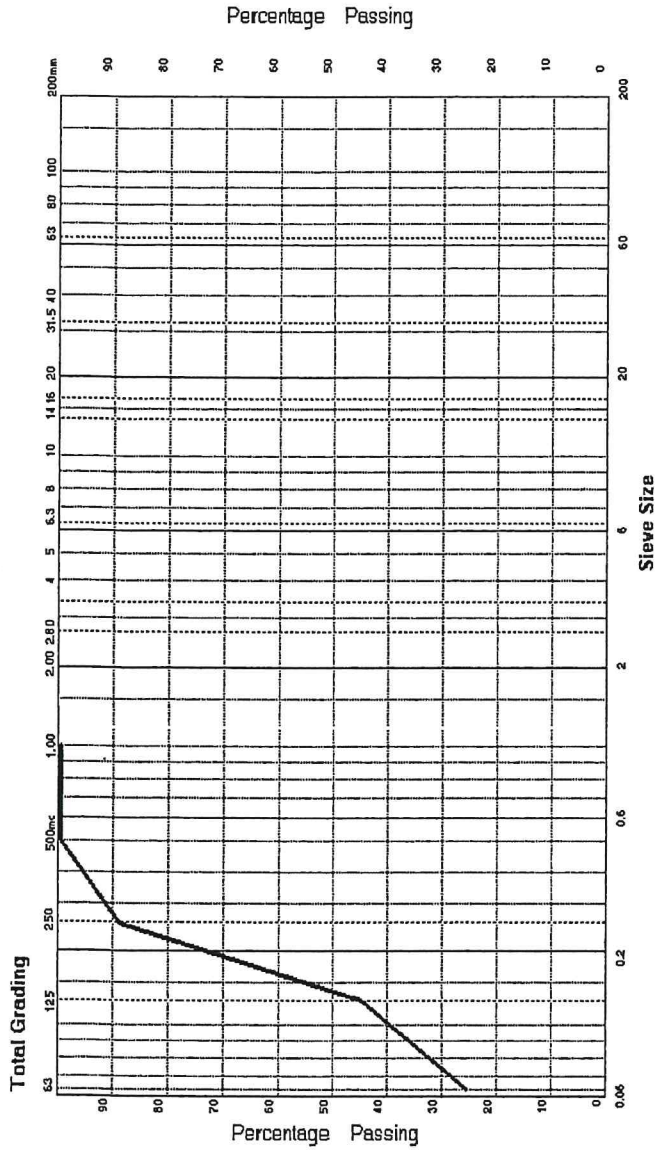
LOCATION : Samesbury Estate - Preston
 Borehole No. : S/08/1
 Depth (m) : 1.90-2.90

GRADING ANALYSES

Sieve Size	% Passing	Theoretical Sand	
		Inc Silt % Passing	ex Silt % Passing
80mm	100.0	100.0	100.0
63mm	100.0	100.0	100.0
40mm	100.0	100.0	100.0
31.5mm	100.0	100.0	100.0
20mm	100.0	99.3	99.1
16mm	100.0	88.8	85.1
14mm	100.0	44.2	26.1
10mm	100.0	24.5	0.0

Compliance
 EN12620 : FP

PARTICLE SIZE DISTRIBUTION



ASSESSMENT

40+	0.0	% Gravel	0.0
20/40 ^b	0.0	% Sand	75.5
10/20 ^b	0.0	% Silt	24.5
4/10 ^b	0.0		

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LOCATION : Samesbury Estate - Preston
 Borehole No. : S/08/2
 Depth (m) : 3.00-4.00

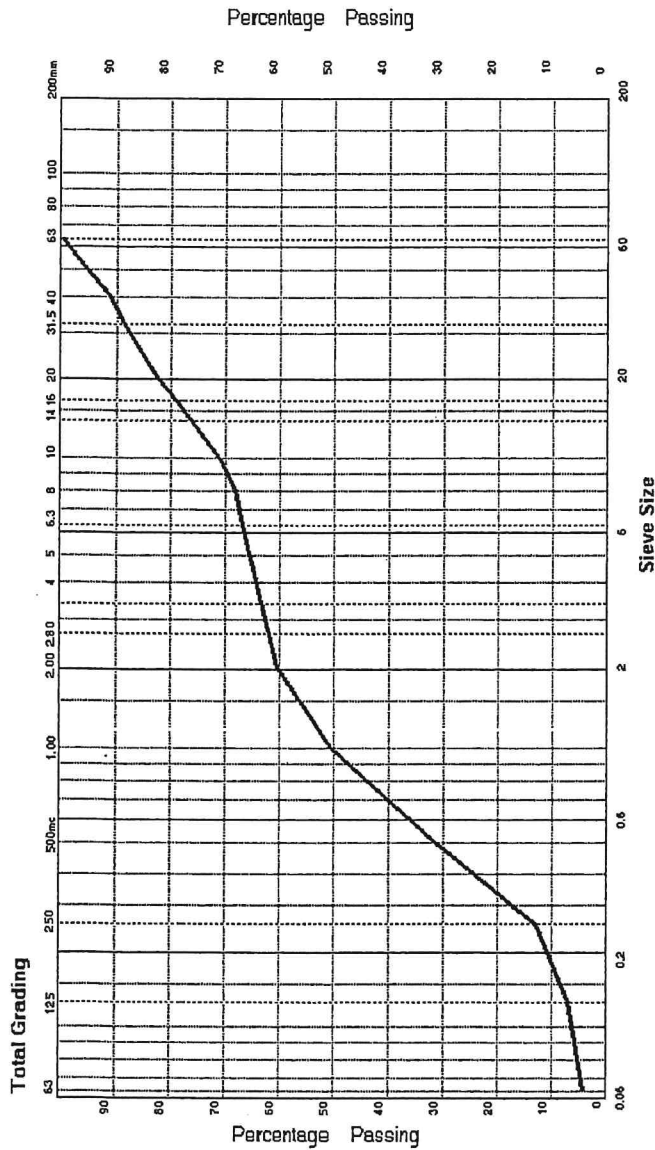
GRADING ANALYSES

Sieve Size	% Passing	Theoretical Sand	
		Inc Silt % Passing	ex Silt % Passing
80mm	100.0	100.0	100.0
63mm	100.0	97.3	97.1
40mm	90.9	93.7	93.3
31.5mm	88.9	77.9	76.4
20mm	81.6	49.5	46.1
16mm	77.8	19.5	14.1
14mm	75.7	10.1	4.1
10mm	71.4	6.3	0.0
8mm	68.3		
6.3mm	66.6		

Compliance

EN12620 : MP

PARTICLE SIZE DISTRIBUTION



ASSESSMENT

40+	9.1	% Gravel	36.2
20/40 ^b	9.4	% Sand	59.8
10/20 ^b	10.1	% Silt	4.0
4/10 ^b	7.6		

M & B Geotechnical Services

Independent Materials Testing Consultancy

Unit 26, Barnwell Workshops, Barnwell

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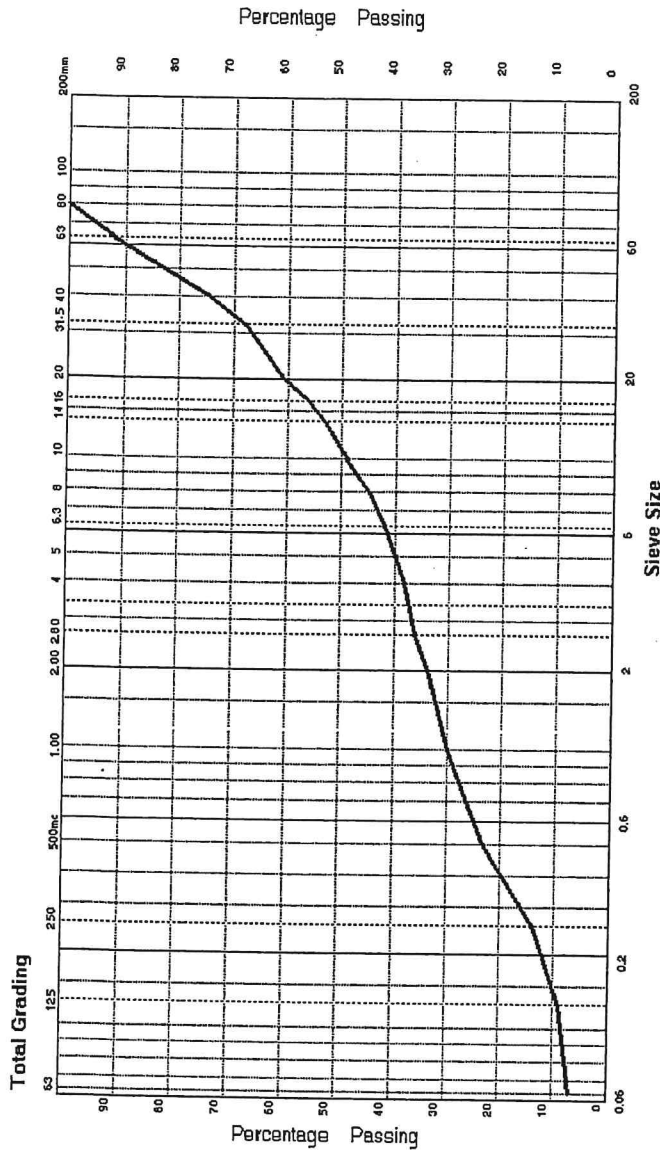
LOCATION : Samlesbury Estate - Preston
 Borehole No. : S/09/2
 Depth (m) : 2.00-3.00

GRADING ANALYSES

Total Grading	Theoretical Sand		ex Silt
	Sieve Size	% Passing	
80mm	100.0	100.0	100.0
63mm	92.1	94.9	93.8
40mm	73.7	89.6	87.2
31.5mm	67.5	78.1	73.0
20mm	60.8	60.4	51.4
16mm	55.5	36.2	21.5
14mm	53.3	24.4	7.0
10mm	48.9	18.7	0.0
8mm	45.2		
6.3mm	42.4		
4mm	37.8		
2.80mm	35.8		
2.00mm	33.8		
1.00mm	29.5		
500mc	22.8		
250mc	13.7		
125mc	9.2		
63mc	7.1		

Compliance
 EN12620 :MP

PARTICLE SIZE DISTRIBUTION



ASSESSMENT

Grading	% Gravel	% Sand	% Silt
40+	26.3	12.9	11.1
20/40 ^b	12.9	11.9	7.1
10/20 ^b	11.9	11.1	7.1
4/10 ^b	11.1	7.1	7.1

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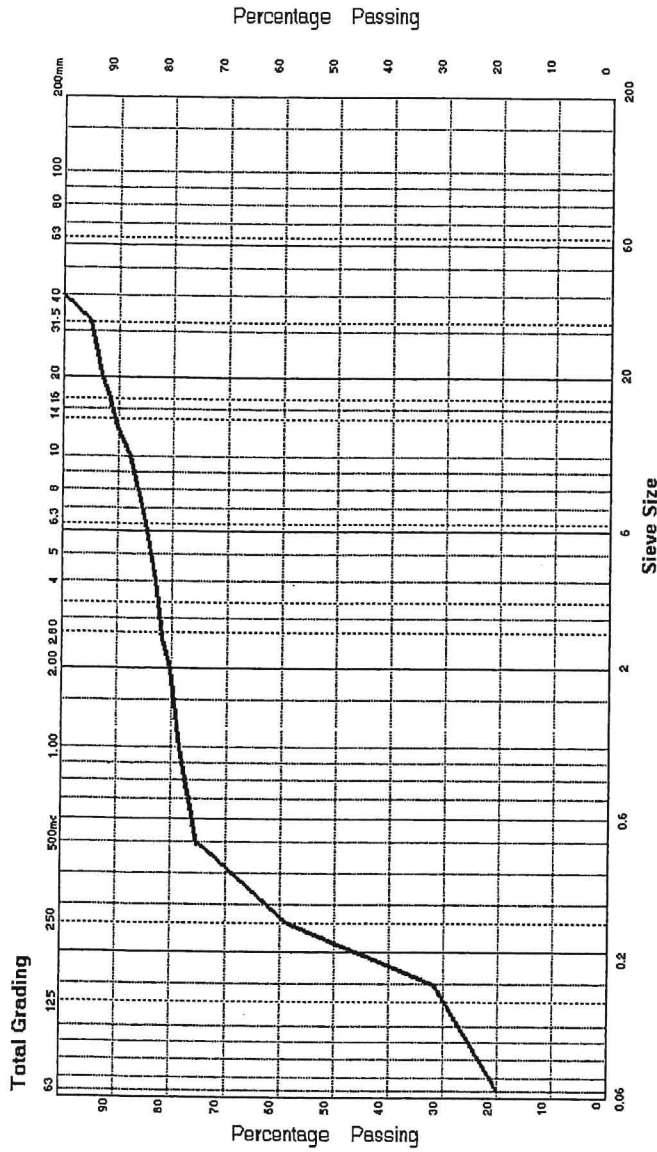
LOCATION : Samesbury Estate - Preston
 Borehole No. : S/09/3
 Depth (m) : 4.50-6.00

GRADING ANALYSES

Sieve Size	% Passing	Theoretical Sand	
		Inc Silt % Passing	ex Silt % Passing
80mm	100.0	100.0	100.0
63mm	100.0	99.0	98.7
40mm	100.0	97.3	96.4
31.5mm	94.1	94.9	93.2
20mm	92.9	90.6	87.6
16mm	91.3	71.0	61.6
14mm	90.8	38.8	18.9
10mm	87.7	24.5	0.0

Compliance
 EN12620 :FP

PARTICLE SIZE DISTRIBUTION



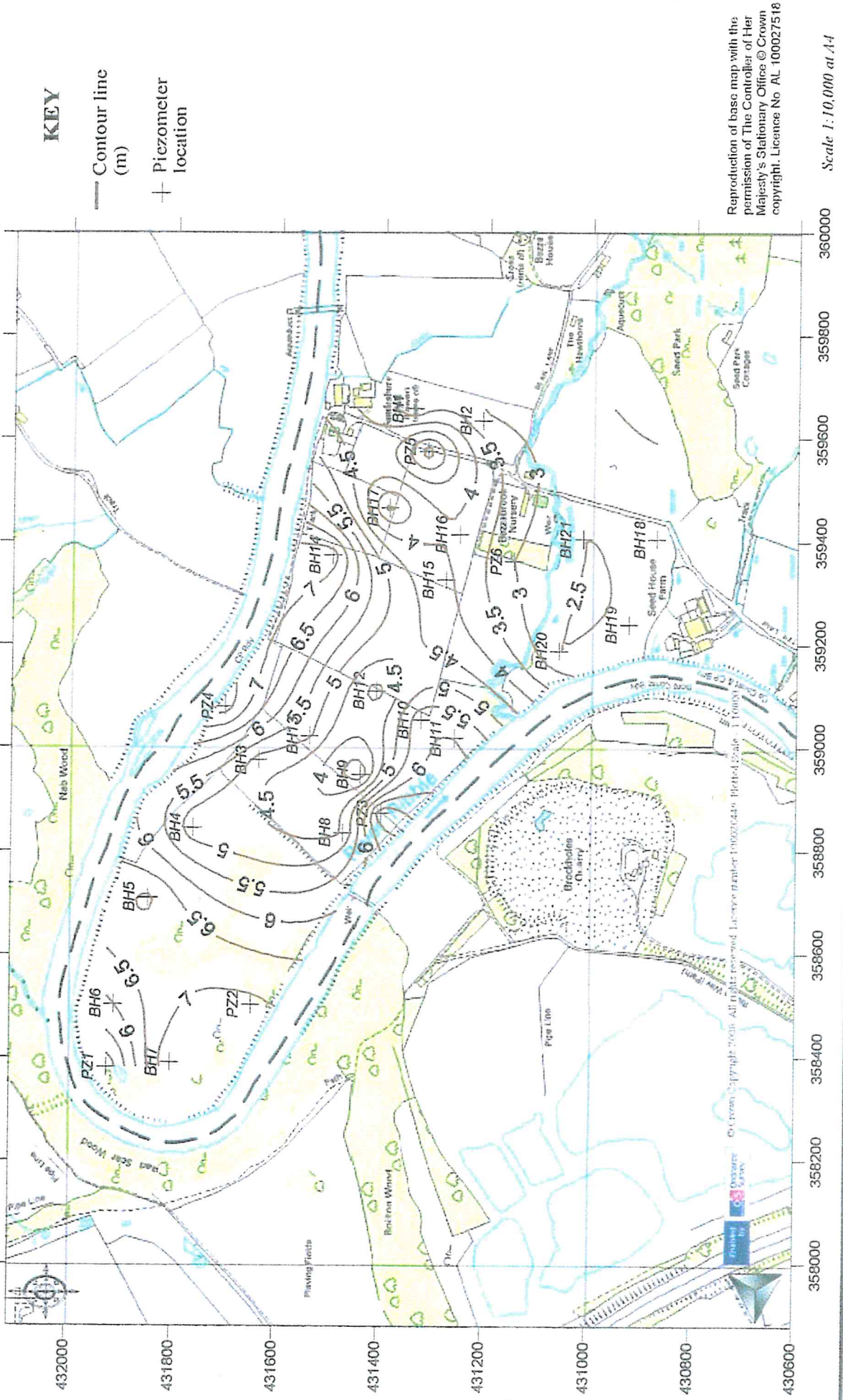
ASSESSMENT

Grading	% Gravel	% Sand	% Silt
40+	0.0	7.1	5.2
20/40 ^b	7.1	5.2	5.1
10/20 ^b	5.2	5.1	
4/10 ^b	5.1		

M & B Geotechnical Services

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KEY

- Contour line (m)
- + Piezometer location

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Scale 1:10,000 at A4

P:\Fox Samlesbury Est (5973)
 Figures\Mineral Thickness Figure 5
 Date: 11/05/09



Fox Samlesbury Estate

Thickness of Mineral Deposit

Figure 5