

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds

Date: 15 September 2015
Test Report Ref: STR 428317

LS15 8GB

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S54309
Client Ref. No:	Perm1/L3/3CF
Date and Time of Sampling:	06/08/2015
Date of Receipt at Lab:	20/08/2015
Date of Start of Test:	26/08/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 428317 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	100 mm	N/A
Height:	98 mm	N/A
Moisture Content:	10.9 %	11.4 %
Bulk density:	2.241 Mg/m ³	2.278 Mg/m ³
Dry density:	2.021 Mg/m ³	2.045 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.62
Final pore pressure coefficient,B:	0.96
Duration of stage:	4 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	4 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	2.3 x 10⁻¹⁰ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds

Date: 15 September 2015
Test Report Ref: STR 428318

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Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S54309
Client Ref. No:	Perm2/L11/3CF
Date and Time of Sampling:	10/08/2015
Date of Receipt at Lab:	20/08/2015
Date of Start of Test:	26/08/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 428318 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	96 mm	N/A
Moisture Content:	12.7 %	13.9 %
Bulk density:	2.215 Mg/m ³	2.312 Mg/m ³
Dry density:	1.965 Mg/m ³	2.030 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.36
Final pore pressure coefficient,B:	1.00
Duration of stage:	2 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	4 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	1.4 x 10⁻¹⁰ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds

Date: 15 September 2015
Test Report Ref: STR 428319

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Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S54309
Client Ref. No:	Perm3/L16/4CF
Date and Time of Sampling:	11/08/2015
Date of Receipt at Lab:	20/08/2015
Date of Start of Test:	26/08/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 428319 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	94 mm	N/A
Moisture Content:	12.5 %	13.3 %
Bulk density:	2.180 Mg/m ³	2.263 Mg/m ³
Dry density:	1.938 Mg/m ³	1.997 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.36
Final pore pressure coefficient,B:	0.96
Duration of stage:	4 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	4 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	9.2 x 10⁻¹¹ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds

Date: 15 September 2015
Test Report Ref: STR 428320

LS15 8GB

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S54309
Client Ref. No:	Perm4/L22/4CF
Date and Time of Sampling:	13/08/2015
Date of Receipt at Lab:	20/08/2015
Date of Start of Test:	26/08/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 428320 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	96 mm	N/A
Moisture Content:	14.1 %	13.3 %
Bulk density:	2.229 Mg/m ³	2.265 Mg/m ³
Dry density:	1.954 Mg/m ³	1.999 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.58
Final pore pressure coefficient,B:	0.98
Duration of stage:	2 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	4 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	6.7 x 10⁻¹¹ m/s

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Leeds

Date: 15 September 2015
Test Report Ref: STR 428321

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Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S54309
Client Ref. No:	Perm5/L26/4CF
Date and Time of Sampling:	17/08/2015
Date of Receipt at Lab:	20/08/2015
Date of Start of Test:	26/08/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 428321 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	102 mm	N/A
Height:	91 mm	N/A
Moisture Content:	11.7 %	12.7 %
Bulk density:	2.300 Mg/m ³	2.361 Mg/m ³
Dry density:	2.059 Mg/m ³	2.095 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.38
Final pore pressure coefficient,B:	0.96
Duration of stage:	4 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	4 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	5.2 x 10⁻¹¹ m/s

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Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55020
Client Ref. No:	Perm6/L28/5CF
Date and Time of Sampling:	18/08/2015
Date of Receipt at Lab:	29/09/2015
Date of Start of Test:	19/10/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Stratus
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: -



Eric Goulden
Technical Manager

Test Report Ref: STR 433677 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	100 mm	N/A
Moisture Content:	10.3 %	10.8 %
Bulk density:	2.209 Mg/m ³	2.252 Mg/m ³
Dry density:	2.003 Mg/m ³	2.032 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.58
Final pore pressure coefficient,B:	0.96
Duration of stage:	3 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	4 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	2.2 x 10⁻¹⁰ m/s

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LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55020
Client Ref. No:	Perm7/L30/5CF
Date and Time of Sampling:	18/08/2015
Date of Receipt at Lab:	29/09/2015
Date of Start of Test:	19/10/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Stratus
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: -



Eric Goulden
Technical Manager

Test Report Ref: STR 433678 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	100 mm	N/A
Height:	99 mm	N/A
Moisture Content:	14.0 %	15.0 %
Bulk density:	2.215 Mg/m³	2.297 Mg/m³
Dry density:	1.943 Mg/m³	1.997 Mg/m³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.40
Final pore pressure coefficient,B:	0.96
Duration of stage:	3 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	4 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	9.2 x 10⁻¹¹ m/s

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Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55020
Client Ref. No:	Perm8/L1/4B
Date and Time of Sampling:	20/08/2015
Date of Receipt at Lab:	29/09/2015
Date of Start of Test:	
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Stratus
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 433679 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	99 mm	N/A
Height:	98 mm	N/A
Moisture Content:	14.8 %	14.7 %
Bulk density:	2.206 Mg/m³	2.287 Mg/m³
Dry density:	1.922 Mg/m³	1.994 Mg/m³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.60
Final pore pressure coefficient,B:	0.96
Duration of stage:	3 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	4 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	5.5 x 10⁻¹¹ m/s

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Thorpe Park
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Date: 24 November 2015
Test Report Ref: STR 433680

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Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55020
Client Ref. No:	Perm9/L4/5B
Date and Time of Sampling:	21/08/2015
Date of Receipt at Lab:	29/09/2015
Date of Start of Test:	19/10/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Stratus
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 433680 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	101 mm	N/A
Moisture Content:	9.7 %	10.7 %
Bulk density:	2.245 Mg/m ³	2.308 Mg/m ³
Dry density:	2.046 Mg/m ³	2.085 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.32
Final pore pressure coefficient,B:	1.00
Duration of stage:	3 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	4 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	4.5 x 10⁻¹⁰ m/s

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Thorpe Park
Leeds
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Date: 24 November 2015
Test Report Ref: STR 433681

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Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55020
Client Ref. No:	Perm10/L4/4B
Date and Time of Sampling:	21/08/2015
Date of Receipt at Lab:	29/09/2015
Date of Start of Test:	19/10/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Stratus
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 433681 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	101 mm	N/A
Moisture Content:	13.8 %	14.2 %
Bulk density:	2.223 Mg/m ³	2.302 Mg/m ³
Dry density:	1.953 Mg/m ³	2.016 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.62
Final pore pressure coefficient,B:	0.96
Duration of stage:	3 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	4 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	6.2 x 10⁻¹¹ m/s

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Date: 24 November 2015
Test Report Ref: STR 433682

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Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55020
Client Ref. No:	Perm11/L1/2GH
Date and Time of Sampling:	24/08/2015
Date of Receipt at Lab:	29/09/2015
Date of Start of Test:	19/10/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Stratus
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 433682 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	100 mm	N/A
Moisture Content:	14.2 %	14.6 %
Bulk density:	2.189 Mg/m ³	2.237 Mg/m ³
Dry density:	1.917 Mg/m ³	1.952 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.62
Final pore pressure coefficient,B:	1.00
Duration of stage:	3 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	2 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	6.9 x 10⁻¹¹ m/s

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Thorpe Park
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Date: 24 November 2015
Test Report Ref: STR 435542

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Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55186
Client Ref. No:	Perm12/L2/3GH
Date and Time of Sampling:	28/09/2015
Date of Receipt at Lab:	08/10/2015
Date of Start of Test:	02/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 435542 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	92 mm	N/A
Moisture Content:	14.9 %	14.8 %
Bulk density:	2.156 Mg/m ³	2.207 Mg/m ³
Dry density:	1.876 Mg/m ³	1.922 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.64
Final pore pressure coefficient,B:	1.00
Duration of stage:	3 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	4 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	8.6 x 10⁻¹¹ m/s

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Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55186
Client Ref. No:	Perm13/L3/3G
Date and Time of Sampling:	29/09/2015
Date of Receipt at Lab:	08/10/2015
Date of Start of Test:	02/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: -



Eric Goulden
Technical Manager

Test Report Ref: STR 435543 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	103 mm	N/A
Moisture Content:	12.2 %	13.8 %
Bulk density:	2.197 Mg/m ³	2.308 Mg/m ³
Dry density:	1.958 Mg/m ³	2.028 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.40
Final pore pressure coefficient,B:	0.96
Duration of stage:	8 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	2 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	8.2 x 10⁻¹¹ m/s

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Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55186
Client Ref. No:	Perm14/L3/3GH
Date and Time of Sampling:	29/09/2015
Date of Receipt at Lab:	08/10/2015
Date of Start of Test:	02/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 435544 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	99 mm	N/A
Moisture Content:	13.8 %	14.0 %
Bulk density:	2.210 Mg/m ³	2.263 Mg/m ³
Dry density:	1.942 Mg/m ³	1.985 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.52
Final pore pressure coefficient,B:	0.96
Duration of stage:	4 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	3 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	6.2 x 10⁻¹¹ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Date: 24 November 2015
Test Report Ref: STR 435881

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55186
Client Ref. No:	Perm15/L4/3GH
Date and Time of Sampling:	29/09/2015
Date of Receipt at Lab:	08/10/2015
Date of Start of Test:	02/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 435881 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	94 mm	N/A
Moisture Content:	14.4 %	13.9 %
Bulk density:	2.199 Mg/m³	2.243 Mg/m³
Dry density:	1.922 Mg/m³	1.969 Mg/m³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.40
Final pore pressure coefficient,B:	0.96
Duration of stage:	3 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	4 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	8.8 x 10⁻¹¹ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Date: 24 November 2015
Test Report Ref: STR 435634

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55256
Client Ref. No:	Perm16/L12/3G
Date and Time of Sampling:	29/09/2015
Date of Receipt at Lab:	12/10/2015
Date of Start of Test:	11/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: -



Eric Goulden
Technical Manager

Test Report Ref: STR 435634 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	100 mm	N/A
Height:	98 mm	N/A
Moisture Content:	12.3 %	12.2 %
Bulk density:	2.301 Mg/m³	2.338 Mg/m³
Dry density:	2.049 Mg/m³	2.084 Mg/m³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.60
Final pore pressure coefficient,B:	0.98
Duration of stage:	2 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	3 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	4.7 x 10⁻¹¹ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Date: 24 November 2015
Test Report Ref: STR 435636

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55256
Client Ref. No:	Perm17/L17/4GH
Date and Time of Sampling:	30/09/2015
Date of Receipt at Lab:	12/10/2015
Date of Start of Test:	11/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: -



Eric Goulden
Technical Manager

Test Report Ref: STR 435636 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	93 mm	N/A
Moisture Content:	12.4 %	12.5 %
Bulk density:	2.205 Mg/m ³	2.262 Mg/m ³
Dry density:	1.962 Mg/m ³	2.011 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.52
Final pore pressure coefficient,B:	0.98
Duration of stage:	6 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	2 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	4.2 x 10⁻¹¹ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Date: 24 November 2015
Test Report Ref: STR 435637

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55256
Client Ref. No:	Perm18/L19/4GH
Date and Time of Sampling:	30/09/2015
Date of Receipt at Lab:	12/10/2015
Date of Start of Test:	11/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 435637 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	95 mm	N/A
Moisture Content:	11.3 %	11.6 %
Bulk density:	2.265 Mg/m ³	2.311 Mg/m ³
Dry density:	2.035 Mg/m ³	2.071 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.52
Final pore pressure coefficient,B:	0.98
Duration of stage:	2 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	3 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	2.7 x 10⁻¹¹ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Date: 24 November 2015
Test Report Ref: STR 435639

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55256
Client Ref. No:	Perm19/L22/4GH
Date and Time of Sampling:	30/09/2015
Date of Receipt at Lab:	12/10/2015
Date of Start of Test:	11/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 435639 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	91 mm	N/A
Moisture Content:	12.1 %	12.4 %
Bulk density:	2.257 Mg/m ³	2.331 Mg/m ³
Dry density:	2.013 Mg/m ³	2.074 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.42
Final pore pressure coefficient,B:	0.96
Duration of stage:	6 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	2 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	3.4 x 10⁻¹¹ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Date: 24 November 2015
Test Report Ref: STR 435640

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55256
Client Ref. No:	Perm20/L24/4GH
Date and Time of Sampling:	30/09/2015
Date of Receipt at Lab:	12/10/2015
Date of Start of Test:	10/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 435640 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	85 mm	N/A
Moisture Content:	12.4 %	12.7 %
Bulk density:	2.261 Mg/m ³	2.336 Mg/m ³
Dry density:	2.012 Mg/m ³	2.073 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.60
Final pore pressure coefficient,B:	0.98
Duration of stage:	7 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	2 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	3.1 x 10⁻¹¹ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Date: 24 November 2015
Test Report Ref: STR 435642

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55256
Client Ref. No:	Perm21/L26/4GH
Date and Time of Sampling:	01/10/2015
Date of Receipt at Lab:	12/10/2015
Date of Start of Test:	10/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 435642 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	88 mm	N/A
Moisture Content:	12.7 %	12.7 %
Bulk density:	2.233 Mg/m ³	2.291 Mg/m ³
Dry density:	1.981 Mg/m ³	2.033 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.74
Final pore pressure coefficient,B:	1.00
Duration of stage:	7 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	2 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	3.6 x 10⁻¹¹ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Date: 24 November 2015
Test Report Ref: STR 435643

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55256
Client Ref. No:	Perm22/L29/4GH
Date and Time of Sampling:	02/10/2015
Date of Receipt at Lab:	12/10/2015
Date of Start of Test:	10/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 435643 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	96 mm	N/A
Moisture Content:	13.1 %	12.8 %
Bulk density:	2.240 Mg/m ³	2.302 Mg/m ³
Dry density:	1.981 Mg/m ³	2.041 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.74
Final pore pressure coefficient,B:	0.98
Duration of stage:	3 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	3 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	5.9 x 10⁻¹¹ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Date: 24 November 2015
Test Report Ref: STR 435645

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55256
Client Ref. No:	Perm23/L32/5GH
Date and Time of Sampling:	05/10/2015
Date of Receipt at Lab:	12/10/2015
Date of Start of Test:	11/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 435645 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	98 mm	N/A
Moisture Content:	12.5 %	12.5 %
Bulk density:	2.267 Mg/m ³	2.315 Mg/m ³
Dry density:	2.015 Mg/m ³	2.058 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.66
Final pore pressure coefficient,B:	0.98
Duration of stage:	6 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	2 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	4.3 x 10⁻¹¹ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Date: 24 November 2015
Test Report Ref: STR 435710

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55256
Client Ref. No:	Perm24/L33/5GH
Date and Time of Sampling:	05/10/2015
Date of Receipt at Lab:	12/10/2015
Date of Start of Test:	11/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 435710 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	85 mm	N/A
Moisture Content:	12.2 %	12.2 %
Bulk density:	2.287 Mg/m ³	2.352 Mg/m ³
Dry density:	2.038 Mg/m ³	2.096 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.64
Final pore pressure coefficient,B:	1.00
Duration of stage:	6 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	2 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	3.7 x 10⁻¹¹ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Date: 24 November 2015
Test Report Ref: STR 435711

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55256
Client Ref. No:	Perm25/L34/5GH
Date and Time of Sampling:	05/10/2015
Date of Receipt at Lab:	12/10/2015
Date of Start of Test:	10/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 435711 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	96 mm	N/A
Moisture Content:	12.2 %	12.5 %
Bulk density:	2.212 Mg/m ³	2.261 Mg/m ³
Dry density:	1.971 Mg/m ³	2.010 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.56
Final pore pressure coefficient,B:	1.00
Duration of stage:	3 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	3 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	3.9 x 10⁻¹¹ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Date: 25 November 2015
Test Report Ref: STR 436389

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55323
Client Ref. No:	Perm26/L1/3CF
Date and Time of Sampling:	01/10/2015
Date of Receipt at Lab:	15/10/2015
Date of Start of Test:	12/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 436389 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	99 mm	N/A
Moisture Content:	11.7 %	12.2 %
Bulk density:	2.272 Mg/m³	2.323 Mg/m³
Dry density:	2.033 Mg/m³	2.070 Mg/m³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.48
Final pore pressure coefficient,B:	0.96
Duration of stage:	4 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	2 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	8.0 x 10⁻¹¹ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Date: 25 November 2015
Test Report Ref: STR 436434

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55323
Client Ref. No:	Perm27/L3/3CF
Date and Time of Sampling:	01/10/2015
Date of Receipt at Lab:	15/10/2015
Date of Start of Test:	12/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 436434 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	95 mm	N/A
Moisture Content:	10.9 %	11.4 %
Bulk density:	2.301 Mg/m ³	2.337 Mg/m ³
Dry density:	2.075 Mg/m ³	2.098 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.30
Final pore pressure coefficient,B:	0.96
Duration of stage:	6 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	3 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	6.1 x 10⁻¹¹ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Date: 25 November 2015
Test Report Ref: STR 436435

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Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55323
Client Ref. No:	Perm28/L38/5GH
Date and Time of Sampling:	08/10/2015
Date of Receipt at Lab:	15/10/2015
Date of Start of Test:	12/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: -



Eric Goulden
Technical Manager

Test Report Ref: STR 436435 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	100 mm	N/A
Moisture Content:	11.3 %	12.0 %
Bulk density:	2.255 Mg/m ³	2.314 Mg/m ³
Dry density:	2.027 Mg/m ³	2.066 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.46
Final pore pressure coefficient,B:	0.98
Duration of stage:	4 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	3 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	8.4 x 10⁻¹¹ m/s

Stratus Environmental Limited
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Thorpe Park
Leeds
LS15 8GB

Date: 25 November 2015
Test Report Ref: STR 436436

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55323
Client Ref. No:	Perm29/L1/3CF
Date and Time of Sampling:	08/10/2015
Date of Receipt at Lab:	15/10/2015
Date of Start of Test:	12/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: -



Eric Goulden
Technical Manager

Test Report Ref: STR 436436 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	101 mm	N/A
Moisture Content:	12.1 %	12.6 %
Bulk density:	2.249 Mg/m ³	2.299 Mg/m ³
Dry density:	2.007 Mg/m ³	2.042 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.54
Final pore pressure coefficient,B:	0.98
Duration of stage:	4 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	4 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	1.2 x 10⁻¹⁰ m/s

Stratus Environmental Limited
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Leeds
LS15 8GB

Date: 25 November 2015
Test Report Ref: STR 436437

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55323
Client Ref. No:	Perm30/L3/3CF
Date and Time of Sampling:	09/10/2015
Date of Receipt at Lab:	15/10/2015
Date of Start of Test:	12/11/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Core Cutter
Sampled By:	Client
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

None

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 436437 - Page 2 of 2

TEST RESULTS

Sample condition: **Undisturbed**

Method of Remoulding (If applicable): **N/A**

Specimen Details:	Initial:	Final:
Diameter:	103 mm	N/A
Height:	101 mm	N/A
Moisture Content:	10.4 %	11.5 %
Bulk density:	2.298 Mg/m ³	2.345 Mg/m ³
Dry density:	2.081 Mg/m ³	2.103 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.36
Final pore pressure coefficient,B:	0.96
Duration of stage:	6 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	3 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	7.9 x 10⁻¹¹ m/s

Stratus Environmental Limited
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Thorpe Park
Leeds
LS15 8GB

Date: 25 November 2015
Test Report Ref: STR 433683

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55020
Client Ref. No:	Bulk 1
Date and Time of Sampling:	28/09/2015
Date of Receipt at Lab:	29/09/2015
Date of Start of Test:	28/10/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Disturbed Bulk Sample
Sampled By:	Stratus
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

Remoulded at 10% moisture content

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: - 

Eric Goulden
Technical Manager

Test Report Ref: STR 433683 - Page 2 of 2

TEST RESULTS

Sample condition: **Remoulded**

Method of Remoulding (If applicable): **2.5kg rammer**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	99 mm	N/A
Moisture Content:	10.4 %	14.4 %
Bulk density:	2.244 Mg/m ³	2.382 Mg/m ³
Dry density:	2.033 Mg/m ³	2.082 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.10
Final pore pressure coefficient,B:	0.96
Duration of stage:	7 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	4 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	7.3 x 10⁻¹¹ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Date: 25 November 2015
Test Report Ref: STR 433684

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55020
Client Ref. No:	Bulk 1
Date and Time of Sampling:	28/09/2015
Date of Receipt at Lab:	29/09/2015
Date of Start of Test:	28/10/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Disturbed Bulk Sample
Sampled By:	Stratus
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

Remoulded at 11% moisture content

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: -



Eric Goulden
Technical Manager

Test Report Ref: STR 433684 - Page 2 of 2

TEST RESULTS

Sample condition: **Remoulded**

Method of Remoulding (If applicable): **2.5kg rammer**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	99 mm	N/A
Moisture Content:	11.2 %	14.6 %
Bulk density:	2.241 Mg/m ³	2.400 Mg/m ³
Dry density:	2.015 Mg/m ³	2.094 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.12
Final pore pressure coefficient,B:	1.00
Duration of stage:	6 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	4 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	5.1 x 10⁻¹¹ m/s

Stratus Environmental Limited
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Date: 25 November 2015
Test Report Ref: STR 433685

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55020
Client Ref. No:	Bulk 2
Date and Time of Sampling:	28/09/2015
Date of Receipt at Lab:	29/09/2015
Date of Start of Test:	28/10/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Disturbed Bulk Sample
Sampled By:	Stratus
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

Remoulded at 10% moisture content

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: -



Eric Goulden
Technical Manager

Test Report Ref: STR 433685 - Page 2 of 2

TEST RESULTS

Sample condition: **Remoulded**

Method of Remoulding (If applicable): **2.5kg rammer**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	99 mm	N/A
Moisture Content:	10.3 %	14.9 %
Bulk density:	2.216 Mg/m ³	2.391 Mg/m ³
Dry density:	2.009 Mg/m ³	2.081 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.08
Final pore pressure coefficient,B:	0.98
Duration of stage:	7 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	4 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	9.7 x 10⁻¹¹ m/s

Stratus Environmental Limited
4245 Park Approach
Thorpe Park
Leeds
LS15 8GB

Date: 25 November 2015
Test Report Ref: STR 433686

Page 1 of 2

Contract: Hafod Landfill - Cell 4 Phase 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Coefficient of Permeability under constant head conditions in a Triaxial Cell in accordance with **BS 1377: Part 6 : 1990 : Clause 6.**

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S55020
Client Ref. No:	Bulk 2
Date and Time of Sampling:	28/09/2015
Date of Receipt at Lab:	29/09/2015
Date of Start of Test:	28/10/2015
Sampling Location:	Unknown
Name of Source:	Unknown
Method of Sampling:	Disturbed Bulk Sample
Sampled By:	Stratus
Material Description:	Red/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

See attached

Comments

Remoulded at 11% moisture content

Certificate
Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by: -



Eric Goulden
Technical Manager

Test Report Ref: STR 433686 - Page 2 of 2

TEST RESULTS

Sample condition: **Remoulded**

Method of Remoulding (If applicable): **2.5kg rammer**

Specimen Details:	Initial:	Final:
Diameter:	101 mm	N/A
Height:	99 mm	N/A
Moisture Content:	11.2 %	14.2 %
Bulk density:	2.235 Mg/m ³	2.326 Mg/m ³
Dry density:	2.010 Mg/m ³	2.037 Mg/m ³

Saturation stage: **Performed in accordance with clause 5.4.3 - Saturation by increments of cell pressure and back pressure.**

Initial pore pressure coefficient,B:	0.14
Final pore pressure coefficient,B:	1.00
Duration of stage:	6 days

Consolidation stage:

Effective pressure:	100 kPa
Duration of stage:	3 days

Permeability stage:

Pressure difference across specimen:	20 kPa
Mean effective stress:	90 kPa
Duration of stage	2 days
Coefficient of Permeability (k_v) at 20°C =	9.3 x 10⁻¹¹ m/s