

Repository Development Programme

Tranche 1

Design Package 1 – Surcharge and Profile Fill

Earthworks Specification

August 2026



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Earthworks Specification

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Quality information

Prepared by



Bruce Shearer
Principal Geotechnical
Engineer

Checked by



David Raeside
Associate

Verified by

Digitally signed by
Christian, Scott
DN: cn=Christian, Scott,
ou=AECOMUsers
Reason: I have reviewed
this document
Date: 2026.09.03 10:20:28
+01'00'



Scott Christian
Lead Verifier

Approved by

Digitally signed by
Jenkinson, Andrew
DN: cn=Jenkinson,
Andrew, ou=AECOMUsers
Date: 2026.09.03 10:23:10
+01'00'



Andrew Jenkinson
Project Manager

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0	1	Richard Blackwell – Senior RDP CS&A Responsible Engineer, LLWR

Document Acceptance

Accepted by:	Position	Signature	Date
Richard Blackwell	Senior RDP CS&A Responsible Engineer, LLWR		Digitally signed by Richard Blackwell Date: 2026.09.03 15:35:16 +01'00'

Prepared for:

LLW Repository Ltd

Prepared by:

AECOM Limited
Tanyard Suite, Fleswick Court
Westlakes Science & Technology Park
Moor Row CA24 3HX
United Kingdom

T: +44 (1946) 517 530
aecom.com

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Preamble

The works covered by this specification are limited to the placement of profile fill and surcharge material over the Northern Trenches and Vault 8. Prior to these works the Contractor is required to complete the following on the Northern Trenches; a topsoil strip, puncturing of the existing membrane and proof-rolling of formation level prior to placement of any fill material. Prior to the works over Vault 8, the contractor is required to complete the works associated with the void filling operations.

An observational monitoring system is also to be installed within the Interim Cap material, over each of the trenches and along the shoulders between each trench, to determine the rate and extent of settlement following the application of the Profile Fill and Surcharge material. These works are included within Design Package 9. Further observational monitoring shall be undertaken within a trial area over the containers within Vault 8.

The placement of profile fill/surcharge material shall take place not more than 5 working days following the topsoil strip in order to minimise the area of the Interim Cap exposed to water ingress (e.g. from precipitation).

The Contractor shall provide a detailed method statement and programme of works linked to specific areas to cover the above activities.

The works are specified in accordance with Manual of Contract Documents for Highway Works (MCHW) Volume 1 Specification for Highway Works (SHW) Series 600 – Earthworks, published 28/02/2017. reference should be made to this version and not the current published version.

The Specification for this Contract is the Design Manual for Roads and Bridges – Specification for Highway Works.

Appendix 0/3 – List of Numbered Appendices Referred to in the Specifications and Included in the Contract

Appendix 0/3 is comprised of two lists, A and B, of numbered Appendices as follows: -

List A is a list of the Numbered Appendices referred to in the Specification for Highway Works. Those not referred to below are not used in this contract.

List B is a list of contract specific Numbered Appendices devised for the Contract.

LIST A: LIST OF NUMBERED APPENDICES REFERRED TO IN THE SPECIFICATION FOR HIGHWAY WORKS AND INCLUDED IN THE CONTRACT

Appendix Number	Title
Appendix 0/3	List of Numbered Appendices Referred to in the Specifications and Included in this Contract
Appendix 0/4	List of Drawings Included in the Contract
Appendix 1/5	Testing to be performed by the Contractor
Appendix 2/2	Filling of Trenches and Pipes
Appendix 2/5	Hazardous Materials
Appendix 2/6	Site Clearance Environmental Requirements

Earthworks

Appendix 6/1	Requirement for Acceptability and Testing etc. of Earthwork Materials
Appendix 6/2	Requirements for Dealing with Class U1B and U2 Unacceptable Material
Appendix 6/3	Requirements for Excavation, Deposition, Compaction (Other than Dynamic Compaction)
Appendix 6/4	Requirements for Class 3 Material
Appendix 6/5	Geotextiles Used to Separate Earthworks
Appendix 6/6	Fill to Structures and Fill above Structures Foundations
Appendix 6/7	Sub-Formation and Capping and Preparation and Surface Treatment of Formation
Appendix 6/8	Topsoiling
Appendix 6/9	Earthworks Environmental Bunds, Landscape Materials, Strengthened Embankments
Appendix 6/10	Ground Anchorages, Crib Walling and Gabions
Appendix 6/11	Swallow Holes & Other Naturally Occurring Cavities & Disused Mine Workings
Appendix 6/12	Instrumentation and Monitoring
Appendix 6/13	Ground Improvement
Appendix 6/14	Limiting Values for Pollution of Controlled Waters
Appendix 6/15	Limiting Values for Harm to Human Health and the Environment

LIST B: LIST OF CONTRACT-SPECIFIC NUMBERED APPENDICES DEvised FOR THE CONTRACT

Not Required.

Appendix 0/4 – List of Drawings

Drawing Number Drawing Title

RD289	DP1d Cut-Off Wall General arrangement
RD317	DP3 Monitoring Infrastructure Sheet 1
RD654	Existing Trench and Vault 8 Layout
RD655	Proposed Surcharge & Profile Fill – General Layout and Sequencing
RD656	Profile Fill – Trenches – General Layout
RD657	Profile Fill – Trenches – Cross Sections Sheet 1 of 2
RD658	Profile Fill – Trenches – Cross Sections Sheet 2 of 2
RD659	Surcharge – Trenches – General Layout
RD660	Surcharge – Trenches – Cross Sections Sheet 1 of 2
RD661	Surcharge – Trenches – Cross Sections Sheet 2 of 2
RD662	Profile Fill – Vault 8 – General Layout
RD663	Profile Fill – Vault 8 – Cross Sections Sheet 1 of 2
RD664	Profile Fill – Vault 8 – Cross Sections Sheet 2 of 2
RD746	Profile and Surcharge Earthworks Details
RD 974	DP3 Cover and Install Logger with Networks
RD1182	Cut off Wall Monitoring Infrastructure - Protect and Extend Design
RD1190	DP3 Construction Phase 2 - Commencement of Tranche 1 and Prior to Other Design Packages Sheet 1
RD1236	Observational Settlement Monitoring – Vault 8 – Sheet 1 of 3
RD1237	Observational Settlement Monitoring – Vault 8 – Sheet 2 of 3
RD1238	Observational Settlement Monitoring – Vault 8 – Sheet 3 of 3
RD1240	Observational Settlement Monitoring - Northern Trenches - Sheet 1
RD1241	Observational Settlement Monitoring - Northern Trenches - Sheet 2
RD1242	Observational Settlement Monitoring - Northern Trenches - Sheet 3
RD1243	Observational Settlement Monitoring - Northern Trenches - Sheet 4
RD1244	Observational Settlement Monitoring - Northern Trenches - Sheet 5
RD1245	Observational Settlement Monitoring - Northern Trenches - Sheet 6
RD1246	Observational Settlement Monitoring - Northern Trenches - Sheet 7
RD1269	Tranche 1 - Extent of Surcharging
RD1285	Northern Trenches Sensor Coordinates
RD1359	Tennis Court PCM Waste Plan
RD1360	Tennis Court PCM Waste Sections
RD1364	LLWR Tranche 1 Phase 2 Plan of PCM Waste over Vault 8
RD1365	LLWR Tranche 1 Phase 2 PCM Waste over Vault 8 Section
RD1620	DP1b Northern Trenches Drainage Enabling Works



Document title	Document ref
Designers Risk Assessment	AEC-RDP-T1.00-RA-013
DP1 CQA Requirements	AEC-RDP-T1.00-RP-192
Civils 3D Models	AEC-RDP-T1.00-MOD-019 / B1445-ACM-276-XX-M3-C-1003 (Surcharge_V8S1) AEC-RDP-T1.00-MOD-020 / B1445-ACM-276-XX-M3-C-1004 (Surcharge_V8S2) AEC-RDP-T1.00-MOD-021 / B1445-ACM-276-XX-M3-C-1005 (Surcharge_V8S3) AEC-RDP-T1.00-MOD-022 / B1445-ACM-276-XX-M3-C-1006 (Surcharge_Trenches) AEC-RDP-T1.00-MOD-039 / B1445-ACM-276-XX-M3-C-1022 (Void Fill Surfaces) B1445-ACM-276-XX-M3-C-1025 (Mag Bag Void Fill - Tennis Court) B1445-ACM-276-XX-M3-C-1026 (Mag Bag Void Fill - Vault 8) B1445-ACM-276-XX-M3-C-1027 (V8 Void Fill Surfaces by Vault C3D) B1445-ACM-276-XX-M3-C-1028 (V8 Void Fill Surface - 6 Stack C3D) B1445-ACM-276-XX-M3-C-1029 (V8 Void Fill Slopes by Vault Bay C3D) B1445-ACM-276-XX-M3-C-1030 (Mag Bag Running Surface - Vault 8) B1445-ACM-276-XX-M3-C-1031 (Mag Bag Running Surface - 6 Stack) B1445-ACM-276-XX-M3-C-1032 (Mag Running Surface Slopes) B1445-ACM-276-XX-M3-C-1033 (DP1 Proposed Cut Off Wall) B1445-ACM-276-XX-M3-C-1037 (DP1 Full Starter Layer) B1445-ACM-276-XX-M3-C-1038 (Class 2 Material)
Surcharge & Profile Fill Calculations	AEC-RDP-T1.00-CAL-009

Appendix 1/5 – Testing to be performed by the Contractor

General

1. This Specification applies to the DP1 Profile and Surcharge Fill construction, refer to Drawings and models listed in Appendix 0/4 for locations and details of the works.
2. The Contractor shall undertake all testing described in Table 1/1.1 below and provide details of their proposed testing programme and frequency for any equivalent work, goods or materials proposed by the Contractor.
3. Unless otherwise stated, all sampling and testing shall be carried out by the Contractor, except where products are imported with Quality Assurance Certificate complying with European Standards or having a product acceptance scheme in accordance with 100 series of MCHW, which do not need to be retested by the Contractor.
4. Tests comparable to those specified in this Appendix will be necessary for any equivalent work, goods or material proposed by the Contractor.
5. Unless otherwise stated, test certificates for works, goods or materials as scheduled under any Clause are required for all such works, goods or materials in the Works.
6. Test certificates are required to be submitted 7 days prior to use of the applicable material.
7. Testing shall be carried out immediately after sampling and a copy of the results shall be passed to the CQA Engineer within 24 hours of the completion of each test.
8. Within 10 days of substantial completion of the contract a copy of all certificates and test results shall be bound together and submitted to the CQA Engineer.
9. The Contractor shall carry out additional testing as and when instructed by the CQA Engineer.
10. (N) indicates that a United Kingdom Accreditations Service (UKAS) accredited laboratory sampling and test report or certificate is required.
11. Field dry density measurements made using a nuclear density gauge are required to be calibrated prior to works and every 50 measurements using field sand replacements test or laboratory calibration box.
12. The Contractor shall allow the Overseeing Organisation every reasonable opportunity and facility to inspect and monitor all the sampling and testing. The Contractor shall notify the Overseeing Organisation of whom, where and samples and testing are being carried out and be able to demonstrate that the UKAS accreditation required above is being complied with.
13. If additional sampling and testing is required in excess of that specified in this Appendix 1/5 or elsewhere in the Specifications due to non-compliance; then the additional cost of additional sampling and testing shall be borne by the Contractor.
14. The Contractor shall ensure the timely undertaking of all testing, submission of all results to the CQA Engineer and a daily basis list of all samples / tests taken that day.
15. Record of all test results shall be maintained by the Contractor and copies shall be made available to the CQA Engineer when required.
16. Due to the Client's proposed importation of material strategy, the Contractor is requested to submit test results from the source prior to importing material to site as well as testing required at the point of deposition as stated in Table 1/5.1.

17. Where materials are known to be marginal or if initial test results show them to be such, the frequency of testing should be increased. Conversely where material properties are consistently in excess of specified minimum requirements or well below specified maximum limits, then the frequency of testing should be reduced. (N) indicates UKAS accreditation or equivalent.
18. Granular surcharge material placed over the trenches which is to be re-used as profile fill over the vaults will be assessed and may require to be re-tested. LLWR may relax the extent of testing required following an assessment of the material to be reused. As a minimum, it is anticipated that surcharge material will require moisture content and/or MCV (depending on material and suitability for testing) re-testing at the point of deposition as profile fill.
19. Non-calcareous aggregate (Aggregate containing less than 5% calcium carbonate, by mass, determined in accordance with BS1377 Part 3 [2021], Section 8) Testing on material required to be non-calcareous shall be undertaken at a minimum rate of 3 per source for approval prior to import and then at a rate of 1 per 5,000m³ during placement.
20. Material to be used as profile fill and running surface, below the final cap, shall comply with the stated pH level requirements. The testing of pH levels is to be of a soil suspension (30-35g soil sample in 75ml of distilled/de-ionized water for at least 8hrs) of less than 9 (determined in accordance with BS1377 Part 3 [2021], Section 12) undertaken at the frequency stated in Table 1/5.1 below.

Table 1/5.1: Material Testing

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 300					
306	Permanent fencing				Quality management scheme applies
308	Gates and stiles				Quality management scheme applies
Series 500					
501	Pipes for drainage and service ducts Vitrified Clay Concrete PC/SRC (not exceeding 900mm dia.) Iron cast Iron ductile PVC-U GRP Plastics. See table 5/1			Required	Product certification scheme applies
	Other				BAA certificate (or equivalent) applies
503	Pipe bedding	Grading and fines Content (N)	1 per 1,000m ³ per source and a min of 3 per source prior to import and as requested during placement	Required	
		Water-soluble sulphate (WS) content (N)	1 per 2,000m ³ or a minimum of 3 per source prior to import and as requested during placement		
		Oxidisable sulfides (OS) content and total potential sulfate (TPS) content (N)	1 per 2,000m ³ or a minimum of 3 per source prior to import and as requested during placement		
		Resistance to Fragmentation (N)	1 per 2,000m ³ or a minimum of 3 per source prior to import and as requested during placement		LA Category
		Test Suites as Appendix 6/14 (N)	1 per 2,000m ³ or a minimum of 3 per source prior to import and as requested during placement		Geochemical testing for soil and leachates refer to Appendix 6/14 for details.
505	Filter medium backfill	Plastic index (N)	1 per 2,000m ³ or a minimum of 3 per source prior to import and as requested during placement	Required	
		Resistance to Fragmentation (N)	1 per 2,000m ³ or a minimum of 3 per source prior to import and as requested during placement		LA Category

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
		Water-soluble sulphate (WS) content (N)	1 per 2,000m ³ or a minimum of 3 per source prior to import and as requested during placement		
		Oxidisable sulfides (OS) content and total potential sulfate (TPS) content (N)	1 per 2,000m ³ or a minimum of 3 per source prior to import and as requested during placement		
		Grading (N)	1 per 1,000m ³ per source and a min of 3 per source prior to import and as requested during placement		
		Permeability (N)	See Comments		Only required on request
		Test Suites as Appendix 6/14 (N)	1 per 2,000m ³ or a minimum of 3 per source prior to import and as requested during placement		Geochemical testing for soil and leachates refer to Appendix 6/14 for details.
		pH	Minimum of 3 per source prior to import and 1 per 5,000 m ³ during placement		Required where Type B filter stone used as running surface
507	Chambers				
	Precast concrete				Product certification scheme applies
	Covers, grates and frames				
	Cover bolts				Quality management system applies
509	Water tightness of joints	Air test	All pipelines with watertight joints	Required	
512	Backfilling to pipe bay	Grading (N)	1 per 1,000m ³ per source and a min of 3 per source prior to import and as requested during placement	Required	
		Water-soluble sulphate (WS) content (N)	1 per 2,000m ³ or a minimum of 3 per source prior to import and as requested during placement		
		Oxidisable sulphides (OS) content and total potential sulphate (TPS) content (N)	1 per 2,000m ³ or a minimum of 3 per source prior to import and as requested during placement		
		Test Suites as Appendix 6/14 (N)	1 per 2,000m ³ or a minimum of 3 per source prior to import and as requested during placement		Geochemical testing for soil and leachates refer to Appendix 6/14 for details.
514	Fin drains	(Manufacturer's tests)		Required	BBA certificate (or equivalent) applies
515	Narrow filter drains				



Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments	
		Geotextile, pipes and fittings	(Manufacturer's tests)		Required	BBA certificate (or equivalent) applies	
		Granular fill	Plastic index (N)	1 per 2,000m³ or a minimum of 3 per source prior to import and as requested	Required	LA Category	
			Resistance to fragmentation (N)				
			Water-soluble sulphate (WS) content (N)				1 per 2,000m³ or a minimum of 3 per source prior to import and as requested
			Oxidisable sulphides (OS) content and total potential sulphate (TPS) content (N)				1 per 2,000m³ or a minimum of 3 per source prior to import and as requested
			Grading and fines content (N)				1 per 1,000 m³ per source and a min of 3 per source prior to import and as requested during placement
			Permeability (N)				See comments
		Test Suites as Appendix 6/14 (N)	1 per 2,000m³ or a minimum of 3 per source prior to import and as requested	Geochemical testing for soil and leachates refer to Appendix 6/14 for details.			
518	Thermoplastics structured wall pipes and fittings		(Manufacturer's tests)		Required	BBA certificate (or equivalent) applies	
Series 600							
601,631 to 637, 640	Acceptable Material						
	Class	General Description					
	1	General Granular Fill	Grading/Uniformity coefficient (N)	1 per 1,000 m³ material sub-class per source prior to import and twice a week during placement	Required	Refer to Clause 601.12 and 601.18 for requirements for recycled aggregate.	
			Moisture content (N)	1 per 1,000 m³ per material sub-class prior to import and twice weekly during placement			
			OMC (N)	1 per 5,000 m³ per material sub-class prior to import			
			Drained shear parameters (N)	1 per 5,000 m³ prior to import and as requested during placement		Refer to Specification Appendix 6/1 for required shear strengths, if no shear strength requirement then no testing required	



Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
			Test Suites as Appendix 6/14 (N)	1 per 2,000 m ³ or a minimum of 3 per source prior to import and as requested during placement (e.g. for site won material)		Geochemical testing for soil and leachates refer to Appendix 6/14 for details. Please note that any sources classified as waste may require further radiological and/or WAC testing as instructed by LLWR.
			pH	Minimum of 3 per source prior to import and 1 per 5,000 m ³ during placement		
			Carbonate content, BS1377 Part 3 (2021) Section 8	Minimum of 3 per source prior to import and 1 per 5,000 m ³ during placement		
			1C only Resistance to fragmentation (N)	1 per 1,000 m ³ during import per source prior to import and as requested during placement		LA Category
	2	General Cohesive Fill	Grading (N)	1 per 1,000 m ³ per material sub-class per source prior to import and twice a week during placement	Required	
			Plastic limit (N)	1 per 1,000 m ³ per material sub-class per source prior to import and twice a week during placement		
			Moisture content (N)	1 per 1,000 m ³ per material sub-class per source prior to import and daily during placement		In order to utilise MCV on site as a rapid assessment (Cl. 632) the Contractor is responsible for correlating MCV values with undrained shear strength.
			OMC (N)	1 per 2,000 m ³ per material sub-class per source prior to import and as requested during placement		
			Undrained shear parameters (N)	1 per 1,000 m ³ prior to import and twice weekly during placement		Refer to Specification Appendix 6/1 for required shear strengths, if no shear strength requirement then no testing required. Source approval testing to be via triaxial testing, placement test may be hand vanes with triaxial verification, with approval of LLWR / CQA Engineer.

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
		Drained shear parameters (N)	1 per 5,000 m ³ prior to import and as requested during placement		Refer to Specification Appendix 6/1 for required shear strengths, if no shear strength requirement then no testing required
		Permeability (N)	2 per source then 1 per 500 m ³ delivered		Refer to Specification Appendix 6/1 for permeability values, if no permeability requirement then no testing required
		Test Suites as Appendix 6/14 (N)	1 per 2,000 m ³ or a minimum of 3 per source prior to import and as requested during placement (e.g. for site won material)		Geochemical testing for soil and leachates refer to Appendix 6/14 for details. Please note that any sources classified as waste may require further radiological and/or WAC testing as instructed by LLWR.
		pH	Minimum of 3 per source prior to import and 1 per 5,000 m ³ during placement		
	4	Grading/MC/MCV (N)	1 per 1,000 m ³ per day per material sub-class per source prior to import and a min of 3 and daily during placement	Required	In order to utilise MCV on site as a rapid assessment (Cl. 632) the Contractor is responsible for correlating MCV values with undrained shear strength.
		Undrained and drained shear parameters (N)	2 per source prior to import (min of 5) and 1 per 1,000m ³ during placement		Refer to Specification Appendix 6/1 for required shear strengths, if no shear strength requirement then no testing required Source approval testing to be via triaxial testing, placement test may be hand vanes with triaxial verification, with approval of LLWR / CQA Engineer.
		Test Suites as Appendix 6/14 (N)	1 per 2,000 m ³ or a minimum of 3 per source prior to import and as requested during placement (e.g. for site won material)		Geochemical testing for soil and leachates refer to Appendix 6/14 for details. Please note that any sources classified as waste will require further radiological and/or WAC testing as instructed by LLWR.
	5	Topsoil	As specified in AEC-RDP-T1.00-SP-045	As specified in AEC-RDP-T1.00-SP-045	Refer to Clause 618
	6	Selected granular fill	Grading/uniformity coefficient (N)	Required	
			1 per 1,000 m ³ per material sub-class per source prior to import and twice a week during placement		



Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
			PI/LL(N)	1 per 2,000 m ³ per material sub-class per source prior to import and twice a week during placement		
			Resistance to fragmentation (N)	Weekly for site won material. At least 5 tests per source for source approval and then one per month per source during rail imports.		
			OMC/MC (N)	1 per 2,000 m ³ per material sub-class per source prior to import and as requested during placement		
			MC or MCV (N)	1 per 2,000m ³ per material sub-class per source prior to import and twice a week during placement		In order to utilise MCV on site as a rapid assessment (Cl. 632) the Contractor is responsible for correlating MCV values with shear strength.
			Organic matter/water soluble sulfate (WS) (N)	1 per 2,000m ³ or a minimum of 3 per source prior to import and as requested		BS EN 1744-1 clause 10, clause 13 Testing only required for material described in Cl. 601 15 to 17.
			Oxidisable sulfides (OS) and total potential sulfate (TPS) content (N)	1 per 2,000m ³ or a minimum of 3 per source prior to import and as requested		
			ph/chloride ion content (N)	1 per 2,000m ³ or a minimum of 3 per source prior to import and as requested		
			Resistivity (N)	One per source for approval		Refer to Specification Appendix 6/1, if no resistivity requirement then no testing required
			Drained shear parameters (N)	1 per 5,000m ³ prior to import and as requested during placement		Refer to Specification Appendix 6/1 for required shear strengths, if no shear strength requirement then no testing required
			Test Suites as Appendix 6/14 (N)	1 per 2,000 m ³ or a minimum of 3 per source prior to import and as requested during placement (e.g. for site won material)		Geochemical testing for soil and leachates refer to Appendix 6/14 for details. Please note that any sources classified as waste will require further radiological and/or WAC testing as instructed by LLWR.
	6F1 & 6F2	Selected granular fill	Class Ra (asphalt) content	1 per 1000 m ²	Required	
			Bitumen content	1 per 1000 m ²		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
	6F4 & 6F5	Selected granular fill	Size designation and overall grading category	1 per 1,000 m³ per material sub-class per source prior to import and twice a week during placement	Required	Results of routine control tests from the factory production Control system operated by the Produced to be provided for Class 6F4 and Class 6F5 - see Annex C of BS EN 13242 and Annex D of BS EN 13285
			Maximum fines and oversize categories	1 per 5,000 m³ per material sub-class per source prior to import and min of 3		
			Volume stability of blast furnace slag	1 per 5,000 m³ per material sub-class per source prior to import and min of 3		
			Volume stability of steel (BOF and EAF) slag	1 per 5,000 m³ per material sub-class per source prior to import and min of 3		
			Other aggregate requirements:	Annex C of BS EN 13242		Reference to be made see Annex D of BS EN 13285
			Laboratory dry density and optimum water content	1 per 5,000 m³ per material sub-class per source prior to import and min of 3		
			Water content	1 per 5,000 m³ per material sub-class per source prior to import and min of 3		
			Class Ra (asphalt) content	1 per 5,000 m³ or a minimum of 3 per source prior to import and as requested during placement		
			Bitumen content	1 per 5,000 m³ or a minimum of 3 per source prior to import and as requested during placement		
	6N	Selected well graded granular material	Grading coefficient (N)	Three per source prior to import and 1 per 100m³ during placement	Required	
			Los Angeles Coefficient (N)	Three per source prior to import and 1 per 500m³ during placement		
			Drained shear parameters (N)	Three per source prior to import and 1 per 500m³ during placement		Refer to Specification Appendix 6/1 for required shear strengths, if no shear strength requirement then no testing required
609 621	Geotextiles		Tensile load	See comments	Required	Not required if BBA certificate is available for the geotextiles and includes this data. Unless requested by LLWR/CQA Engineer or stated in
Yield point elongation						
CBR puncture resistance						
Cone drop penetration						
Permeability						



Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
		Pore size			Specification appendix 6/5 or 6/9.
612	Compaction of Fills				
	Method compaction	Field dry density (N)	As required by CQA Engineer	Required	
	End Product Compaction	Nuclear Density Gauge (NDG) or, Sand Replacement Test (SRT)	50m x 50m grid for each layer. Or min 3 per structure.		1 SRT per 10 NDG minimum, or as per equipment manufacture recommendations. Frequency to be reviewed and altered if required due to poor correlation.
631	Subgrade	Hand shear vanes (TBC by LLWR/CQA Engineer)	25 x 25 metre grid	Yes	Refer to Specification Appendix 6/3 for details
Series 700					
702	Surface regularity	Longitudinal regularity: Rolling straight-edge	Nearside wheel track	Required	The WTZ is taken to be 457-1458mm either side of the 4.6m wide running lane center-line
		Transverse regularity: 3 m long straight-edge	1 per 100m		
Series 800					
801, 803	General requirements for unbound mixtures adjacent to cement bound materials, concrete pavements, structures or products	Water-soluble sulfate (WS) content (N)	1 per 1,000m³ or a minimum of 3 per source prior to import and as requested	Required	
		Oxidisable sulfides (OS) content and total potential sulfate (TPS) content (N)			
	Unbound mixtures beneath surface of a road or paved central reserve	Frost heave (N)	1 per source		
		Grading and fines content	1 per 1,000 m³ per material sub-class per source prior to import and twice a week during placement		
		Plastic index (N)			
		Resistance to fragmentation (N)	6 monthly		
		Resistance to wear micro-Deval test	1 per source		
		Resistance to freezing and thawing (magnesium sulphate soundness) (N)	1 per source		
		Water absorption (N)	1 per source		
		Volume stability of blast furnace slags	6 monthly		
		Volume stability of steel (BOF and EAF) slags	6 monthly		
		OMC/mc (N)	OMC: 2 per source Mc: 1 prior to placement per week		
		Density (N)	1 per source		
		Water absorption (N)	1 per source		



Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments	
Clause 6.38-6.39 CS229	Subgrade verification CBR Testing.	CBR / Surface modulus specified in Clause 884 (N)	50m centres per lane.	Required	Refer to RD 306 Table 2 and App.7/1 for CBR requirements.	
	Sub-base and Capping verification CBR testing	CBR / Surface modulus specified in Clause 884 (N)	50m centres per lane Capping: CBR 5% (Surface Modulus 50 MPa) Sub-base CBR 10.5% (Surface Modulus 80 MPa)			
Series 900						
901, 911, 925, 929	Aggregates for bituminous material			Required		
		Resistance to fragmentation (hardness)	Resistance to fragmentation (N)		Monthly	
		Resistance to freezing and thawing (durability)	Soundness (N)		1 per source	
			Water absorption (N)		1 per source	
		Cleanness	Sieve test (mass passing 0.063mm sieve) (N)		Monthly	
		Shape	Flakiness index (N)		Monthly	
		Blast furnace slag	Bulk density (N)		1 per 500 tonnes	
			Soundness (N)		Once every 4 months	
			Dicalcium silicate disintegration (N)		1 per 500 tonnes	
			Iron disintegration (N)			
		Steel slag	Bulk density (N)		1 per 500 tonnes	
			Volume stability (N)		1 per 500 tonnes	
		Coarse aggregate for surface courses and pre-coated chippings	Resistance to polishing (PSV) (N)		1 per source	
			Resistance to surface abrasion (AAV) (N)		1 per source	
901, 911, 925, 929	Binders for bituminous materials	Penetration (N)	1 per 750 tonnes		National quality management sector schemes apply. Modified binders should have product acceptance scheme certification in accordance with 100 series of MCHW. In the event that no such Certificates have been issued, then in the interim, only modified binders undergoing product acceptance scheme assessment (or equivalent) should be considered for approval.	
		Softening point (N)	1 per 750 tonnes			
903, 911, 925, 929	Bituminous mixtures	Grading (N)	For Audit Test purpose only	On request	National quality management sector schemes apply	
		Binder Content (N)				

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
920	Bond coats, tack coats and other bituminous sprays		Accuracy of spread	1 for each binder and sprayer per month	Required	Not more than 6 weeks prior to start of work and one per month
			Rate of spread	1 per week		
			Penetration at 25°C and 5°C (N)	1 per source		Manufacturer's QA test results may be submitted
			Vialit Pendulum Cohesion			
			Complex shear modulus and phase angle	Required for modified binders		
929	Base and Binder Course Asphalt Concrete (Design Mixtures)		Density and in-situ air voids (N)	Continuous using calibrated indirect density gauge at 20 m intervals in alternate wheel-tracks	Required	As per 929.8.to 929.11 Correlation Required. Cores may be required in the event of not meeting requirements of continuous testing using indirect density gauge as per Clause 937.11.
			Air voids in wheel tracks (N)	2 cores from the wheel-tracks every 1,000m laid from each mixing plant		As per 929.12 and 929.13 and 929.16 to 929.18, in accordance with BS 594987.
			Air voids in joints (N)	2 cores every 250m laid, centred 100mm from the final joint position at any unsupported edge from each mixing plant		As per 929.14 to 929.18, in accordance with BS 594987.
			Series 1100			
1101	Precast concrete kerbs, channels, edgings and quadrants		Transverse strength	Minimum of 3 per 1000 units of each product	Required	
			Water absorption	(BS 7263: Part 1)		
	Recycled plastic kerbs				Required	QM and product certification applies
1104	Precast concrete flags		Transverse strength	Minimum of 3 per 1000 units of each product	Required	
				Water absorption		
	Bedding	granular material			Required	
		mortar				
Series 1200						
1202	Permanent traffic signs				Required	Quality management scheme applies. Certification that the traffic sign is capable of passing the tests in BS 873: Part 1 is required
1210	Holding down bolts and anchorages to bases of permanent bollards					Certification that the holding down bolts and anchorages are capable of complying with the performance requirements of BS 873: Part 3 is required



Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments	
1212	Road markings		Test specified in BS EN 1824			National Quality management and sector scheme applies. Procedures are given in BS EN 1824	
Series 1700							
1702 1704	Cement types as stated in sub-Clause 1702.1				Required	Certification to be provided monthly for each cement Quality management & product certification schemes apply	
	Cement (all types)		Chloride content	Monthly		Tests to be carried out by the manufacturer and results included on the test certificates required above	
	Pulverised-fuel ash		Sulphate content	Monthly			
	Ground granulated		Acid-soluble alkali content	Daily (PC) weekly (pfa ggbs)			
	Aggregates		Grading & fines content	1 per week (per source)		Results of routine control tests from factory production control systems operated by the producer to be provided – see Annex H of BS EN 1260 Production certificate scheme applies	
			Shell content (N)	Monthly			
			Flakiness index (N)	Monthly			
			Resistance to fragmentation (N)	Every 6 months			
			Drying shrinkage (N)	1 per 5 years			
			Chloride content (N)	1 per week or as otherwise agreed			
			Sulphate content (N)	Yearly			
		Blast furnace slag	Bulk density (N)	Every 6 months			
			Stability (N)	Every 6 months			
			Sulphur content (N)	Every 6 months			
	Water		Tests specified in BS EN 1008	As required			
			Chloride content	Monthly			
			Sulphate content	Monthly			
			Acid-soluble alkali content	Weekly			
		Admixtures		Chloride content	1 per consignment	Required (BS 934-2)	(see sub-clause 1702.3)
				Sulphate content	1 per consignment		
Acid-soluble alkali content				1 per consignment			
1707	Hardened concrete – Identity Testing		Cube strength (N) – as described in contract specific Appendix 17/4	Reinforced concrete. four cubes from 30m3	Required		
				Mass concrete. Four cubes from 50m3 where concrete is used within the sediment forebays. No testing required for blinding concrete.			

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
		Density	As required		
		Modulus of elasticity			
	Fresh concrete – Identity Testing	Consistency (slump or compacting factor or Vebe) (N)	Each batch	Required	
		Air content	Each batch		
		Cement content	As required		
		Water/cement ration			
1710	Precast concrete manufactured off site	Cube strength (manufacturer's tests)			Contractor to make available records of tests by the manufacturer
1712	Reinforcement				
	Steel bars			Required (BS 4449)	Product certification scheme applies
	Steel wire			Required (BS 4482)	
	Steel fabric			Required (BS 4483)	
	Stainless steel			Required (BS 6744)	
1713	Fabricated reinforcement			Required (BS 8666)	Certification that fabricated reinforcement complies with the routine inspection / testing requirements of BS 8666 is required if the fabrication is not covered by a product certification scheme listed in Appendix B.
1726	Stainless steel bar			Required (BS 6744)	
Series 3000					
	All testing to be in accordance with AEC-RDP-T1.00-SP-045				

All materials will be required to undergo source acceptance testing prior to importing to site (the source is considered to be the original quarry or similar and not any site stockpiles). This testing shall comprise the sets of tests listed above in Table 1/5 per source of material – to be taken at source prior to transportation to site, and during placement.

LLWR/the CQA Engineer retain the right to request further testing. Additional testing may be required at stockpiles if there is an ambiguity as to the stockpile material due to poor stockpile management/record keeping.

Appendix 2/1 – Site Clearance

The Contractor shall:

- Clear all trees shrubs, hedges, scrub and other vegetation (including roots), where required from below the full footprint of the works.
- Remove all superficial obstructions from within the areas where required, which are in the way of the or otherwise affected by the Permanent Works. Items to be removed include, but not limited to: fencing, gates, kerbs, chamber covers etc.

NOTE: Service diversion/clearance work is not covered by this Appendix.

In areas where tree felling will be required, note the following:

Ecological Constraints:

Any works must take cognisance of the environmental constraints provided by LLWR.

Trees should be felled prior to the bird nesting season, which runs March to September to avoid potential disturbance to nesting birds. Should vegetation clearance need to be undertaken within the breeding season, it is recommended that any vegetation to be disturbed is carefully checked by an ecologist for the presence of nests. In the event that an active nest is identified, the vegetation should not be disturbed until the bird has completed its breeding cycle and any young have fledged.

The Contractor's attention is drawn to the Countryside and Wildlife Act 1991, under which all bat roosts must be protected. Trees that contain suspected bat activity shall not be felled; instead, they shall be separately marked and instructions sought from the ecologist as to how to proceed.

Deadwood from tree felling should be retained and used to create habitat piles within retained woodland areas and in the vicinity of the pond to provide terrestrial refugia for amphibians and invertebrates.

No trees or shrubs outside the specified areas of clearance are to be removed or lopped, unless specifically instructed by the CQA Engineer. Existing vegetation to be retained shall be protected from the works to ensure that no machinery or site operators stray into these areas.

Appendix 2/2 – Filling of Trenches and Pipes

1. Removal of pipes, services, etc over 1m below formation.

Details of the removal and protection of any existing services or monitoring installations and modification of the existing perimeter drain as a result of the profile fill and surcharging works across the northern trenches will be highlighted in the Specification produced for DP2, 3 and 7.

Details of the removal of any services associated with Vault 8 will be highlighted within the Specification produced for DP8.

2. Filling of pipes over 1m below formation.

Not required.

3. Backfilling of trenches.

Refer to text above.

4. Retention of pipes, services etc within 1m of formation

Refer to text above and the drawings listed below for information on new monitoring equipment that will be installed within 1m of formation and shall be protected from damaged.

Drawing number	Drawing Title
RD1190	DP3 Construction Phase 2 - Commencement of Tranche 1 and Prior to Other Design Packages Sheet 1
RD1191	DP3 Construction Phase 2 - Commencement of Tranche 1 and Prior to Other Design Packages Sheet 2
RD1192	DP3 Construction Phase 2 - Commencement of Tranche 1 and Prior to Other Design Packages Sheet 3

The Contractor is required to comply with any obligations regarding Monitoring Infrastructure Protection set out within DP3 Specification (AEC-RDP-T1.00-SP-047).

Appendix 2/3: Retention of Material Arising from Site Clearance

All material stripped from the site during the site clearance operations are to be retained on site and stockpiled separately. LLWR are to provide details on which area is available for use to store these materials and if any material can be disposed of off-site.

Appendix 2/5 – Hazardous Materials

1. Hazardous Materials

LLWR have advised that historic demolition material may be encountered during the topsoil strip within the footprint of the Tranche 1 works and subsequent puncturing of the existing membrane (included within DP7 works) and installation of the observational monitoring system across the interim cap (included within DP9 works) which potentially may be contaminated.

Similarly, LLWR have advised that material stored within existing Earth Mounds 1 and 2 may be hazardous. Reference should be made to refer to LLWR documents SOC-RDP-T1.00-RP-080 and SOC-RDP-T1.00-RP-118 issued in the tender package for factual investigation data relating to the existing Earth Mounds.

No works within the DP1a scope shall be allowed to take place below the existing cap membrane unless approved by CQA Engineer and LLWR.

Appendix 2/6 – Site Clearance Environmental Requirements

1. Ecological site clearance restrictions or measures.

Any works must take cognisance of the environmental constraints provided by LLWR.

2. Archaeological site clearance restrictions or measures.

None required

3. Other measures or restrictions

LLWR to advise on any other requirements.

Appendix 6/1 – Requirements for Acceptability and Testing Etc. Of Earthworks Materials

1. Acceptable Limits for Fills in Table 6/1 appropriate to the Contract and including

- i. Permitted classes of construction materials are defined in the following tables:*

Table 6/1.1(attached)	Classification and Compaction Requirements
Table 6/2	Grading Requirements
Table 6/3	Limits of Material Properties for Fill for Use with Metal Components in Reinforced Soil and Anchored Earth Structures
Table 6/4	Method of Compaction for Earthworks Materials
Table 6/5	Off-Site Grading Requirements

A schedule of tests and acceptability limits for the fill materials required for this Contract is given in Table 6/1.1.

The material to be used as profile fill over the Northern Trenches shall comprise either site won material processed to meet the requirements of either Class 1 granular material or Class 2 cohesive material or be imported Class 1 or 2 material. Only Class 1 is permitted for use as profile fill over the Vaults as shown on drawing RD746.

Class 1 and 2 fills arising from within the scheme shall not be permitted to be placed within 5m of any water course, unless the leachability concentrations are proved to be below the environmental quality standard criteria (EQS) for salmonid rivers, or unless an impermeable barrier to leachate migration is present.

- ii. those materials, which may be used for landscape fill Class 4 [601.2(i)(b)]*

Not required.

- iii. cross-references to drawings showing location of 'zoning' of general and selected fills.*

Refer to the drawings and 3D models listed in Appendix 0/4.

- iv. Additional sub-divisions of Classes in Table 6/1 required for the Contract, e.g. to set out environmental requirements for processed Class U1B material.*

Not used.

- v. Alternative and additional requirements for Triaxial and Shear Box tests [633 and 636]*

No additional requirements.

- vi. Class 9D lime stabilised material [615.5 and 615.6]*

Not used.

2. Special requirements for determining acceptability, who classifies and where, and whether trial pitting is required.

The Contractor shall be responsible for the testing, classification and determination of the acceptability of the proposed earthwork materials. Imported materials shall be classified at the point of deposition, and on-site excavated materials generally classified at the point of excavation. The Contractor shall carry out acceptability testing for all earthworks construction materials on samples from the point of deposition, including imported materials and on-site materials rendered acceptable. All samples and test results shall include their location in the works by reference to GPS co-ordinate system and elevation level, or other method agreed with the CQA Engineer.

The Contractor shall provide appropriate plant and personnel for trial pitting or other means as and when required at any stage of the Works, on or off-site.

If in the opinion of the CQA Engineer, the material has altered its classification or is unacceptable for whatever reason the Contractor shall repeat the classification and acceptability tests given in Table Appendix 6/1.1 and Appendix 1/5. The samples taken shall be sufficient to ensure the correct classification of the materials taking into account the variation in their properties.

Generally, the general cohesive fill shall be controlled by MCV values correlated with remoulded undrained shear strength and method compaction in accordance with the SHW.

All fills imported to construct the works shall be tested before and during the deposition at the intervals described in and for the physical criteria established in tables 1/5 & 6/1 of the Specification Appendices. Materials not meeting these criteria shall not be used in the Works.

Classification and acceptability tests shall be carried out by the Contractor and provided to the CQA Engineer for approval and to the Project Manager for information. Source approval shall comprise at least one set of the relevant tests stated in Appendix 1/5, to be reviewed and approved by the CQA Engineer prior to use in the Works and shall be performed on each class of material to be used in the earthworks. Subsequent testing during placement shall be at the frequencies given in Appendix 1/5.

The Contractor shall make all test result summaries available electronically for viewing, filtering, querying and printout on an open access database. All original test sheets shall be filed in the site offices/laboratory after signing in accordance with UKAS requirements. The test results should be submitted in Microsoft Excel format to the Project Manager and CQA Engineer. Test results shall be placed in a site accessible database within one working day of the completion of the test. A weekly summary of all classification and compaction testing shall also be provided to the Project Manager and CQA Engineer, that shall include where test failures have been identified, where the materials these tests relate to have been placed, what, if any, remedial measures where then applied to these materials.

The earthworks shall be managed to comply with Specification Appendices 6/14. The Contractor shall submit a detailed Method Statement for the classification, movement and deposition of all materials used. For the purposes of complying with Specification Appendices 6/14 testing frequencies shall be proposed by the Contractor in his Method Statement for the agreement of the CQA Engineer.

Testing to determine the effective angle of internal friction of fill materials, where specified in Table 6/1.1, shall be in accordance with Specification of Highway Works Clause 636. Testing to determine the undrained shear strength of remoulded cohesive material where specified in Table 6/1.1 shall be in accordance with Specification for Highway Works Clause 633. Unless otherwise agreed with the CQA Engineer.

Acceptability testing and control testing during construction shall be carried out by the Contractor in accordance with Appendix 1/5. The frequency of the testing may be altered in favourable circumstances at the discretion of the CQA Engineer once consistently acceptable standards of production are established. The Contractor shall undertake additional or increased testing in highly variable defective or damaged areas if required by the CQA Engineer. In-situ remoulded shear strength shall be measured to verify the material is suitable and approved by the CQA Engineer.

The Contractor shall make all test results available to the CQA Engineer within 3 working days of completion of the tests.

The Contractor shall obtain suitable soil and water samples from areas of known or suspected Class U2 materials in advance of the excavation works see Appendix 6/2 for details. The samples shall be tested by an accredited laboratory to characterise U1B materials prior to excavation and disposal. Additional chemical tests may be required on any suspected U1B or U2 material encountered during excavation and as required by the relevant authority. The Contractor shall maintain full records relating to the export or import of fill materials to and from the site, including the disposal of U class materials to licensed facilities.

Recycled aggregate shall comply with the appropriate WRAP protocols, and also be subject to testing for the chemical criteria established in Specification Appendix 6/14. Materials not meeting these criteria shall not be used in the Works.

3. Designation of Material as Class 3

Not used.

4. Any requirement for processing to render unacceptable material (other than Class U2) acceptable, cross-referring to drawings where necessary, for each type of material to be processed and class of material to be produced.

Some of the site arising unacceptable material may be suitable for processing to become acceptable fill material. If the Contractor chooses to process site arising material he shall determine the location of materials to be processed, the means of processing and the classes of materials to be produced, and shall submit a detailed Method Statement for the approval of LLWR and the CQA Engineer. The Environment Agency shall be consulted if chemicals other than lime or cement are to be used in the process, LLWR shall be responsible for undertaking this process and will request required information from the Contractor.

Unacceptable Fill drier than Acceptable Limits (Class U1A) to be modified to General Fill (Class 2B or 2C)

Where stiff and very stiff soils (dry cohesive) occur, it shall be necessary to process these to render the material acceptable as Class 2B or 2C fill to ensure an adequate state of compaction (density and air voids) is achieved. Above 150kPa (and MCV13) it shall be necessary to pulverise the as-dug material and to modify (increase) its moisture content to render the material acceptable as Class 2B or 2C fill. It may also be necessary to use higher compactive efforts in the field. The modified material will have to be re-classified in accordance with the criteria of Table 6/1, Table 6/2 and Appendix 6/1 to an appropriate class of acceptable cohesive fill for compaction purposes and construction control following trials of the proposed methods.

Unacceptable Fill wetter than Acceptable Limits (Class U1A) to be modified to General Fill (Class 2A or 2C)

Approved modification/improvement shall be used to render unacceptable soft/weak inorganic cohesive materials with remoulded undrained shear strengths of less than 40 or 50kPa acceptable as Class 2A or 2C fill and their sub-classes (refer to Table 6/1.1 for details of required strength). Where this "modified fill" is to be used as general embankment fill the process shall produce a material that satisfies the requirements of Class 2A or 2C general fill. The modified material will have to be re-classified in accordance with the criteria of Table 6/1, Table 6/2 and Appendix 6/1 to an appropriate class of acceptable cohesive fill for compaction purposes and construction control following trials of the proposed methods.

Mixing of additives with the unacceptable material shall not be carried out without prior approval of the CQA Engineer. Noting the site specific requirements of **non-calcareous** material and/or pH limits.

If improvement in the condition of the fill material is affected by rainfall then additional treatment shall be kept to the minimum necessary to render the material acceptable.

Care shall be taken to ensure that the modified material is not made stronger than the limits specified for acceptability and compaction.

5. Requirements for Groundwater Lowering or Other Treatment

Not used (this refers to groundwater lowering as a pre-treatment to reduce the water level).
Requirements of 602.15 shall apply.

6. Minimum MCV required immediately before compaction for Lime Stabilised Class 9D Material

Not used.

7. Contract-specific (local) requirements for Acceptability and Testing of Unburnt Colliery Spoil

Not used.

8. Any Permitted use of Rapid Assessment Procedure for Material Acceptability

Routine site testing to determine the Moisture Condition Test (MCV) may use the rapid moisture assessment procedure of BS 1377 Part 2 (2022) where a pre-calibrated repeatable standard can be reliably established and is regularly checked for each different type or source of fill material. Rapid methods shall not be used for modified materials. The guidance outlined in TRL Report 273, TRL Report 522 shall also be considered.

9. Requirements (if any) for removal off site of excavated acceptable material or unacceptable material requiring processing or retention of surplus material on site

Not used.

10. Permitted use (if any) of acceptable or unacceptable material required to be processed for purposes other than general fill

Not used.

11. Requirements for In Situ Resistivity Tests

Not used.

12. Requirements for In Situ Redox Potential Tests

Not used.

13. Bearing ratio requirements for class 6R and 7I material.

Not used.

14. Requirements for the assessment of the effects of water soluble (WS) sulfate, oxidisable sulfides and total potential sulfate in accordance with BS EN 1744-1 clauses 10, 11 and 13

Testing and terminology shall be from BS EN 1744 which is to be taken to supersede the terminology used with the SHW 600 Series.

15. Requirements for the magnesium sulfate (MS) soundness test.

These methods are required where defined in Table 6/1 and Appendix Table 6/1.1.

Appendix Table 6/1.1

Class	General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in clause 631)				Compaction Requirements in Clause 612
				Property (See exception in previous column)	Defined and Tested in Accordance with	Acceptable Limits Within:-		
						Lower	Upper	
1A(3)	Well graded granular material	General fill - Profile and Surcharge Fill	Natural gravel, natural sand, crushed gravel, crushed rock or any combination thereof. None of these constituents shall include any argillaceous rock, chalk, limestone, Class 3 or calcareous materials. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from source code "P" natural aggregates – except argillaceous rock, chalk, limestone, Class 3 or calcareous materials. See Notes 8, 9 and 10.	(i) grading	BS 1377: Part 2	As standard Class 1A in Table 6/2		Tab 6/4 Method 2
				(ii) uniformity coefficient	See Note 5	10	-	
				(iii) mc (see Note 12)	BS 1377: Part 2	Opt mc-2% (See note 16)	Opt mc +2% (See note 16)	
				(iv) MCV provided grading complies with Fig 1 of TRL Report 273	Clause 632	8.5	-	
				(v) pH BS 1377 Part 3	BS 1377: Part 3, Refer to Note 21 in Appendix 1/5	6	9	
				(vi) carbonate content	BS1377: Part 3 Method 6 Refer to Note 19 in Appendix 1/5	-	5% w/w	

1A(4)	For Class 1A(4) please refer to Class 1A(3). Class 1A(4) is no longer required. This row has been retained so that any legacy cross references to Class 1A(4) are re-directed to Class 1A(3).
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Class	General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in clause 631)				Compaction Requirements in Clause 612
				Property (See exception in previous column)	Defined and Tested in Accordance with	Acceptable Limits Within:-		
						Lower	Upper	
1B(3)	Uniformly graded granular material	General fill - Profile and Surcharge Fill	Natural gravel, natural sand, crushed gravel, crushed rock or any combination thereof. None of these constituents shall include any argillaceous rock, chalk, limestone, Class 3 or calcareous materials. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from source code "P" natural aggregates – except argillaceous rock, chalk, limestone, Class 3 or calcareous materials. See Notes 8, 9 and 10.	(i) grading	BS 1377: Part 2	As standard Class 1B in Table 6/2		Tab 6/4 Method 3
				(ii) uniformity coefficient	See Note 5	-	10	
				(iii) mc (see Note 12)	BS 1377: Part 2	Opt mc-2% (See note 16)	Opt mc +2% (See note 16)	
				(iv) pH BS 1377: Part 3	Refer to Note 21 in Appendix 1/5	6	9	
				(v) carbonate content	Refer to Note 19 in Appendix 1/5	-	5% w/w	

Class	General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in clause 631)				Compaction Requirements in Clause 612
				Property (See exception in previous column)	Defined and Tested in Accordance with	Acceptable Limits Within:-		
						Lower	Upper	
1B(4)	For Class 1B(4) please refer to Class 1B(3). Class 1B(4) is no longer required. This row has been retained so that any legacy cross references to Class 1B(4) are re-directed to Class 1B(3).							

Class	General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in clause 631)				Compaction Requirements in Clause 612
				Property (See exception in previous column)	Defined and Tested in Accordance with	Acceptable Limits Within:-		
						Lower	Upper	
2A(2)	Wet cohesive material	General fill - Profile Fill in specific locations over the trenches where permitted only. Not acceptable over the vault (or for surcharge fill over the trenches without an acceptable permanent end use post-surcharge).	Natural material or crushed rock. Non-plastic material is required to deliver the strain distribution function of the profile fill in the short term i.e. to bound undrained conditions. None of the constituents shall include any chalk, limestone, Class 3 or calcareous materials. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from source code "P" natural aggregates – except limestone, chalk, Class 3 or calcareous materials. See Notes 8, 9 and 10. Materials conforming to other source codes require prior approval from NWS, substantiated by further studies to assess acceptability against the Environmental Safety Case.	(i) grading	BS 1377: Part 2	As standard Class 2A in Table 6/2		Tab 6/4 Method 1 except for materials with liquid limit greater than 50, determined by BS 1377:Part 2 only tamping or grid rollers shall be used
				(ii) plastic limit (PL)	BS 1377: Part 2	Non-Plastic		
				(iii) mc (see Note 12)	BS 1377: Part 2	Opt mc-2% (See note 16)	Opt mc +2% (See note 16)	
				(iv) MCV	Clause 632	8.5 (see note 20)	12 (see note 20)	
				(v) undrained shear strength of remoulded material	Clause 633	50kN/m ²	100kN/m ²	
				(vi) drained shear strength of remoulded material	Clause 636	$\phi' = 28^{\circ}$ $c' = 0 \text{ kPa}$	-	
				(vii) pH BS 1377: Part 3	Refer to Note 20 in Appendix 1/5	6	9	
				(viii) carbonate content	Refer to Note 19 in Appendix 1/5	-	5% w/w	

Class	General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in clause 631)				Compaction Requirements in Clause 612
				Property (See exception in previous column)	Defined and Tested in Accordance with	Acceptable Limits Within:-		
						Lower	Upper	
2A(3)	For Class 2A(3) please refer to Class 2A(2). Class 2A(3) is no longer required. This row has been retained so that any legacy cross references to Class 2A(3) are re-directed to Class 2A(2).							

Class	General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in clause 631)				Compaction Requirements in Clause 612
				Property (See exception in previous column)	Defined and Tested in Accordance with	Acceptable Limits Within:-		
						Lower	Upper	
2B(2)	Dry cohesive material	General fill - Profile Fill in specific locations over the trenches where permitted only. Not acceptable over the vault (or for surcharge fill over the trenches without an acceptable permanent end use post-surcharge).	Natural material or crushed rock. Non-plastic material is required to deliver the strain distribution function of the profile fill in the short term i.e. to bound undrained conditions. None of the constituents shall include any chalk, limestone, Class 3 or calcareous materials. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from source code "P" natural aggregates – except limestone, chalk, Class 3 or calcareous materials. See Notes 8, 9 and 10. Materials conforming to other source codes require prior approval from NWS, substantiated by further studies to assess acceptability against the Environmental Safety Case.	(i) grading	BS 1377: Part 2	As standard Class 2B in Table 6/2		Tab 6/4 Method 2
				(ii) plastic limit (PL)	BS 1377: Part 2	Non-Plastic		
				(iii) mc (see Note 12)	BS 1377: Part 2	Opt mc -2% (See note 16)	Opt mc +2% (See note 16)	
				(iv) MCV	Clause 632	8.5 (see note 20)	15 (see note 20)	
				(v) undrained shear strength of remoulded material	Clause 633	50kN/m²	150kN/m²	
				(vi) drained shear strength of remoulded material	Clause 636	$\phi' = 28^\circ$ $c' = 0 \text{ kPa}$	-	
				(vii) pH BS 1377: Part 3	Refer to Note 21 in Appendix 1/5	6	9	
				(viii) carbonate content	Refer to Note 19 in Appendix 1/5	-	5% w/w	

2B(3)	2B(3) For Class 2B(3) please refer to Class 2B(2). Class 2B(3) is no longer required. This row has been retained so that any legacy cross references to Class 2B(3) are re-directed to Class 2B(2).
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Class	General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in clause 631)				Compaction Requirements in Clause 612
				Property (See exception in previous column)	Defined and Tested in Accordance with	Acceptable Limits Within:-		
						Lower	Upper	
2C(1)	Stony cohesive material	General fill - Profile Fill in specific locations over the trenches where permitted only. Not acceptable over the vault (or for surcharge fill over the trenches without an acceptable permanent end use post-surcharge).	Natural material or crushed rock. None of the constituents shall include any Class 3 material, chalk, limestone or calcareous materials. Non-plastic material is required to deliver the strain distribution function of the profile fill in the short term i.e. to bound undrained conditions. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from source code "P" natural aggregates – except limestone, chalk, Class 3 or calcareous materials. See Notes 8, 9 and 10. Materials conforming to other source codes require prior approval from NWS, substantiated by further studies to assess acceptability against the Environmental Safety Case.	(i) grading	BS 1377: Part 2	As standard Class 2C in Table 6/2		Tab 6/4 Method 2
				(ii) plastic limit (PL)	BS 1377: Part 2	Non-Plastic		
				(iii) mc (see Note 12)	BS 1377: Part 2	Opt mc-2% (See note 16)	Opt mc +2% (See note 16)	
				(iv) MCV	Clause 632	8.5 (see note 20)	15 (see note 20)	
				(v) undrained shear strength of remoulded material	Clause 633	50 kN/m²	150 kN/m²	
				(vi) drained shear strength of remoulded material	Clause 636	$\phi' = 28^\circ$ $c' = 0 \text{ kPa}$	-	
				(vii) pH BS: 1377 Part 3	Refer to Note 20 in Appendix 1/5	6	9	
				(viii) carbonate content	Refer to Note 19 in Appendix 1/5	-	5% w/w	

Class	General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in clause 631)				Compaction Requirements in Clause 612
				Property (See exception in previous column)	Defined and Tested in Accordance with	Acceptable Limits Within:-		
						Lower	Upper	
2C(2)	For Class 2C(2) please refer to Class 2C(1). Class 2C(2) is no longer required. This row has been retained so that any legacy cross references to Class 2C(2) are re-directed to Class 2C(1).							

Notes:

1. to 10. Refer to Standard Table 6/1 Notes in SHW.
11. All acceptable earthwork materials from site won and imported sources must comply with the contamination limits in Specification Appendix 6/14. All acceptable earthwork materials imported onto site must come from certified uncontaminated inert sources.
12. The moisture content (mc) of granular fills shall be determined on the material passing the 20mm BS sieve.
13. Where material source codes are referenced these are as listed in Table 6/7.
14. Where materials are required to be aggregates conforming to BS EN 13242 materials certificated as being compliant with BS EN 13285 are acceptable specification requirements and the Declaration of Performance for constituent parts to BS EN 13242 are provided to the Overseeing Organisation.
15. Materials shall comply with the current Environmental Regulations at the time of use. Reference shall be made to Annex ZA (informative) of BS EN 13242.
16. Where Note 16 is referred to in Table 6/1 the moisture content shall lie in the range necessary to achieve 95% of maximum dry density obtained with the compactive effort specified on the Optimum Moisture Content (OMC) / Dry Density Relationship as defined by BS1377 Part 2 (2022).
17. Where determination of the optimum moisture content of imported materials is required and the grading of the material places it in Zone 'X' as defined in BS1377 Part 2 Figure 3, then the omc shall be determined using a CBR mould where > 10% of the material passes the 37.5mm BS sieve. Where this is the case, the Contractor shall propose a suitable adjustment of the results (dry density and moisture content) to allow for the influence of the coarse fraction, to be agreed with the CQA Engineer, following one of the methods defined in BS 6031:2009 7.6.4 and associated references. The procedures for soils susceptible to crushing during compaction shall be applied to all relevant soils.
18. The upper and lower limits for the Class 1 and 2 materials are based on experience of similar materials; however these values shall be confirmed by the Contractor for each source of fill prior to inclusion of the fill in the permanent works. The limits shall be set to achieve the requirements of HA 44/91 for the specified method of compaction, (note: HA 44/91 has been withdrawn and not replaced, however for the purpose of setting compaction requirements it shall still be referenced), the MC/MCV shall be set such as the undrained shear strength (where applicable) is the overriding minimum acceptable parameter within the works.
19. For all fills where MCV and shear strength acceptability limits are provided the MCV compliance criteria shall be used to control the acceptability of the fill material, subject to compliance with NG632, unless agreed otherwise with the CQA Engineer.
20. Where only undrained shear strength is specified as the method of material classification and control, the Contractor may use a Moisture Condition Apparatus (MCA) provided that MCV results are calibrated against the unconsolidated undrained remoulded shear strength determined by laboratory triaxial testing in accordance with SHW 633 and BS 1377: Part 2 (2022), Section 13 on 100mm nominal diameter samples, and the MCV test in accordance with SHW 632. The Contractor shall submit details of his proposed calibration method to the CQA Engineer for acceptance prior to the start of earthworks.

Appendix 6/2 – Requirements for Dealing with Class U1B and U2 Unacceptable Material

If the Contractor suspects the presence of contamination, including but not limited to U1B or U2 material, they shall inform LLWR. LLWR will then advise on the course of action (testing, dealing with material etc.).

The Contractor shall be aware that no material (UB1/U2 unacceptable or otherwise) is to be removed from site, unless instructed by LLWR.

The Contractor shall also be aware that Hazard Maps A, B, C and D and the LLWR Ground Information Folder are included with the pre-construction information and provide an indication of areas of potential contamination. The LLWR Ground Information Folder includes the LLWR Live Services Drawing BE2846604, historic information associated with the previous use of the site as a Royal Ordnance Factory and further information on areas of potential radiological and non-radiological contamination.

Following the HAZCON (LLWR-RDP-T1.00-RP-208) the following risks were also identified to be present within the area of the DP1 profile and surcharge works:

- Exposure to radiation contamination, TNT residue, other contaminants
- Trench excavation will follow puncturing trench cap membrane Spread of contamination could occur across site during bulk soil movement, not just localised on the trench cap.
- Potential for waste to be above membrane.

Appendix 6/3 – Requirements for Excavation, Deposition, Compaction (Other Than Dynamic Compaction)

All materials shall be placed and compacted in accordance with the requirements of the Specification for Highway Works (Series 600).

Materials shall be excavated in accordance with Clause 602.6 where a combination of acceptable and unacceptable materials is encountered.

Any former walls and/or foundations encountered within the formation are to be broken out to 1.0m below formation level. For clarity, the existing Vault 8 structure including the walls and Secant Pile wall are not to be broken out.

The Contractor shall make all arrangements that they consider necessary prior to commencement of the Works to ensure the following:

- i. Excavations remain stable whilst open.
- ii. De-watering systems remain operational during the works to prevent degradation of existing or proposed backfill material, and to ensure stability of the excavations.
- iii. Batters are adequately benched to allow filling to the satisfaction of LLWR and the CQA Engineer.
- iv. The Contractor shall be responsible for potential damage to adjacent land, properties, services etc. as a consequence of their chosen methods of working.
- v. When planned excavation of soft compressible deposits has been completed, the materials at the base of excavation shall be inspected by a suitably qualified and experienced geotechnical engineer/engineering geologist prior to backfilling.

1. The drawing numbers of all drawings which give related earthworks requirements including line and level.

Refer to the drawings and 3D models listed in Appendix 0/4.

2. Blasting for Excavation

Blasting is not permitted.

3. Cutting Faces

- (i) *Undercutting restrictions - extent and limitations for sequential excavation and backfilling, where Contractor is required to undercut slopes or toes of cuttings.*

Cut faces shall be made good using any of the methods set out in SHW 603.7. Isolated areas of soft, fragmented or insecure material shall be excavated and filled with material of similar surrounding characteristics to the requirements of the CQA Engineer. Undercutting is not permitted unless otherwise permitted on the contract drawings and/or agreed with the CQA Engineer.

- (ii) *Clearing loose material, where no topsoiling is required, by airline hose including maximum pressure and nozzle arrangements.*

Not used.

- (iii) *Making face stable, where no topsoiling is required, including tolerances of irregularities in the cut face, depth of cut-back and thickness of cementitious material to be applied if different from Clause 603, extent of cementitious material to be applied, location and type of reinforcement and details of weep holes.*

Not used.

- (iv) *Protecting face of soft or insecure material interlayered with rock, where no topsoiling is required, including depth of back and details of masonry infill.*

Not used.

- (v) *Making good prior to topsoiling*

Not used.

- (vi) *Other requirements for cuttings*

Where seepages are encountered during the works the Contractor shall inform the Site CQA Engineer immediately. In areas of persistent or significant groundwater seepage from cutting faces, additional drainage measures shall be provided as specified by the CQA Engineer.

Where cutting slopes include the requirement for berms to be constructed, the berm shall be graded to shed water to the ends of the cutting and away from the earthwork.

Temporary ditches shall be provided by the Contractor to prevent ponding of water on or adjacent to all earthworks, with any outfalls agreed with LLWR and the CQA Engineer. It shall be the responsibility of the Contractor to prevent weathering / degradation of cut faces by topsoiling and seeding sufficiently soon after construction.

4. Watercourses including ditches etc.

- (i) *New or modifying old – details including protection, lining etc.*

Refer to Specification for Design Package 2. Includes the modification of the cap perimeter drain to allow for profile fill/surcharging and contractors temporary drainage measures.

- (ii) *Redundant – where draining and clearing required, extent of excavation and Classes of fill for their infilling*

Not used.

5. Embankment Construction

Embankments (in this instance the profile fill and surcharge fill are considered embankments) shall be constructed in such a way as to ensure unrestricted drainage of water from the earthworks. Granular materials placed in composite embankments shall generally be placed beneath cohesive soils in order to prevent perched water tables within embankments and any associated softening and/or instabilities. Where this is not possible, the cohesive material shall be shaped to shed water and following precipitation events the upper most layer may need removed to provide a firm base for subsequent layer construction, any such instances shall be reviewed and agreed with the CQA Engineer and/or LLWR.

It is not currently anticipated that any cohesive profile fill would be suitable for re-use within the final cap construction unless the Contractor can demonstrate compliance with materials outlined in Specification AEC-RDP-T1.00-SP-052.

Unless specifically provided for within the contract no trenches or other excavations will be permitted within completed embankments.

No modified fill materials shall be used below unless demonstrated to the satisfaction of LLWR and the CQA Engineer.

Formation Inspection / Proof rolling / Testing – Requirements (Trenches only)

Foundation/formation inspections shall be carried out jointly by the Contractor and the CQA Engineer. Any treatment measures necessary; including the location, extent and depth of any inadequate foundation/formation strata to be removed, shall be agreed with the CQA Engineer and recorded. All areas of embankment foundations shall be proof-rolled prior to fill placement. The proof rolling shall consist of at least four passes of a smooth-wheeled vibratory roller having a minimum mass per metre roll width of 2100kg, or other suitable method agreed with the CQA Engineer. Inadequate foundation strata in embankment foundations shall be material as identified above and areas where the cohesive soil does not meet the minimum shear strength requirements defined above. This should be identifiable by the fact that the soil does not support the roller weight during proof-rolling without excessive deformation and by insitu testing.

The undrained shear strength (C_u) of foundation strata shall also be demonstrated by in-situ testing (hand vanes, or equivalent as agreed with the CQA Engineer) to the satisfaction of the CQA Engineer, the minimum allowable value shall be 40 kPa unless otherwise stated on the design drawings or by the CQA Engineer. Testing shall be carried out at intervals defined in Specification Appendix 1/5. A set of 3 no. measurements shall be carried out at each test location to establish the lowest reliable strength ensuring values affected by gravel content are ignored and repeated. Further testing will be required if soils are variable. If the foundation material does not satisfy the minimum requirements, it shall be excavated and replaced. Depths and extents of removal shall be agreed with the CQA Engineer. Where the formation is found to be granular in nature it should be visually inspected and proof rolled.

The area of excavated formation exposed at any one time shall be kept to a minimum dependent on ground and weather conditions and availability of fill material, in order to minimise the area of trenches exposed to water ingress (e.g. from precipitation).

Notice shall be given to the CQA Engineer of the expected date and time of completion of excavations and when the excavations have been taken out to the lines and levels specified or shown on the Drawings the Contractor shall give notice to the CQA Engineer to allow an inspection to be arranged.

No formation shall be covered until it has been tested in accordance with this Appendix and the Contractor has obtained the CQA Engineer's sanction to proceed with the Works requirements stated by LLWR.

Formation Inspection / Proof rolling / Testing – Requirements (Vault 8 only)

The formation for the profile fill over the Vault 8 containers shall be on a nominally 300mm thick layer of void fill (Refer to RD746), No proof rolling or verification testing is required for the void fill. A visual inspection will be undertaken subject to the Contractor preparing suitable risk assessments and method statements that are submitted to LLWR and the CQA Engineer for review and approval. It should be noted that a geotextile membrane is required to be placed over the void fill prior to receiving the profile fill and as such the formation will need inspected to ensure it is adequate for installation of the geotextile.

(i) Limits on oversteepening or in increase in width

Embankments and other areas of unsupported fills shall not be constructed with side slopes steeper than 1 in 3. (vertical to horizontal proportions) unless indicated otherwise on the Earthworks Drawings.

Where erodible materials (including Classes 1B and 2E) are deposited within 1m of the earthworks outline, slopes steeper than 10 degrees shall be covered as soon as possible with topsoil or other protection measures agreed with the CQA Engineer.

(ii) Stage construction of fills – details and rates of controlled filling

Not used.

(iii) Surcharging – details including time period, type of surcharge material, initial level of top of surcharge above designed formation or sub-formation

The extent of the areas to be surcharged is shown on drawings RD655, 659, 660 and 661. Drawing 746 provide details of the Earthworks Details.

An Observational Approach is to be adopted and the actual hold period will be determined by the rate of settlement recorded by the monitoring system installed within the interim cap. At present the hold period is estimated to be a minimum of six months. A further monitoring system is included within a trial area over the containers in Vault 8. Refer to Specification Appendix 6/12 for details on the monitoring infrastructure.

(iv) Minimum thickness of capping or of sub-base as appropriate for weather protection of sub-formation or formation

The minimum thickness of capping or of sub-base as appropriate for weather protection of sub-formation or formation shall be as defined in Clause 608.9. No reduction in thickness shall be permitted. The Contractor's particular attention is drawn to Clause 608 (Construction of Fills) of the SHW. In particular, protection of sub-formation or formation against weather shall be carried out in accordance with Specification for Highway Works sub-clause 608.9(i)(a) or 608.9(ii).

(v) Description of location, class and thickness of starter layers

The locations, and class and thickness of starter layers and drainage layers are shown on the relevant construction drawing (drawing number RD746).

Where coarse granular fills are used in starter layers, drainage layers (including herringbone drains), scour protection or fill to structures then geotextile separators shall be installed in accordance with Specification Appendix 6/5.

(vi) Additional general requirements

Where minimum shear strength requirements are specified for the earthwork formation material, the undrained shear strength (c_u) of formation material shall be demonstrated by in-situ testing (Hand vanes, or equivalent as agreed with the CQA Engineer) to the satisfaction of the CQA Engineer. If the formation material does not satisfy the minimum requirements, it shall be excavated and replaced as agreed with the CQA Engineer. Depths and extents of removal shall be agreed with the CQA Engineer.

Soft Spots (over Trenches only)

All areas of embankment foundations shall be proof-rolled prior to fill placement.

The proof-rolling shall consist of at least two passes of a smooth-wheeled vibratory roller having a minimum mass per metre roll width of 2100kg, or other suitable method agreed with the CQA Engineer.

The extent of soft spots shall be determined by inspection during proof-rolling. Soft spots shall be excavated and backfilled as stipulated on the Standard Earthworks Detail Drawings.

Foundation inspections shall be carried out jointly by the Contractor and the CQA Engineer; and any remedial measures necessary, including the location and depth of any soft spots encountered, shall be agreed and recorded.

Cohesive/Granular fill interfaces

Cohesive/granular fill interfaces shall be constructed such that drainage of the interface is towards the edge of the embankment. The slope of the interface shall be such that any water drains to the outside of the embankment. No pockets of granular material shall be formed within cohesive material.

Additional Requirements

It is required that the Contractor submit a detailed method statement outlining all the earthworks practices they will undertake to minimise the infiltration into the profile fill and underlying waste both in the Trenches area and Vault 8. The method statement is required to be approved by LLWR and/or the CQA Engineer prior to work commencing on site.

6. Compaction

(i) General

(a) Requirements if compaction not to comply with Clause 612.

Compaction shall be undertaken in accordance with Specification for Highway Works Clause 608, Clause 612 and Table 6/1.1 of Specification Appendix 6/1.

The maximum size of clay lumps for cohesive materials prior to compaction shall be no more than two thirds of the compaction layer thickness. The maximum size of cobbles and boulders shall be no more than two thirds of the compaction layer thickness.

For end product compaction, the Contractor shall employ methods and equipment that ensures the earthworks plant can fully remould cohesive fill materials, breaking down all lumps of soil and reducing air voids to the specified limit uniformly throughout the earthworks.

(ii) Method Compaction

(a) Locations where extra compaction in top 600mm for Classes 1A, 1B, 2A, 2B, and 2C is not required for full width of embankment or between outer extremities of verges

Extra compaction in the top 600mm for Classes 1A, 1B, 2A, 2B, and 2C over the full width of the embankments to Specification for Highway Works Clause 612.10 is required. Temporary over-widening to achieve adequate compaction of the shoulders of the embankment will be permitted.

(b) Requirements for compaction of drainage materials other than Class 6H

Not used.

(c) Frequency of field dry density testing

Field dry density testing shall be specified by the CQA Engineer where it is suspected that inadequate compaction has been achieved. The frequency of testing shall be based on the guidance provided in HA70/94 'Construction of Highway Earthworks'.

(iii) End Product Compaction

(a) Whether a nuclear surface density gauge is to be used or is permitted for measuring field dry densities

The use of a nuclear density gauge (NDG) is permitted (unless otherwise advised by LLWR) in place of Sand Replacement Tests (SRTs) subject to a calibration on each class of material (as defined in Appendix Table 6/1.1) at a rate of 1 SRT per 50 NDG readings. Nuclear density gauges shall be calibrated regularly and operated in accordance with BS1377: Part 9 (2025). The test shall be UKAS accredited.

Additional Requirements

When working over the Vault 8 containers, the placement of the Type B running surface and profile fill/surcharge material could lead to the yielding of the container lids. In order to minimise the impact, the plant to be used within the first 2.0m above the container lids to compact the profile fill/surcharge should not apply a load in excess of that equivalent to 0.7m of fill (Table 8 AEC-RDP-T1.00-RP-176), unless agreed with LLWR. No person operated equipment is to be used to compact fill within 2m of the container lids, it should be remote operated only (e.g. on the end of an excavator boom or via remote control) as stated within AEC-RDP-T1.00-RP-176.

It should be noted the Type B filter stone running surface requires regular inspections (frequency to be determined by the Contractor but expected to be at least daily) to ensure rutting of the surface doesn't impact the stability and safety of equipment travelling over the running surface to place bagged mag waste. Excessive rutting will require remediation to return the running surface to the tolerances within Annex A.

The Contractor is required to prepare and submit risk assessments and method statements to LLWR and the CQA Engineer for approval for the placement of the fill up to 2.0m above the container lids, detailing the plant proposed to be used and considering the impact of the plant on the underlying container lids (reference should be made to the Temporary Works Forum document TWf2024:3).

When the profile fill/surcharge material is at a level of 2.0m above the container lids, the above constraints can be relaxed but the compaction methodology still requires approval from LLWR and the CQA Engineer.

7. Limiting distance for deposition of materials referred to in sub-Clause 601.15, 601.16, 601.17 and 601.18

Limiting distance for deposition of materials referred to in Specification for Highway Works sub-Clauses 601.15, 601.16 and 601.17 are unchanged.

8. Locations of excavations that are permitted to be battered and requirements for benching prior to backfilling and compaction

Refer to drawings listed in Table 6/3.1 for locations where excavations shall be battered and the requirements for benching. Design of temporary excavations is the Contractor's responsibility. Excavations shall be battered to an inclination no steeper than stated on drawings in order to suit the zone of replacement fill and to provide a transition from treated to untreated ground. Refer to sub-clause 10 below for further details on benching.

9. Locations where excavation supports are to be left in position

All excavations that are not cut at stable slope angles shall be supported. No excavation supports are required to be left in place to suit the permanent works. Where supports are required for temporary works the Contractor shall remove them unless otherwise agreed in advance with the CQA Engineer. Excavation supports shall be removed as filling proceeds. The Contractor shall submit design proposals to allow the CQA Engineer to assess the impact, if any, on the permanent works.

10. Requirements for benching or shaping to natural or earthworks slope faces to receive fill [608.12]. Location of and benching requirements for cutting slopes to receive topsoil, and areas of cutting slopes which do not need harrowing or harrowing depth if not 50mm

Refer to construction drawings for requirements for benching or shaping to natural or earthworks slope faces to receive fill.

- (i) Where existing embankments are to be extended or where embankments are to be constructed on ground with a slope steeper than one in five, such slope being measured at right angles across the width of the embankment, sloping ground shall be benched as shown on the construction drawing (drawing number RD746).
- (ii) Fill material in areas of benching shall be carefully placed and compacted to ensure that no voids occur at the upright steps of the benching.
- (iii) Placing and compaction of the fill material shall be placed to a level at or above an adjacent bench before material is placed upon that bench.
- (iv) Four additional passes of the roller shall be made on the area within two metres each side of the upright face immediately following the compaction of the fill material on each bench.
- (v) Inadequate foundation materials or soft materials shall be removed where present and the resulting profile benched.
- (vi) Benches formed in sidelong ground shall be inspected by the CQA Engineer for signs of seepage. Starter layer (drainage blanket) shall be installed and connected to a suitable outfall/drain.

All cutting slopes to receive topsoil shall be prepared in accordance with Specification for Highway Works Clause 603.7.

11. Permitted variation (if any) in the maximum difference in fill level of Class 6M material on opposite sides of corrugated steel buried structures from 250mm

Not used.

12. Contract-specific permitted depth of any protection layer over corrugated steel buried structures

Not used.

13. Contract-specific permitted mixing of excavated materials where a combination of acceptable and unacceptable material is revealed in excavations

Not used, unless otherwise advised by LLWR and the CQA Engineer.

14. Fill to excavated voids or natural voids in excavation for foundations where ST1 concrete is not required or an alternative is permitted or required

Not used.

15. Additional requirements for corrugated steel buried structures

Not used.

16. Materials Supplied by Others

Any materials that are to be supplied by others will be detailed within the Contract Scope.

17. Stockpile Management

Excavated material classified as acceptable shall be temporarily stockpiled (in locations approved by LLWR) or deposited immediately as fill to suit contract requirements. Where acceptable materials have been tested and subsequently stockpiled for later use, the contractor should ensure that the

material does not degrade significantly from exposure to elements, such that the acceptability limits presented in Table 6/1 are exceeded at time of use.

The Contractor shall ensure that different classifications of fill (including any unacceptable material to be processed) are stockpiled separately. Additionally, where fill materials with common classification are sourced from different sources i.e. imported and site-won or materials of differing characteristics occur within a single area of excavation, these materials shall be stockpiled separately.

Stockpiled materials shall be situated on free draining surfaces free from the risks of ponding water and limited to a height as stated by LLWR or the CQA Engineer. Geotechnical unacceptable materials should be stockpiled with a maximum slope batter of 1 in 4, depending on the material parameters.

Stockpiled material may be subject to additional testing at the request of the CQA Engineer to ensure no degradation of the material has occurred.

All stockpiles (regardless of material type) will be constructed, protected and maintained in accordance with Defra Code of Practice "Construction Code of Practice for the Sustainable Use of Soils on Construction Sites" (2009). Soil and vegetation will be cleared before stockpile construction with excavated soil stored in accordance with the Defra Code of Practice and for re-use as stockpile cover. Where the stockpile mound will be in situ for a period in excess of six months and comprises principally soils or soil forming material, the site planning permission requires the stockpile to be grass seeded. Refer to Appendix 6/3 Clause 17 for further details.

18. Deposition and Compactors

The Contractor shall carry out compaction of backfill materials in accordance with the method specified in Table 6/1 for the specific fill classification, using the methods and layer thicknesses specified in Table 6/4. Plant and methods not included in Table 6/4 shall only be used providing the Contractor demonstrates at site trials that a state of compaction is achieved by the alternative method equivalent to that obtained using the specified method.

All deleterious materials including timber, plastics, ferrous and non-ferrous metals present in excavations or site-won materials shall be removed and disposed of in accordance with LLWR's instruction.

Following inspection of the base of excavation and prior to receiving fill the base shall be compacted to the satisfaction of the CQA Engineer.

Fill shall be placed and compacted in horizontal layers and each lift shall, as far as practicable, be brought up at a uniform rate ensuring all areas of fill achieve the final level at the same time.

The Contractor shall take all necessary steps to ensure that the moisture content of the placed fill is within the acceptable limits given in Table 6/1 and shall, where necessary, add water to or dry the fill in order to achieve this value.

No fill shall be placed and left uncompacted at the end of the working day. The base of excavations should be compacted and sealed prior to extended breaks in work to prevent degradation of the compacted surface. Compacted fill at the base of excavations shall be graded to falls to ensure free runoff of rainwater without ponding.

Should weather conditions (such as frost or heavy rain) cause deterioration of the material such that the earthworks no longer meet the specification, the Contractor shall take such steps as are necessary to bring the fill to specification requirements.

Compaction plant and methods shall be selected having regard to the proximity of existing trenches, excavations, retaining walls or other structures and all work shall be performed in such a way as to ensure that their existing stability is not impaired.

Appendix 6/4 – Requirements for Class 3 Material

Not Used.

Appendix 6/5 - Geotextiles Used to Separate Earthworks

Geotextiles are to be used as separation membranes at locations shown on the Construction drawings or as instructed by the Site CQA Engineer on site. All geotextiles used within the project shall be constructed within the tolerances stated in Annex A.

Locations at which geotextiles are used in drainage works are shown on the Drainage drawings within the DP2 package of works.

Details of the installation of geotextiles used to separate earthworks are shown on drawing number RD746.

1) General purpose geotextile separator materials for use in the works shall meet the following criteria:

Geotextiles shall comprise synthetic materials and shall conform to SWH Clause 609 requirements unless otherwise stated on the relevant drawings. Guidance shall also be taken from BS 8661.

For any separators proposed by the Contractor the selected grade of separator shall be appropriate when compared to the sub-grade strength, maximum particle size, manufacture guidance, and industry best practice and will be submit to LLWR/CQA Engineer 14 days ahead of placement.

Geotextiles shall be synthetic non-woven, thermally bonded or mechanically needled fabric composed of UV stabilised polypropylene or polyester filaments, except that where geotextile is in contact with PFA it shall be synthetic non-woven mechanically needled fabric composed of UV stabilised polypropylene filaments.

Geotextile Separator for above or below a starter layer shall meet the following criteria:

Characteristics	Test Standard	Value and units
Tensile Strength	BS EN ISO 10319:2024	30.0 kN/m (minimum)
Elongation at Maximum Load	BS EN ISO 10319: 2024	60% (maximum)
Static Puncture Resistance (CBR test)	BS EN ISO 12236: 2026	5350 N (minimum)
Dynamic Perforation Resistance (cone drop test)	BS EN ISO 13433:2025	14 mm
Characteristic Opening Size	BS EN ISO 12956:2020	60 µm
Water Permeability Normal to the Plane	BS EN ISO 11058:2019	30 l/m ² sec (minimum)
Durability	BS EN ISO 13251:2016 (Table 1, Annex B and Annex C)	100 years

2) Drawing references for locations where geotextiles and geotextile-related products are to be used including details of laying and lapping

Geotextiles are to be used as separation membranes at locations shown on the construction drawings, and location required by CQA Engineer or where the Contractor determines there are required. Details of

geotextiles used in drainage works are shown on the Drainage drawings contained within the DP2 package of works.

3) Required Attestation of Conformity System (or Assessment and verification of consistency of performance (AVCP) as detailed in BS EN 13251 (System 2+ or System 4)

AVCP System 4 shall apply for geotextile that is used as a separation layer only. Otherwise AVCP system 2+ shall apply.

4) Contract Compliance testing Details

Testing of geotextiles and geocomposites shall be in accordance with the Specification for Highway Works and relevant European Standards to confirm the supplier specifications. The frequency of testing geotextiles and geocomposites shall be as Specification Appendix 1/5, Table 1/5. As stated in Table 1/5, testing is not required if BBA certificate is available for the geotextile. Unless requested by the CQA Engineer to ensure material being used on site has not degraded during transportation, storage or handling.

Geotextiles and geo-composites used in the Works shall, when exposed to UV light in an accelerated weathering test, carried out and interpreted in accordance with BS PD 6533:1993 Section B, have a resistance to UV light and weathering, such that the time to reduce the characteristic tensile strength by 50% exceeds 3 months. They shall have a resistance to chemical and biological degradation, such that when tested in accordance with index test methods in BS PD 6533:1993 Sections 4 & 5, the reduction in characteristic tensile strength does not exceed 25% of the original value. The Contractor shall provide test results confirming that all relevant materials comply with these criteria.

Samples for testing in accordance with clause 609 shall be taken in accordance with the prescriptions of BS EN ISO 9862:2023. The sampling report shall be sent with the samples to the test laboratory and a copy shall be delivered to the CQA Engineer and project manager within 3 days of the sampling. Samples are to be retained by the Contractor for a minimum of 12 months.

5) Additional requirements

Supply and Handling

Geosynthetics shall be supplied to site in an undamaged condition and shall not be damaged by site handling, whether supplied in the form of rolls or packages. The methods of supply and handling adopted shall ensure that: the geotextile is supplied dry, and remains dry; the geotextile is protected from abrasion and damage; the geotextile is protected from contamination; the geotextile is protected from exposure to sunlight (ultra-violet radiation in particular).

Items within consignments of geosynthetics shall be supplied to site clearly marked with the name of the product and its grade or code number, in order that it shall easily be identified both before and after removal of any wrapping.

Geosynthetics shall not, by virtue of their storage environment, be subject to temperature extremes or other harmful conditions. Geosynthetics shall be stored on an even horizontal surface.

Geosynthetics shall be stockpiled or stored in such a way that the weight of overlying material does not damage that which is below. Any geosynthetics damaged during storage should be removed from site. Wrapping provided shall not be removed before the geotextile is used unless replaced by alternative wrapping that shall provide the required protection. The stockpile shall be prevented from collapsing.

Installation Procedure

The geosynthetics shall at all times prior to placement be stored under cover and suitably protected from direct sunlight and water. Care shall be taken to ensure that the geosynthetic reinforcement is not damaged during placement or during the deposition, spreading and levelling of the fill material. No traffic or site plant shall be permitted to traffic the reinforcement prior to placing the fill.

The fabrication and installation shall be planned and implemented taking into account existing or diverted services and drainage works.

Excluding geocomposite basal drainage layers, jointing shall be by overlapping and all overlap shall be a minimum of 500mm (or in accordance with manufacturers guidance where greater). Any punctures shall be made good by overlapping with geotextiles having an overlap of at least 500mm from the edge of the damaged areas. The number of joints shall be kept to an absolute minimum and only in accordance with the manufacturer's recommendations. Jointing shall only be permitted at the end of the roll in line with the manufacturer's recommendations. Jointing of geocomposite basal drainage layers shall be in accordance with the manufacturer's recommendations.

Requirement for Placing and Compaction of Fill

The layer or surface against which the geosynthetic is to be placed shall not have protrusions or sharp projections that are likely to damage the geosynthetic during installation or in service. It shall be free from stumps, stones or other large protrusions that could cause damage to the geosynthetic.

Placing and compaction of fill shall be carried out so that the geosynthetic shall be installed at the specified level on top of compacted fill, completed formation or completed sub-formation as appropriate. The surface on which the geosynthetic is to be placed shall comply with the surface level tolerance in Clause 616 and Annex A, where conflicts exist Annex A take precedence.

Fill shall not be tipped directly onto the geosynthetic. Fill or Type 1 sub-base material shall be carefully spread onto previously placed geosynthetic and shall be taken forward and placed by hand-raking or suitable plant with a bucket type that causes the covering material to cascade (spread) onto the geosynthetic. The fill shall not be dropped directly onto the geosynthetic. The fill shall be deposited and spread to prevent segregation. Fill shall not be end tipped onto the geosynthetic. Operation of construction plant directly on the installed geosynthetic is not permitted and its covering with fill material shall be carried out immediately after laying and jointing.

During placing and compaction of fill, care shall be taken to avoid displacing the geosynthetic. At overlaps, the top piece of geosynthetic shall be the first to be covered by fill and no fill shall be permitted to come between overlapping layers.

Appendix 6/6 – Fill to Structures and Fill above Structures Foundations

Not Used.

Appendix 6/7 – Sub-formation and Capping and Preparation of Surface Treatment of Formation

Not Used.

Appendix 6/8 – Topsoiling

The existing topsoil shall be stripped in advance of the membrane puncturing works and shall be transported and stored separately from other materials. The stockpile of topsoil shall be compacted and sealed so it can be reused on site, in accordance with SHW Clause 618.

If stripped material is to be temporarily stored on site it shall not interfere with other site operations so it can be left undisturbed until reuse. Stockpile location shall be approved by the LLWR and the CQA Engineer. The Contractor shall make sure that all planned erosion and sediment control practices are in place and functioning properly prior to stripping.

No topsoil is to be left within the footprint of the proposed filling works.

Appendix 6/9 – Earthworks Environmental Bunds, Landscape Materials, Strengthened Embankments

Not Used

Appendix 6/10 – Ground Anchorages, Crib Walling and Gabions

Not Used

Appendix 6/11 – Swallow Holes & Other Naturally Occurring Cavities & Disused Mine Workings

It is anticipated that during or following the placement of profile fill /surcharging material over the containers in Vault 8, the container lids or container stacks may yield. The contractor is required to take account of this and consider appropriate measures within their method statement and risk assessments.

Refer to Specification Appendix 6/3 Clause 6 – Additional Requirements for the special requirements related to compaction of the fill over the Containers.

Appendix 6/12 – Instrumentation and Monitoring

1. Details of protection to existing monitoring wells or on how to decommission them within the northern trenches is to be provided within Design Package 3, in particular the drawings (RD 1190, 1191 & 1192) referenced below.

2. Details of the settlement monitoring to be installed over the northern trenches and vault prior to the commencement of any profile and surcharging works is detailed in the Monitoring Specification (AEC-RDP-T1.00-SP-050) and the below listed drawings:

Drawing number	Drawing Title
RD1190	DP3 Construction Phase 2 - Commencement of Tranche 1 and Prior to Other Design Packages Sheet 1
RD1191	DP3 Construction Phase 2 - Commencement of Tranche 1 and Prior to Other Design Packages Sheet 2
RD1192	DP3 Construction Phase 2 - Commencement of Tranche 1 and Prior to Other Design Packages Sheet 3
RD1236	Observational Settlement Monitoring – Vault 8 – Sheet 1 of 3
RD1237	Observational Settlement Monitoring – Vault 8 – Sheet 2 of 3
RD1238	Observational Settlement Monitoring – Vault 8 – Sheet 3 of 3
RD1240	Observational Settlement Monitoring - Northern Trenches - Sheet 1
RD1241	Observational Settlement Monitoring - Northern Trenches - Sheet 2
RD1242	Observational Settlement Monitoring - Northern Trenches - Sheet 3
RD1243	Observational Settlement Monitoring - Northern Trenches - Sheet 4
RD1244	Observational Settlement Monitoring - Northern Trenches - Sheet 5
RD1245	Observational Settlement Monitoring - Northern Trenches - Sheet 6
RD1246	Observational Settlement Monitoring - Northern Trenches - Sheet 7

Appendix 6/13 – Ground Improvement

Not Used.

Appendix 6/14 – Limiting Values for Pollution of Controlled Waters

LLWR Soil Suitable for Use Levels (S4ULs)

LLWR has chemical limits for imported materials and any suspected site won fill that has contamination, as shown in S4ULs Table, below.

The Contractor shall provide the source and provenance of their proposed supply with a statement that it does not exceed the limits of the S4ALs. If the Contractor wants to propose material that exceeds the limits in the S4ALs, they will be required to submit details for LLWR to consider for acceptance. LLWR may require random testing of imported materials to confirm compliance. Limestone bulk aggregates are not allowed on the site.

LLWR Soils Suitable for Use Levels (S4ULs)

The site end-state following delicensing at the LLWR is expected to be public open space and therefore imported soils must be suitable for this land use. Furthermore, the current land use is commercial/industrial and therefore soils must also be suitable for this land use. The LLWR S4UL has therefore been set at the most stringent limit for these land use scenarios. The LLWR S4ULs are shown in the Table 1 below. S4ULs are generic screening criteria which are suitable for all uses. Soils with chemical concentrations above the shown criteria may still be suitable for use but would require further specific risk assessment by LLWR prior to authorisation.

Table Annex B1: LLWR S4UL's

Determined	Commercial (mg/kg)	POSpark (mg/kg)	LLWR S4UL (mg/kg)
Metals			
Inorganic arsenic	640	170	170
Beryllium	12	63	12
Boron	240000	46000	46000
Cadmium	190	532	190
Chromium (III)	8600	33000	8600
Chromium (VI)	33	220	33
Copper	68000	44000	44000
Elemental mercury	58	30	30
Inorganic mercury	1100	240	240
Lead	1100	580	580
Methylmercury	320	68	68
Nickel	980	3400	980
Selenium	12000	1800	1800
Vanadium	9000	5000	5000
Zinc	730000	170000	170000
Petroleum Hydrocarbons			
Benzene	27	90	27
Toluene	56000	87000	56000

Ethylbenzene	5700	17000	5700
o-xylene	6600	17000	6600
m-xylene	6200	17000	6200
p-xylene	5900	17000	5900
Aliphatic EC 5-6	3200	95000	3200
Aliphatic EC >6-8	7800	150000	7800
Aliphatic EC >8-10	2000	14000	2000
Aliphatic EC >10-12	9700	21000	9700
Aliphatic EC >12-16	59000	25000	25000
Aliphatic EC >16-35	1600000	450000	450000
Aliphatic EC >35-44	1600000	450000	450000
Aromatic EC 5-7 (benzene)	26000	76000	26000
Aromatic EC >6-8 (toluene)	56000	87000	56000
Aromatic EC >8-10	3500	7200	3500
Aromatic EC >10-12	16000	9200	9200
Aromatic EC >12-16	36000	10000	10000
Aromatic EC >16-21	28000	7600	7600
Aromatic EC >21-35	28000	7800	7800
Aromatic EC >35-44	28000	7800	7800
Aliphatic + aromatic EC >44-70	28000	7800	7800
Polyaromatic Hydrocarbons			
Acenaphthene	84000	29000	29000
Acenaphthylene	83000	29000	29000
Anthracene	520000	150000	150000
Benz(a)anthracene	170	49	49
Benz(a)pyrene (only)	35	11	11
Benzo(b)fluoranthene	44	13	13
Benzo(ghi)perylene	3900	1400	1400
Benzo(k)fluoranthene	1200	370	370
Chrysene	350	93	93
Dibenz(ah)anthracene	3.5	1.1	1.1
Fluoranthene	23000	6300	6300
Fluorene	63000	20000	20000
Indeno(1,2,3-cd)pyrene	500	150	150
Naphthalene	190	1200	190
Phenanthrene	22000	6200	6200
Pyrene	54000	15000	15000
Coal tar (BaP as surrogate marker)	15	4.4	4.4
Chloroalkanes and alkenes			
1,2-dichloroethane	0.67	21	0.67
1,1,1-trichloroethane	660	57000	660

1,1,1,2-tetrachloroethanes	110	1500	110
1,1,2,2-tetrachloroethanes	270	1800	270
Tetrachloroethene	19	810	19
Tetrachloromethane	(carbon tetrachloride)	2.9	190
Trichloroethene	1.2	70	1.2
Trichloromethane (chloroform)	99	2600	99
Chloroethene (Vinyl chloride)	0.059	4.8	0.059
1,2-dichloroethane	0.67	21	0.67
1,1,1-trichloroethane	660	57000	660
1,1,1,2-tetrachloroethanes	110	1500	110
1,1,2,2-tetrachloroethanes	270	1800	270
Tetrachloroethene	19	810	19
Tetrachloromethane	(carbon tetrachloride)	2.9	190
Trichloroethene	1.2	70	1.2
Trichloromethane (chloroform)	99	2600	99
Chloroethene (Vinyl chloride)	0.059	4.8	0.059
Explosives			
2,4,6-trinitrotoluene (TNT)	1000	260	260
RDX and HMX	210000	49000	49000
Pesticides			
Aldrin	170	30	30
Dieldrin	170	30	30
Atrazine	9300	2300	2300
Dichlorvos	140	26	26
Alpha-endosulfan	5600	2400	2400
Beta-endosulfan	6300	2400	2400
Alpha-hexachlorocyclohexane	170	47	47
Beta-hexachlorocyclohexane	65	15	15
Gamma-hexachlorocyclohexane	67	14	14
Chlorobenzenes			
Chlorobenzene	56	1300	56
1,2-Dichlorobenzene	2000	24000	2000
1,3-Dichlorobenzene	30	390	30
1,4-Dichlorobenzene	4400	36000	4400
1,2,3-trichlorobenzene	102	770	102
1,2,4-trichlorobenzene	220	1700	220
1,3,5-trichlorobenzene	23	380	23
1,2,3,4-tetrachlorobenzene	1700	1500	1500
1,2,3,5-tetrachlorobenzene	49	110	49
1,2,4,5-tetrachlorobenzene	42	25	25
Pentachlorobenzene	640	190	190
Hexachlorobenzene	110	30	30
Phenol and Chlorophenols			

Phenol	760	760	760
2-chlorophenol	3500	1100	1100
2,4-dichlorophenol	3500	1100	1100
2,4,6-trichlorophenol	3500	1100	1100
2,3,4,6-tetrachlorophenol	3500	1100	1100
Pentachlorophenol	400	110	110
Other			
Carbon disulphide	11	1300	11
Hexachlorobutadiene	31	48	31

Appendix 6/15 – Limiting Values for Harm to Human Health and the Environment

Not used.

Annex A – Construction Tolerances

Earthworks Tolerances – Vertical Alignment			
Item / Component	Tolerance (levels)	Comment	Specification or Guidance Ref.
Formation Level (e.g. underside of profile/surcharge fill following topsoil strip or other preparation activities)	+ 20mm /- 30mm	Subject to pre and post topsoil strip topographic survey and formation proof role and verification test results.	This document
Running Surface (e.g. bagged waste formation level)	+ 20mm /- 30mm	Subject to rutting and uneven remediation as required.	This document
Fill Layers Thickness	+/- 50mm	Tolerance is linked to particle size; larger particle may justify larger tolerance range.	This document, SHW 600 Series
Final Elevation of Surcharge	+ 50mm /- 0mm	Notwithstanding the tolerance permitted, the minimum / maximum designed gradients shall be maintained.	This document
Geosynthetic materials	+/- 30 mm (horizontal and vertical)	Notwithstanding the tolerance permitted, geosynthetic should be fully in contact with underlying soil surface, with all reasonable steps taken to remove wrinkles.	This document
Geosynthetics materials laps	+/- 10 mm (horizontal) +/- 10 mm (vertical)	Tolerance on overlapping width. Lapped geosynthetic material should be in contact with each other.	This document
Gas Collection Formation Level; (the level following removal of surcharge fill)	+ 50mm /- 0mm	Notwithstanding the tolerance permitted, the minimum / maximum designed gradients shall be maintained.	This document and AEC-RDP-T1.00-SP-052

