A CAF GROUP COMPANY

GROUND SOLUTIONS

Strawsons Property
Phase 3, Witham Saint Hughs – Playing Fields Area

Earthworks Specification

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Strawsons Property

Phase 3, Witham Saint Hughs – Playing Fields Area

Earthworks Specification

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Notice

Preamble

This method specification has been prepared specifically for this area of work (Playing/Sports Fields, Phase 3 – Witham St. Hughs) and follows the format of Series 600 as described in the Specification for Highway Works (SHW).

WSH-BWB-GZZ-XX-SP-CE-0100
SERIES 100: PRELIMINARIES

APPENDIX 1/5 – TESTING TO BE CARRIED OUT BY THE CONTRACTOR

1.5.1 Unless otherwise stated below, all sampling and testing in this Appendix shall be undertaken by the Contractor.

1.5.2 All test results shall be maintained and prior to the issue of the "Certifica Completion Date" shall be forwarded to the Overseeing Organisation electronically in a format to be agreed.

1.5.3 The testing facilities utilised by the Contractor shall have achieved UKAS accreditation relevant to each test.

1.5.4 Sampling shall be carried out by a UKAS accredited laboratory. Each test shall be carried out within 24 hours of the sample being taken or as appropriate.

1.5.5 The Contractor shall submit weekly to the Overseeing Organisation a programme of the anticipated testing regime for the following week's work and copies of a preceding week's test results, including a commentary on any failures. This programme shall be submitted by 1200 hrs on the Friday preceding the week's testing.

1.5.6 24 hours' notice shall be given to the Overseeing Organisation to carry out inspections or witnessing tests. The Overseeing Organisation shall be given the opportunity to witness all tests. Prior to the Supervisor being asked to carry out an inspection the Contractor shall provide their signed quality inspection reports.

1.5.7 The Contractor shall give unfettered access to the Contractor's laboratory during working hours to members of the Overseeing Organisation's staff for the purpose of carrying out audit testing.

1.5.8 Notes on Table 1/5.1:

(N) indicates that a UKAS accredited laboratory sampling and test report certificate is required.
Unless otherwise shown in this Appendix tests and associated certificates for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.
Cube strength tests are not required for concrete complying with Clause 2602.
References to OO mean the Overseeing Organisation.

Table 1/5.1 Testing Details

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
601, 631 to 637, 640	1.	General granular fill	Grading/uniformity coefficient	Weekly	Required	
			MC (N)	Twice a week		
			OMC (N)	Weekly		Vibrating hammer metho
			SMC of Chalk (N)	n/a		
		(1C only)	Resistance to fragmentation (N)	Weekly		
	2.	General Cohesive Fills	Grading	Weekly		
			MC(N)/ PL (N)	Twice a week		
			Undrained shear strength (N)	Twice a week		HSV used to determine undrained shear strength
			OMC (N)	Weekly		
			SMC of Chalk (N)	n/a		
			Bulk density (PFA) (N)	n/a		
	3.	General Chalk Fill	MC (N)	n/a		
			SMC (N)	n/a		
	4.	Landscape fill	Grading/MC/MCV (N)	Daily		
	5.	Topsoil	Grading	Daily		
	6.	Selected granular fill	Grading/uniformity coefficient	1 per 400 tonnes		
			PI/LL (N)	n/a		
			Resistance to fragmentation (N)	Weekly for on-site material		[LA category but not for Class 6F4 and 6F5]
			SMC (N)	n/a		
			OMC/MC, MC (N)	1 per 400 tonnes		
			Organic matter/water soluble (WS) sulphate content (N)	Weekly		
			Oxidisable sulphides (OS) content and total potential sulfate (TPS) content (N)	Weekly		
			pH/chloride ion content (N)	Weekly		
			Resistivity (N)	1 No. per Source		
			Undrained and drained shear parameters (N)	n/a		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
	6F4 and 6F5		Size designation and overall grading category	1 per week per source	Required	
			Maximum fines and oversize categories	1 per week per source		
			Volume stability of blast furnace slag	6 monthly		
			Volume stability of steel (BOF and EAF) slag	6 monthly		
			Other aggregate requirements	Annex C of BS EN 13242		
			Laboratory dry density and optimum water content	Monthly per source		
			Water content			
	7.	Selected cohesive fill	Grading/MC/MCV/ bulk density (N)	1 per 400 tonnes		
			SMC of Chalk (N)	n/a		
			PI/LL (N)	Daily		
			Organic matter/ water soluble (WS) sulphate content (N)	Twice a week		
			Oxidisable sulphides (OS) content and total potential sulfate (TPS) content (N)	Twice a week		
			pH/chloride ion content (N)	Weekly		
			Resistivity (N)	1 No. per Source		
			Undrained and drained shear parameters (N)	1 No. per Source		
			Permeability (N)	1 per source		
	8.	Miscellaneous fill	MC/MCV (N)	Daily		
	9.	Stabilised Materials	Pulverisation	1 per lane width pe 200m length		
			MC/MCV (N)			
			Bearing Ratio (N)			
	Pulverised fuel ash		Chemical analysis	1 per consignment		
	Furnace bottom ash		Grading	1 per 300 tonnes		
	Fill adjacent to cementitious material or metallic items		Water-soluble sulphate (WS) content, oxidisable sulphides (OS) content and total potential sulfate (TPS) content (N)	1 per 400 tonnes or per location if less than 400 tonnes		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 600					
602	Earthworks material beneath surface of a road or paved centr reserve	Frost heave (N)		Required	If within 450mm of paved surface
	(i) Imported onto site		1 every four months		
	(ii) On site source		1 per source		
609, 621	Geotextiles	Tensile strength	1 per 400 square metres per source	Required	
		Elongation			
		Tensile strength of seams and joints			
		Static puncture			
		Characteristic opening size			
		Water permeability			
		Durability			
612	Compaction of fills			Required	
	Method Compaction	Field dry density (N)	As required (1 per 400 tonnes minimum)		
	End Product Compaction	Optimum mc (2.5kg rammer/vibrating hammer method) (N	Each class or sub class of material		
		Field dry density (N)	1 per 400 tonnes		
614	Cement stabilisation to form capping	Rate of spread of cement	1 per 500 square metres of cement spread	Required	
615 641 643	Lime stabilisation to form capping	Rate of spread of lime	1 per 500 square metres of lime spread	Required	
		Available lime content	Each source of lime weekly during stabilisation operation		
622 638 639	Earthworks for reinforced earth and anchored earth structures	Redox potential	5 locations within the affected area	Required	
	Drainage layers	Grading Chemical analysis	1 per 400 tonnes		
	Reinforcing Elements	Coefficient of friction	One for each type of element with each type of fill		
	Anchor Elements	Adhesion			
624	Ground anchorages	Proof loading	As required in Appendix 6/10	Required	

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 600					
626	Gabions			Required	
	Fill	Grading	1 per 400 tonnes		
		Los Angeles coefficient (N)			
	Wire and wire mesh	In accordance with manufacturer specification	1 per 400 square metres		
642	Earthworks materials for corrugated steel buried structures (if required)	Constrained soil modulus (M)	3 on each side of structure	Required	

WSH-BWB-GZZ-XX-SP-CE-0600
SERIES 600: EARTHWORKS

REVISION LOG

Status	Revision	Details	Date
S4	P01	First issue for approval	01/07/2022

Note:

The Contractor is advised of the following information that shall be read in conjunction with the published Specification for Highway Works and the Specification Appendices contained herein:

APPENDIX 6/1 – REQUIREMENTS FOR ACCEPTABILITY AND TESTING ETC. OF EARTHWORKS MATERIALS

Acceptable Limits for Fills in Table 6/1

6.1.1 The classification of earthwork materials shall be carried out using the requirements shown in Table 6/1 of this Appendix. A schedule of acceptability limits for the fill materials required for this contract (as defined in Table 6/1.1, below) is given in Table 6/1 of this specification. The grading requirements for each class of fill are given in Table 6/2 and Table 6/5 of the Specification for Highway Works (SHW). Further properties for materials in contact with metal components in reinforced soil systems are given in Table 6/3 of the SHW. The compaction requirements are given in Table 6/4 of the SHW.

(i) permitted Classes where alternatives are listed in the Specification:

Table 6/1.1 Permitted Classes of Material

Use	Description
General Embankment Fill (for 1:3 side-slopes or shallower)	Class 1A, 1B, 2A, 2B, 2C
Selected Embankment Fill (for steeper than 1:2.5 slopes)	Class 1A, 1B
Landscape Fill	Class 4
Topsoil	Class 5
Select Fill for Reinforced Soil	Not anticipated
Select Fill behind retaining walls	Not anticipated
Starter Layers	Class 6B, 6C
Capping	Class 6F1, 6F2, 6F3, 6F4, 6F5
Drainage Layer to reinforced soil	Class 6H or Type A or B Clause 505 of SHW
Lower bedding for corrugated steel buried structures	Not anticipated
Upper bedding for corrugated steel buried structures	Not anticipated
Surround to corrugated steel buried structures	Not anticipated
Trench Fill	Not anticipated
Selected cohesive material for stabilisation	Not anticipated
Stabilised cohesive material (capping)	Not anticipated

(ii) Class U1A material may be dried to make it workable such that it can be used as Class 4 material in landscaping bunds.

(iii) For details of the extents of general and selected fills refer to the earthworks drawings. These drawings shall be read in conjunction with all other relevant design information.

(iv) No additional sub-divisions of Classes in Table 6/1 are proposed.

(v) Where shear box testing is required by Table 6/1, it is to be undertaken in accordance with Clause 636.

(vi) Class 9 material (in-situ stabilised cohesive material) is not currently anticipated.

6.1.2 The acceptability of materials arising from the site earthworks or materials imported for use as earthworks fill shall be the responsibility of the Contractor, including the definition of classification and testing required. The requirements for earthworks materials testing are indicated in Specification Appendix 1/5. The Contractor shall be responsible for identifying the need for and location of trial pits and excavations should they be required to aid in materials classification.

For any imported materials, the testing for acceptability shall be carried out at the point of deposition.

In the case of site derived materials, testing for acceptability shall be undertaken at the point of origin. If, in the opinion of the Overseeing Organisation, the material has altered from the classification made by the Contactor, or has become unacceptable for whatever reason, they may require the Contractor to repeat the classification and acceptability tests given in Appendix 1/5 or remove such unacceptable material where placed in the works. The rate of further testing required shall be sufficient to ensure the correct classification of materials taking into account the variation of their properties. All testing shall be procured by the Contractor and undertaken in an independent laboratory with relevant UKAS accreditation for the required tests. The Contractor shall provide two copies of all the classification test results within, five working days of the completion of the test, to the Overseeing Organisation, duly signed by the Contractor's responsible engineer or technician.

Imported material shall be submitted for source approval a minimum of 14 days prior to use to enable testing to be undertaken to ensure compliance with the Specification.

6.1.3 Class 3 material is not required and shall not be used.

6.1.4 Class U1A materials may be crushed, graded or blended in order to render them acceptable, except for those materials listed in Clause 601.2 (i) (b) which may only be processed for use as Class 4 Landscape Fill. Class U1B material shall not be processed for use as acceptable fill.

6.1.5 Groundwater data has been provided in the Ground Investigation Report. Permanent groundwater lowering is not required. Temporary groundwater lowering is not expected to be required, but temporary drainage (including measures such as pumping from sumps) may be necessary in localised areas.

6.1.6 Minimum MCV required immediately before compaction for lime stabilised Class 9D material: To be provided in a future update, if required.

6.1.7 Requirements for unburnt colliery spoil: not required.

6.1.8 Rapid assessment procedure for material acceptability is not to be used on this project.

6.1.9 Removal of acceptable material off site or retention of unacceptable material: no exceptions to 602.3 and 602.5 are proposed.

6.1.10 Permitted use of material for purposes other than acceptable general fill: Materials complying with the requirements for Class 1 or 2, but surplus to the quantity needed to construct the works may also be used as Class 4 material.

6.1.11 Requirements for In Situ Resistivity Tests: Not used.

6.1.12 Requirements for In Situ Redox Potential Tests: Not Used.

6.1.13 California Bearing Ratio Requirements for Class 6R and 7I materials: The use of stabilised capping is not currently anticipated.

6.1.14 Requirements for assessment of the effects of water soluble sulfate, oxidisable sulfates and total potential sulfate: As required in Table 6/1.

6.1.15 Requirements for Magnesium Sulfate soundness test: Not used.

Table 6/1.1 Acceptable Earthworks Materials: classification and compaction requirements

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and contract specific 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	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within: Lower	Upper				
GENERAL COHESIVE FILL	2	A	–	Wet cohesive material	General Fill	Any material, or combination of materials, other than chalk.	(i) grading	EN ISO 17892-4	Tab 6/2	Tab 6/2	Tab 6/4 Method 1 except for materials with liquid limit greater than 50, determined by BS 1377: Part 2, only deadweight tamping or vibratory tamping rollers or grid rollers shall be used.	2	A	–
							(ii) plastic limit (PL)	BS 1377: Part 2	–	–				
							(iii) mc	BS 17892-1: See Note 4	OMC – 2% (but not less than PL-4%) (OMC based on 2.5kg rammer method or as otherwise agreed with the Designer)	OMC + 2%				
							(iv) MCV	Clause 632	Not used					
							(v) undrained shear strength of remoulded material	Clause 633	50kPa	150 kPa				
	2	B	–	Dry cohesive material	General Fill	Any material, or combination of materials, other than chalk	(i) grading	EN ISO 17892-4	Tab 6/2	Tab 6/2	Tab 6/4 Method 2	2	B	–
							(ii) plastic limit (PL)	BS 1377: Part 2	–	–				
							(iii) mc	BS 17892-1 See Note 4	OMC – 2% (OMC based on 2.5kg rammer method or as otherwise agreed with the Designer)	OMC + 2% (but not greater than PL-4%)				
							(iv) MCV	Clause 632	Not used					
							(v) undrained shear strength of remoulded material	Clause 633	50kPa	150 kPa				

Table 6/1.1 Acceptable Earthworks Materials: classification and compaction requirements (continued)

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and contract specific 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	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within: Lower	Upper				
GENERAL COHESIVE FILL	2	C	–	Stony cohesive material	General Fill	Any material, or combination of materials, other than chalk	(i) grading	BS 1377: part 2	Tab 6/2	Tab 6/2	Tab 6/4 Method 2	2	C	–
							(ii) plastic limit (PL)	BS 1377: part 2	–	–				
							(iii) mc	BS 17892-1: See Note 4	OMC – 2% (OMC based on 2.5kg rammer method or as otherwise agreed with the Designer)	OMC + 2%				
							(iv) MCV	Clause 632	Not used					
							(v) Undrained shear strength of remoulded material	Clause 633	50kPa	150 kPa				

Table 6/1.1 Acceptable Earthworks Materials: classification and compaction requirements (continued)

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and contract specific 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	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within: Lower	Acceptable Limits Within: Upper				
TOPSOIL	5	A	–	Topsoil, or turf, existing on site	Topsoiling	Topsoil or turf designated as Class 5A in the Contract	(i) grading	Clause 618	–	Clause 618	–	5	A	–
	5	B	–	Imported topsoil	Topsoiling	General purpose grade complying with BS 3882	–	–	–	–	–	5	B	–

Footnotes to Table 6/1

1	(02/16) App = contract specific Appendix
2	(02/16) Tab = Table
3	(02/16) Where in the Acceptable Limits column reference is made to App 6/1, only those properties having limits ascribed to them in contract specific Appendix 6/1 shall apply. Where contract specific Appendix 6/1 gives limits for other properties not listed in this Table such limits shall also apply.
4	The moisture content shall be determined on the material passing the 37.5mm sieve.
5	(02/16) Uniformity coefficient is defined as the ratio of the particle diameters D_{60} to D_{10} on the particle-size distribution curve, where: D_{60} = particle diameter at which 60% of the soil by weight is finer D_{10} = particle diameter at which 10% of the soil by weight is finer
6.	(02/16) The limiting values for Class U1B material are given in contract specific Appendix 6/14 and contract specific Appendix 6/15.
7	(02/16) For works in Wales see sub-Clause 601.21W.
8	(02/16) Where material source codes are referenced these are as listed in Table 6/7.
9	(02/16) Where materials are required to be aggregates conforming to BS EN 13242 materials certificated as being compliant with BS EN 13285 are acceptable for use provided that they meet all the specification requirements and the Declaration of Performance for constituent parts to BS EN 13242 are provided to the Overseeing Organisation.
10	(02/16) 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.
11	Where MCV values are to be used calibration must be made using on-site materials in a suitable accredited laboratory.
12	Grading to meet Class 6A, with the addition that the particle size at 50% passing (D_{50}) has a lower limit of 50mm and an upper limit of 100mm and that the particle size at 10% passing (D_{10}) has a lower limit of 0.15mm.
13	To be reviewed when the source approval results are available

APPENDIX 6/2 – REQUIREMENTS FOR DEALING WITH CLASS U1B AND CLASS U2 UNACCEPTABLE MATERIALS

6.2.1 Drawing references for excavation and disposal of known Class U1B and U2 material: Not used.

6.2.2 Pre-agreed requirements of the environmental authority for disposal including specific sites: Not used.

6.2.3 List of known hazardous materials likely to be encountered: None.

In the unlikely event that the Contractor encounters any asbestos, they are to cordon off the area immediately and raise this issue with the Employer to determine who is to deal with this issue. Where asbestos containing material has been identified it may be feasible to retain it on site beneath a geotextile marker membrane, such as Terram Hi-Vis (orange) or similar, and a minimum of 600mm cover. The locations of any such burial will be recorded on an as-built drawing by the Contractor. Where it is not feasible to cover the soils with 600mm of cover the asbestos should be removed from site.

Any material removed from site will require Waste Acceptance Criteria (WAC) testing in order to characterise the material before disposal. See App 2/5 and associated schedules.

6.2.4 Methods of excavation, precautions and requirements for handling:

It may be possible that previously unidentified contamination may be encountered during the Works. Site staff should be vigilant for visual and/or olfactory indications of contamination and any suspected contaminated material identified during the Works should be isolated and submitted for separate testing and assessment in order to determine the appropriate treatment for re-use or disposal. The excavation, handling and transport of any hazardous material requiring disposal off-site should be carried out according to all relevant regulations, guidelines and current best practice. Pre-notification of any movement of Class U2 material shall be submitted for authorisation to the receiving local Environment Agency Office responsible for the disposal site at least 3 working days before the transport of any consignment. The Contractor shall be responsible for registering the site as a producer of hazardous waste.

6.2.5 Requirements for special drainage and for sealing exposed surfaces of contaminated materials: Not used.

6.2.6 Test methods: see Appendix 1/5. Materials testing shall be undertaken by a UKAS accredited laboratory and using UKAS and MCERTS accredited tests where available and appropriate.

APPENDIX 6/3 – REQUIREMENTS FOR EXCAVATION, DEPOSITION, COMPACTION (OTHER THAN DYNAMIC COMPACTION)

Excavation

6.3.1 Excavations shall be excavated to the lines and levels contained within the Project 3D model (Civils 3D software) and as shown on the earthworks and ground improvement drawings provided for the works.

6.3.2 Blasting for excavation: blasting is not permitted.

6.3.3 Cutting faces: Not required.

6.3.4 Watercourses, including diches etc: Not required.

6.3.5 Embankment Construction:

(i) No oversteepening of burrow pit cutting slopes shall be permitted. Trenches for drainage or other works at the toe of the cutting slopes shall be adequately supported to prevent failure of the slopes. Such trenches shall not exceed 20 metres in length or remain open for a period in excess of 24 hours and shall be backfilled with well compacted materials as soon as is practical after temporary works. No trenches or other excavations shall be permitted within completed embankment slopes.

(ii) Stage construction of fills – details and rates of controlled filling: Not required.

(iii) Surcharging: Not required.

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

If the full thickness of capping or sub-base cannot be completed in one shift immediately following the preparation of the sub-formation or formation then a weather protection layer of at least 100mm (or as otherwise directed by the designer's site representative) of capping or sub-base must be placed.

(v) Starter layers: Not currently anticipated.

6.3.6 Compaction:

(i) General:

(a) The Contractor's attention is drawn to Clause 612 and Table 6/4 which gives the approved methods of compaction for the highway embankments.

(ii) Method compaction:

The requirements of 612.10 (ii) shall apply for the full width of the borrow pit in all cases.

Requirements for compaction of materials.

Field dry density is to be used as an additional quality assurance measure (but not as a substitute for method compaction). Refer to Table 1/5 for frequency. Target compaction (except in the upper 600mm of earthworks, where the

additional requirements of 612.10 (ii) applies) to be a minimum of 90% MDD relative to the compaction test method given in Table 6/1.1.
Minimum shear strength of 50kPa as determined by Hand Shear vane (cohesive materials only). Testing to be undertaken in line with Inspection testing plan on a 50m grid on each placed layer.

6.3.7 Limiting distance for deposition of materials referred to in sub-Clauses 601.16, 601.17 and 601.19 shall be as defined in those clauses.

6.3.8 Excavations shall be formed as described in Clause 602.12.

6.3.9 Excavation supports are not to be left in position, except in agreement with t Designer and the Overseeing Organisation.

6.3.10 Where fill is placed against existing slopes at an angle exceeding 1(v):5(h) benches shall be formed at the interface.

Benching of cutting slopes to receive topsoil is not required. For slope treatment details, refer to 6.3.3 (v), above.

6.3.11 Class 6M fill: No variation permitted, and reference should be made to Clause 623.7.

6.3.12 Protection layer over corrugated steel structures should be as per contract-specific details and clause 623.13.

6.3.13 Mixing of acceptable and unacceptable materials: refer to 6.1.4 of this specification.

6.3.14 Fill to natural or excavated voids shall be as Clause 604.

6.3.15 Additional requirements for corrugated steel structures should be as per contract drawings and Clause 623.2.

Additional clauses from the Works Information

6.3.16 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 be placed beneath cohesive soils in order to prevent perched water tables within the embankments and any associated softening and/or instabilities. No stockpiling of fill to a height greater than the final embankment height shall be permitted.

6.3.17 Benching shall be carried out as described below unless otherwise agreed with the Overseeing Organisation.

Where the existing ground is shown to be benched then;

(i) loose surface materials are to be excavated up to a depth of 200mm below existing ground levels and,

(ii) the area of the existing slope of gradient greater than 1v:6h is to be benched in 0.5m vertical steps unless otherwise directed on the drawings.

6.3.18 Temporary slopes in existing ground or fill areas shall be benched as part of th temporary works.

6.3.19 Interfaces between different classes of fill (except topsoil) or fill placed at different times shall be benched as follows unless otherwise shown on the drawings. The interface shall

be benched in 0.5m to 1.0m vertical steps so as to maintain the average slope/interface line shown on the drawings. Vertical interfaces or interfaces sloping at less than 1v:6h do not required benching

6.3.20 The Contractor's attention is drawn to Clause 612 and Table 6/4 which gives th approved methods of compaction for the highway embankments.

6.3.21 The Contractor shall ensure that the plant used and method of compaction employed for the compaction of layers of material overlying geotextile materials shall not cause harm to, or reduce the properties of, the geotextile material.

6.3.22 The Contractor shall have title to materials from site clearance, excavations and demolitions. The Contractor should seek to reuse or recycle material where possible to minimise waste.

6.3.23 Subject and without prejudice to the provisions of the Conditions of Cont expressions 'run to spoil in tips provided by the Contractor', 'haulage and deposition in tips off Site provided by the Contractor', 'disposal of material' and the like, both in this Series and in any other Series of the Specification shall be deemed to have the meanings of requiring the use of waste carriers registered and tipping sites licensed under the Control of Pollution Acts and in compliance with the Environmental Protection Act.

6.3.24 The Contractor shall, before commencing any part of the Works, submit to Overseeing Organisation a list of locations of tips off Site that he proposes to use for the disposal of materials arising from the temporary and permanent works. The list shall be updated to represent actual practice.

6.3.25 The Contractor shall whenever required produce to the Overseeing Organisatio information to show that the disposal sites have current licences or planning consents as appropriate together with details of any conditions or constraints upon their use and that the nature of materials for disposal together with the manner rates and timings of the disposals are acceptable to the waste regulation and disposal authorities, the licensed waste managers, and the local planning authorities, as appropriate.

6.3.26 The Contractor shall be required to provide copies of all Controlled Waste Transfer Notes relating to the disposal of materials arising from the temporary and permanent works.

6.3.27 Except for areas requiring subsequent ground treatment, soft spots shall be replaced with Class 2 material.

APPENDIX 6/ 4 – REQUIREMENTS FOR CLASS 3 MATERIALS

6.4.1 Class 3 material (chalk) is not present on site and shall not be used within the Works.

APPENDIX 6/5 – GEOTEXTILES USED TO SEPARATE EARTHWORKS MATERIALS

6.5.1 Geotextiles used to separate earthworks are not currently anticipated but may be required subject to site circumstances. Refer to the earthworks drawings. Note that geotextiles used as reinforcing elements are covered in Appendix 6/9 (Specific ation.

6.5.2 Where a Geotextile is to be used as a separator under fill it shall be laid on top of the subgrade.

6.5.3 The Geotextile shall be manufactured from synthetic fibres and have a minimum life expectancy of 100 years.

6.5.4 The geotextile shall sustain a tensile load of not less than 8kN/m run when tested in accordance with BS EN ISO 10319:2015 and shall have a minimum axial strain of 20% at failure. It shall also have a minimum water flow at right angles to its principal plane in either direction of 90 litres/m^2/sec when tested in accordance with Clause 609.4 (ii) and the flow rate shall not drop by more than 75% when under a normal pressure of 2 bar (200kN/m^2).

6.5.5 Generally, the geotextiles shall be laid from rolls in a longitudinal direction along the line of the road. Jointing shall be by lapping only. Physical jointing will not be permitted. The lap width shall be 500mm minimum.

6.5.6 In the event that a geotextile is used to demarcate regions of contaminated ground (e.g. Asbestos containing materials) it shall be bright orange coloured, but otherwise comply with 6.5.3 and 6.5.4. Also refer to Clause 6.2.3.

Additional clauses from the Works Information

6.5.7 The distribution and number of geotextile samples for testing and proof of its tensile load shall be specified by the Overseeing Organisation

6.5.8 All samples and test pieces cut from them shall be retained by the Contractor in a clean and dry condition for 1 month after completion of the works.

APPENDIX 6/6 – FILL TO STRUCTURES AND FILL ABOVE STRUCTURAL FOUNDATIONS

6.6.1 Not Required.

APPENDIX 6/7 – SUB-FORMATION AND CAPPING AND PREPARATION AND SURFACE TREATMENT OF FORMATION

Capping

6.7.1 In-situ CBR tests are required at the final earthwork level at 50m by 50m grid interval within the borrow pit area to be reinstated prior to placement of topsoil, to validate the design assumptions.

6.7.2 Preparation and surface treatment of the sub formation, including tolerances, shall be in accordance with Clause 616 sub-Clause 1.

6.7.3 Permitted class of materials for capping shall be Class 2A/2B in accordance with Table 6/1. Capping shall consist of one Class throughout its depth. If stabilised capping-substitute is required it shall be covered in a future revision to this Specification.

6.7.4 The procedure for constructing capping in cuttings shall be as described in 613.11 (i).

The procedure for constructing capping on embankments shall be as described in 613.12 (ii).

If stabilised capping-substitute is required it shall be covered in a future revision to this Specification.

6.7.5 A demonstration area is not required.

6.7.6 The profile of the sub-formation shall have the same longitudinal gradient, cross-fall and surface level tolerances as the formation.

6.7.7 If stabilised capping-substitute is required it shall be covered in a future revision to this Specification.

6.7.8 Rock (in an engineering rather than geological sense) is not expected encountered on this project. Treatment in accordance with 616.4 is therefore not required.

6.7.9 Details of any additional tests for rate of spread of lime (clause 615.6): If stabilised capping-substitute is required, it shall be covered in a future revision to th Specification.

6.7.10 Intervals for the testing for available lime if different from weekly (clauses 615.4, 643.4): If stabilised capping-substitute is required it shall be covered in a future revision to this Specification.

6.7.11 Preparation of formation on existing sub-base (clause 616.6): not used.

6.7.12 Requirements for cement type in lime and cement stabilisation including performance requirements to be included in the manufacturer's Declaration of Performar provided by the Contractor (clause 643.5): If stabilised capping-substitute is required it shall be covered in a future revision to this Specification.

6.7.13 Requirements for alternative thickness of layers to be stabilised (Clause 643.9): If stabilised capping-substitute is required it shall be covered in a future revision to this Specification.

6.7.14 Alternative treatment requirements for layers to be stabilised (Clauses 643.10, 643.16): If stabilised capping-substitute is required it shall be covered in a future revision to this Specification.

APPENDIX 6/8 – TOPSOILING

6.8.1 Topsoil is required for landscaping and as verge dressing for the proposed football pitches/fields as detailed by the landscape architect and in accordance with Appendix 30/1, 30/4 and 30/5; topsoil shall be classified as Class 5 (either site won or imported) in accordance with Table 6/1 and shall be placed to a minimum thickness of 100mm in the absence of any dictated specification.

6.8.2 Topsoil stockpile heights to be limited to 2m as per 602.10.

6.8.3 Reference period of time for when topsoil can be stockpiled: as 602.10.

6.8.4 Topsoil which is surplus to requirements shall be disposed of by the Contractor.

6.8.5 Classes 2E and 7B will not be used.

6.8.6 The use of Class 5B is permitted should it be necessary.

6.8.7 Topsoil treatment in areas to be turfed: Not required.

6.8.8 The requirements of Clause 618.3 are applicable, except 618.3 (iii).

6.8.9 No exemption from clause 618.4 (ii) (a) is permitted.

6.8.10 Standard proposed topsoil thickness is shown the Earthworks Details drawings. For particular landscaping requirements see the Series 3000 numbered appendices.

APPENDIX 6/9 – EARTHWORK ENVIRONMENTAL BUNDS, LANDSCAPE AREAS, STRENGTHENED EMBANKMENTS

6.9.1 Earthwork environmental bunds: Not anticipated to be required.

6.9.2 Landscape Areas: Not anticipated to be required.

6.9.3 Strengthened Embankments: Not anticipated to be required.

APPENDIX 6/ 10 – GROUND ANCHORAGES, CRIB WALLING AND GABIONS

6.10.1 Not anticipated to be required.

APPENDIX 6/11 – SWALLOW HOLES AND OTHER NATURALLY OCCURING CAVITIES AND DISUSED MINE WORKINGS

6.11.1 No swallow holes, cavities or disused mine workings are known to be on the site.

APPENDIX 6/12 – INSTRUMENTATION AND MONITORING

6.12.1 Instrumentation and monitoring is not currently proposed.

APPENDIX 6/13 – GROUND IMPROVEMENT

6.13.1 Ground improvement is not currently proposed.

APPENDIX 6/14 – LIMITING VALUES FOR POLLUTION OF CONTROLLED WATERS

General

6.14.1 The proposed scheme comprises the backfilling of a borrow pit dug on site to utilise the dug material as fill for the housing plots located with the overall site boundary. The earthworks will involve the backfilling of the borrow pit with site won fill (expected to be Class 2A/ 2B).

Background and conceptual understanding

6.14.2 The first stage in assessing whether a soil can be deposited in an area is to assess the potentially sensitive controlled waters nearby. If the area for deposition is close to (within 500m) a surface water body or in an area underlain by a Principal Aquifer there is a perceived risk that potential contaminants within the soil may impact upon controlled waters. It must then be determined whether contaminants are present within the soil. If the area for deposition is not in a controlled water sensitive area, further assessment for the potential harm to controlled waters is not considered necessary. Assessment of the potential harm to human health and the environment should still be undertaken, as detailed in Appendix 6/15.

Geology, Hydrology and Hydrogeology

6.14.3 Previous investigations have found the site to be comprise Topsoil over the completely weathered Scunthorpe Mudstone Formation (Lias Group). This material was excavated from the area considered in this specification and used as general fill in the wider development site. Consequently, the borrow pit will needed to be backfilled with material from other areas of site.

6.14.4 In line with current Aquifer Designation by the Environment Agency, the underlying geology of Scunthorpe Mudstone Formation is designated as unproductive aquifer, with negligible or no significance for water supply or baseflow to rivers, lakes and wetlands. They consist of bedrock with low permeability that naturally offer protection to any aquifers that may be present beneath.

6.14.5 The site is noted have several watercourses and tertiary courses with the nearest significant watercourses are Thurlby Lake, located approximately 1.1km south, and the River Witham, located approximately 1.2km south-east of the site.

6.14.6 Material imported or redeposited, if potentially contaminated, needs chemical testing to demonstrate suitability for use at the intended for backfilling of the borrow pit at a frequency of 1 per 5000m^3 (subject to a minimum of 3 for each material stream from any distinct source). Any soil that is deemed, by visual and olfactory observations, to be impacted by contaminants, should be sampled and submitted for leachate analysis to UKAS/MCERT accredited laboratories.

Excavation and Disposal of Known Class U1B and U2 Material.

6.14.8 The investigation has not identified the presence of any significant contamination at the site which would require remedial or mitigation measures regarding human health risk or risk to controlled waters and no further assessment or remediation deemed necessary at this time.

6.14.9 The Contractor should be vigilant for any signs of contamination during works. If materials encountered during the works are suspected of being contaminated, based on visual or olfactory assessment, the Engineer should be contacted immediately. The Contractor may be instructed to adopt a precautionary approach involving a higher sampling strategy. Material suspected of being contaminated shall be left in-situ while classification is being carried out. The contractor shall allow for whatever testing and other work that is necessary to classify the material in accordance with the requirements of the appropriate Authorities. Testing is to be done at a UKAS approved laboratory, approved by the Engineer.

APPENDIX 6/15 – LIMITING VALUES FOR HARM TO HUMAN HEALTH AND THE ENVIRONMENT

General

6.15.1 The proposed scheme comprises the backfilling of a borrow pit dug on site to utilise the dug material as fill for the housing plots located with the overall site boundary. The earthworks will involve the backfilling of the borrow pit with site won fill (i.e. expected to be Class 2A/2B).

Background and conceptual understanding

6.15.2 All soil that is excavated during the proposed construction, is anticipated to be suitable for use. However, the Contractor should be vigilant for signs of contamination. If materials encountered during the works are suspected of being contaminated, based on visual or olfactory assessment, the Designer should be contacted immediately.

Method of assessment

6.15.3 Material imported or redeposited, if potentially contaminated, needs chemical testing to demonstrate suitability for use at the intended location at a frequency of 1 pe 5000m^3 (subject to a minimum of 3 for each material stream from any distinct source). Any soil that is deemed, by visual and olfactory observations and confirmed by the Designer's site environmental scientist to be impacted by contaminants, should be sampled and submitted for leachate analysis to UKAS/MCERT accredited laboratories. The relevant chemicals of concern to be included in laboratory testing suites and Limiting Values are set out on the table following 6.15.17.

6.15.4 Human health Limiting Values have been sourced from generic assessment criteria for public open space use. Based upon the likely human exposure scenarios for this scheme, these are considered to be the most appropriate limiting values. Limiting factors for phytotoxicity are based upon guidance provided by the Ministry for Agriculture, Fisheries and Food (MAFF, 1998) for the protection of soil. The analyses suggested are based on the possible contaminants identified by the Preliminar Sources Study and a general suite for the assessment of risk to human health and the environment. In addition, and in accordance with the CL:AIRE DOWCOP direct transfer frameworks, imported material should not introduce a new hazard to site, therefore import criteria must have contaminant concentrations within and order of magnitude of the highest levels recorded on site.

6.15.5 Results of soil testing will be compared with Limiting Values to assess potential risk to human health and the environment.

6.15.6 The Limiting Values are conservative. Location-specific quantitative risk assessment may be applied.

6.15.7 Limiting values for Site won soils have been generated using CLEA V1.071 based on a public open space (Resi) end use unless otherwise stated. Soil parameters assume materials encountered will have a pH of 7 and a Soil Organic Matter (SOM) content of 1%.

Determinant	Imported U1B Threshold (mg/kg)	Site won U1B Threshold (mg/kg)	Source
Arsenic	79	79	LQM S4UL/LSC*
Barium	910	1350	LQM S4UL/LSC
Beryllium	2.2	2.2	LQM S4UL/LSC*
Boron	5	5	LQM S4UL/LSC*
Cadmium	2	120	LQM S4UL/LSC*
Chromium VI	7.7	7.7	LQM S4UL/LSC*
Chromium (III)	420	1500	LQM S4UL/LSC*
Copper	135	135	LQM S4UL/LSC*
Lead	240	630	LQM S4UL/LSC*
Mercury	3	120	LQM S4UL/LSC*
Nickel	75	75	LQM S4UL/LSC*
Selenium	10	1100	LQM S4UL/LSC*
Vanadium	480	2000	LQM S4UL/LSC*
Zinc	200	200	LQM S4UL/LSC*
Cyanide (Free)	10	43	BWB HH GSAC
Cyanide (Complex)	10	213	BWB HH GSAC
Total Phenols	10	780	LQM S4UL/LSC*
Benzene	0.01	72	LQM S4UL/LSC*
Toluene	0.01	56000	LQM S4UL/LSC*
Ethylbenzene	0.01	24000	LQM S4UL/LSC*
Xylene	0.02	41000	LQM S4UL/LSC*
Aliphatic C5-C6	0.01	570000	LQM S4UL/LSC*
Aliphatic C6-C8	0.01	600000	LQM S4UL/LSC*
Aliphatic C8-C10	0.01	13000	LQM S4UL/LSC*
Aliphatic C10-C12	10	13000	LQM S4UL/LSC*
Aliphatic C12-C16	20	13000	LQM S4UL/LSC*
Aliphatic C16-C21	80	13000	LQM S4UL/LSC*
Aliphatic C21-35	80	13000	LQM S4UL/LSC*
Aromatic C5-C7	0.01	56000	LQM S4UL/LSC*
Aromatic C7-C8	0.01	56000	LQM S4UL/LSC*
Aromatic C8-C10	0.01	5000	LQM S4UL/LSC*
Aromatic C10-C12	10	5000	LQM S4UL/LSC*
Aromatic C12-C16	20	13000	LQM S4UL/LSC*
Aromatic C16-C21	100	13000	LQM S4UL/LSC*
Aromatic C21-C35	100	13000	LQM S4UL/LSC*
Naphthalene	0.5	4900	LQM S4UL/LSC*
Acenaphthylene	0.5	15000	LQM S4UL/LSC*
Acenaphthene	0.5	15000	LQM S4UL/LSC*
Fluorene	0.5	9900	LQM S4UL/LSC*
Phenanthrene	0.5	3100	LQM S4UL/LSC*
Anthracene	0.5	74000	LQM S4UL/LSC*
Fluoranthene	2.9	3100	LQM S4UL/LSC*
Pyrene	2.8	7400	LQM S4UL/LSC*
Benzo(a)anthracene	0.5	29	LQM S4UL/LSC*
Chrysene	0.5	57	LQM S4UL/LSC*
Benzo(b)fluoranthene	0.5	7.1	LQM S4UL/LSC*
Benzo(k)fluoranthene	0.5	190	LQM S4UL/LSC*
Benzo(a)pyrene	0.5	5.7	LQM S4UL/LSC*

Indeno(1,2,3-c,d)pyrene	0.5	82	LQM S4UL/LSC*
Dibenzo(a,h)anthracene	0.5	0.57	LQM S4UL/LSC*
Benzo(g,h,i)perylene	0.5	640	LQM S4UL/LSC*
Total PAH (US EPA 16)	100	100	BWB Arbitrary standard**
Total TPH (C10-C40)	500	500	BWB Arbitrary standard**
Asbestos	Presence of fibres <0.001% or bound chrysotile	Presence of fibres <0.001% or bound chrysotile	Hazardous waste Directive
LQM S4UL/LSC* – Lowest of The LQM/CIEH Suitable for Use Levels (S4ULs) for public open space or order of magnitude of the highest recorded concentration on site. Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3271 ( ) Numbers in parentheses refer to phytotoxicity thresholds within vegetative rooting zones, depths defined by Appendices 6/8 and 6/9. NRTC: No Risk Threshold Calculated			

6.15.8 All threshold values refer to site-won materials or imported materials, placed in their final destination within 1m of finished ground levels. Materials encountered that exceed one or more of the parameters presented above shall be classified as U1B and dealt with in accordance with Appendix 6/2.

6.15.9 No free phase hydrocarbon shall be permitted for reinstatement in the works and shall automatically be classified as U1B, irrespective of the determined free ph composition. Such materials may be reclassified as suitable for reuse subject t appropriate treatments.

6.15.10 Modification to, or inclusion of additional threshold criteria for ecotoxicity / phytotoxicity may be required subject to consultation.

6.15.11 All threshold values presented in the above table are subject to consultation and agreement with the relevant statutory bodies and shall be treated as draft until written confirmation of their acceptance has been received.

6.15.12 Where possible, chemical testing should be specified to reporting limits which are one order of magnitude less than the relevant limiting value.

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