



Haigh Huddleston & Associates

Civil & Structural Engineering Consultants

Unit 4, Midgley Business Park, Bar Lane, Midgley WF4 4JJ

t 01924 574074 e info@haighhuddleston.co.uk

Earthworks Specification

Development At Lingards Road, Slaithwaite for SB Homes

Job No. 7567/ES01

Date: January 2024

CONTENTS

1. INTRODUCTION3

2. SCOPE OF WORKS3

3. METHOD STATEMENTS3

4. SUPPORT OF EXCAVATION4

5. INSPECTION & APPROVALS4

6. MATERIALS TO BE USED IN THE WORKS4

7. GENERAL CLASSIFICATION5

8. EARTHWORKS METHOD SPECIFICATION..... 11

9. HIGHWAY WORKS SPECIFICATION 11

1. INTRODUCTION

- 1.1. This document provides a general earthworks specification for site won arisings and imported fills to be reused as general fill below adopted highway, plots, private driveways and gardens at north of Lingards Road, Slaithwaite for SB Homes.
- 1.2. If materials differ from those as described in the specification, further advice should be sought from SB Homes or Haigh Huddleston & Associates.

2. SCOPE OF WORKS

- 2.1. The cut and fill earthworks application considered in this specification includes:
 - Excavation
 - Preparation of formation below existing site, private drives, adoptable highways and plot areas.
 - Raising ground levels immediately north of Lingards Road.
- 2.2. For the extent and levels for the earthworks refer to HHA drawing EI9/7567/21, confirm and check latest revision of external works prior to commencement on site.

3. METHOD STATEMENTS

- 3.1. Method statements should be submitted by the contractor to include:
 - Proposed method and sequence of excavation to be undertaken by contractor.
 - Methods of placing and compacting fill including details of compacting plant and proposed number of passes.
 - Temporary works arrangements for levels at boundary of site.
 - Temporary works arrangements to limit and control potential surface water run-off.
 - Proposed method of testing once compaction has taken place.

4. SUPPORT OF EXCAVATION

- 4.1. The contractor shall be responsible for the design, fabrication, erection and removal of all temporary works, and the temporary stability of the works at all stages.
- 4.2. Before the work commences the Contractor shall submit details of his proposals for supporting the sides of excavation which have slope greater than 1:1.5 or exceeding 1.2m. in height.
- 4.3. Any excavations adjacent to boundaries or proposed roads, services shall be carried out in such a manner as to avoid damage. The contractor shall submit details of his proposals and supply information to justify adequacy of his proposals.

5. INSPECTION & APPROVALS

- 5.1. The contractor shall comply with all the requirements of the Local Authority and Building Control regarding the notification, inspection and approval of all excavations, sub-formation levels. In particular, a Kirklees S38 inspector should inspect all formation below the adoptable highway once it is exposed. The contractor shall keep a dated record of all inspection and any instruction received which results in variances with the original scope of works.
- 5.2. The contractor shall provide a minimum 48 hours' notice to all regulators to enable the formation levels to be inspected and agreed if this is desired.
- 5.3. The contractor shall maintain full records including survey information and photographs of the formation levels exposed on site.

6. MATERIALS TO BE USED IN THE WORKS

- 6.1. Site investigation has been undertaken by Haigh Huddleston & Associates as detailed HHA Intrusive Site Investigation Report Ref E19/7567/R001 dated October 2023. The specification document is based on ground conditions as detailed in the site investigation.
- 6.2. The site was formerly open fields divided by dry stone walls, with a watercourse flowing from the central western area of the site to the north east. Near the head of the watercourse in the west of the site is a partially submerged water tank. Generally, the site investigations proved up to 2.8m of clays overlying 1.3-12.3m of weathered mudstone, except in the north west of the site where no mudstone was encountered and the clays directly overlaid sandstone. Beneath this, there was a sandstone bedrock encountered at 0.5-14.6m beneath existing ground levels. The depth to the sandstone reduced the further north and west within the site.
- 6.3. Due to the prevalence of clays on site, it is considered unsuitable for use in the highway works and clean material will need to be imported.
- 6.4. No significant contamination was encountered within the site.

- 6.5. Any materials which are deemed to be unsuitable (including for example materials with a high moisture content or oversized materials) cannot be used as general fill material. Such materials may become suitable for use subject to the approval of SB Homes, however this would be subject to them being workable which could for example require them to be stockpiled and air-dried or tracked over/crushed.
- 6.6. Dependent on the phasing of the works, there may not be sufficient appropriate site-won material for the raising of ground levels immediately north of Lingards Road and materials will need to be imported to site. Any materials brought on to site should be accompanied with a certificate showing levels of any contaminants including grading analysis and optimum moisture content result.
- 6.7. This Section is part of the Specification for Highway Works. it must be read in conjunction with the general requirements to the specification for the particular works to be undertaken

7. GENERAL CLASSIFICATION

- 7.1. 1 (02/16) Earthworks materials shall fall into one or other of the following general classifications
- (i) acceptable material: material excavated from within the site or imported on to the site which meets the requirements of Table 6/1 and contract specific Appendix 6/1 for acceptability for use in the permanent works;
 - (ii) unacceptable material Class UIA as defined in sub-clauses 2(i)(a) and 2(i)(b) of this Clause: material excavated from within the site which, unless processed so that it meets the requirements of Table 6/1 and contract specific Appendix 6/1, shall not be used in the permanent works;
 - (iii) unacceptable material Class UIB as defined in sub-clause 2(ii)(a) of this Clause: material excavated from within the site which, unless processed so that it meets the requirements of Table 6/1 and contract specific Appendix 6/1, shall not be used in the permanent works; and
 - (iv) unacceptable material Class U2 as defined in sub-Clause 3(i) of this Clause: material excavated from within the site which shall not be used in the permanent works.

7.2. (02/16) Unacceptable Materials

2 (02/16) Unacceptable material Classes UIA and UIB:

- (i) unacceptable material Class UIA shall be:
 - (a) material which does not comply with the permitted constituents and material properties of Table 6/1 and contract specific Appendix 6/1 for acceptable material; and
 - (b) material, or constituents of materials, composed of the following unless otherwise described in contract specific Appendix 6/1:
 - peat, materials from swamps, marshes and bogs;

- logs, stumps and perishable material;
 - materials in a frozen condition;
 - clay having a liquid limit determined in accordance with BS 1377: Part 2, exceeding 90 or plasticity index determined in accordance with BS 1377: Part 2, exceeding 65;
 - material susceptible to spontaneous combustion except unburnt colliery spoil complying with sub-Clause 15 of this Clause;
- (ii) unacceptable material Class U1B shall be:
- (a) contaminated materials, including controlled wastes (as defined in the Environmental Protection Act 1990 Part IIA) whose level of contamination is above that given either in contract specific Appendix 6/14 or in contract specific Appendix 6/15, but excluding all hazardous wastes (as defined in the Hazardous Waste (England and Wales) Regulations 2005) and radioactive wastes (as defined in the Radioactive Substances Act 1993).

Unacceptable material Class U2 shall be:

- (i) hazardous waste (as defined in the Hazardous Waste (England and Wales) Regulations 2005) and radioactive waste (as defined in the Radioactive Substances Act 1993).

Where required in contract specific Appendix 6/1, unacceptable material (other than Class U2) shall be processed by mechanical, chemical or other means to render the material acceptable for use in the permanent works in accordance with the requirements of Table 6/1 and contract specific Appendix 6/1.

7.3. Definitions

5 Where source codes are referred to these shall be for materials from the sources listed in Table 6/7.

6 (02/16) Chalk shall mean:

- (i) any porous material of natural origin composed essentially of calcium carbonate and identified as chalk on the maps produced by the British Geological Survey;
- (ii) material designated as Class 3 in contract specific Appendix 6/1.

7 (02/16) Argillaceous rock shall mean shales mudstones siltstones slates and micaceous schists composed of particles of clay and silt and mica. It shall include unburnt colliery spoil. Where argillaceous rock is imported onto the site, it shall be aggregate complying with BS EN 13242 from source codes P (natural aggregates described as shale, siltstone or slate), or G2 (refuse from hard coal mining (black coal shale)).

8 (02/16) Pulverised-fuel ash shall mean solid material extracted by electrostatic and mechanical means from the flue gases of furnaces fired with pulverised bituminous coal. It shall have a maximum particle size of mm. Where pulverised-fuel ash is imported onto the site, it shall be aggregate complying with BS EN 13242 from source code C1 (coal fly ash)

9 (02/16) Furnace bottom ash shall mean agglomerated pulverised-fuel ash obtained from the bottom of the power station furnace and having particle size no larger than 10 mm. Where furnace bottom ash is imported onto the site, it shall be aggregate complying with BS EN 13242 from source code C4 (coal bottom ash).

10 (02/16) Formation shall be the top surface of capping. Where no capping is required formation shall be the top surface of earthworks at the underside of sub-base, unless otherwise shown on the drawings.

11 (02/16) Sub-formation shall be the top surface of earthworks at the underside of capping.

12 (02/16) Stabilisation shall mean the spreading of cement or lime or both on a layer of deposited or intact granular or cohesive material, and the subsequent process of pulverising and mixing followed by appropriate compaction to form the whole or a constituent layer of a capping.

13 (02/16) Where 'recycled aggregate' is used, the material shall be aggregate resulting from the processing of inorganic or mineral material previously used in construction and shall have been tested in accordance with Clause 710. It shall not contain more than 1% other materials (Class X), not more than 50% in Class Ra (bituminous materials) and not more than 25% in Class Rg (crushed glass). Where 'recycled aggregate' is imported onto the site, it shall be aggregate complying with BS EN 13242 from source code A (construction and demolition recycling industries). Where 'recycled aggregate except recycled asphalt' is used in this Series, the aggregate shall have been tested in accordance with Clause 710. It shall not contain more than 1% other materials (Class X), not more than 1% in Class Ra (bituminous materials) and not more than 5% in Class Rg (crushed glass). Where 'recycled aggregate except recycled asphalt' is imported onto the site, it shall be aggregate complying with BS EN 13242 from source codes A2 (crushed concrete) and/or A3 (crushed bricks, masonry).

14 (02/16) 'As dug' shall mean material that has been excavated, transported and placed without any processing. Where imported material undergoes any processing, including cleaning and sorting, it will not be deemed 'as dug' and thus shall be aggregate complying with BS EN 13242.

7.4. Use of Fill Materials

15 (02/16) In addition to any grading requirements the maximum particle size of any fill material shall be no more than two-thirds of the compacted layer thickness except that cobbles having an equivalent diameter of more than 150 mm shall not be deposited beneath verges or central reserves within 1.30m of the finished surface

16 (02/16) Materials placed within 500 mm, or any other distances described in the contract specific Appendix 6/3, of concrete, cement bound materials, other cementitious mixtures or stabilised capping forming part of the permanent works shall conform to, as appropriate, the following requirements:

- (i) Materials shall conform to the following criteria:
 - (a) Water-soluble sulfate (WS) content determined in accordance with BS EN 1744-1 clause 10 shall not exceed 1500 mg of sulfate (as SO_4) per litre;
 - (b) Total sulfur (TS) content determined in accordance with BS EN 1744-1 clause 11 expressed as (S) shall not exceed 1% for aggregates other than air cooled blast furnace slag or 2% for air cooled blast furnace slag.
- (ii) Materials shall conform to at least one of the following options:
 - (a) When described in accordance with BS EN 932-3 and BS EN 13242 Annex A, limestone, chalk, dolomite, blast furnace slag, steel slag or crushed concrete are predominant
or
 - (b) The sulfide content of the material determined in accordance with BS EN 1744-1 Clause 13 is less than 0.5% (as SO_4). When determining WS, TS or sulfide content, at least five samples of each material shall be tested. The mean of the highest two values shall be used for comparison with the limiting values. This shall also apply if six to nine results are available. If ten or more results are available, the mean of the highest 20% of the results shall be used for comparison with the limiting values.

17 Material placed within 500mm, or any other distances described in the contract specific Appendix 6/3, of metallic structural elements forming part of the permanent works shall conform, as appropriate, to the following requirements:

- (i) Materials shall conform to the following criteria:
 - (a) Water-soluble sulfate (WS) content determined in accordance with BS EN 1744-1 clause 10 shall not exceed 300 mg of sulfate (as SO_4) per litre; and
 - (b) Total sulfur (TS) content determined in accordance with BS EN 1744-1 clause 11 expressed as (S) shall not exceed 1% for aggregates other than air cooled blast furnace slag or 2% for air cooled blast furnace slag.
- (ii) Materials shall conform to at least one of the following options:
 - (a) When described in accordance with BS EN 932-3 and BS EN 13242 Annex A, limestone, chalk, dolomite, blast furnace slag, steel slag or crushed concrete are predominant; or
 - (b) The sulfide content of the material determined in accordance with BS EN 1744-1 Clause 13 is less than 0.06% (as SO_4). When determining WS, TS or sulfide content, at least five samples of each material shall be tested. The mean of the highest two values shall be used for comparison with the limiting values. This shall also apply if six to nine results are available. If ten or more results are available, the mean of the highest 20% of the results shall be used for comparison

with the limiting values. The requirements in (i) and (ii) above shall not apply to metallic items protected by concrete or ancillary metallic items such as the tops of chambers and gullies.

18 (02/16) Unburnt colliery spoil may be used as general fill provided it is compacted in compliance with Clause 612 and complies with the requirements of contract specific Appendix 6/1.

19 (02/16) Pulverised-fuel ash shall not be placed within the dimension described in contract specific Appendix 6/3, below sub-formation or formation.

20 (02/16) Where pulverised-fuel ash is used, the Contractor shall for each consignment, make available to the Overseeing Organisation a record of the type and source from which it was obtained and a certificate of results of tests showing that the material complies with the requirements of Table 6/1.602

(02/16) General Requirements

1 (02/16) The Contractor shall employ only plant and working methods which are suited to the materials to be handled and traversed. He shall be responsible for maintaining the nature of the acceptable material so that when it is placed and compacted it remains acceptable in accordance with the contract. Acceptability shall be determined in accordance with Table 6/1 and any special contract specific requirements in Appendix 6/1.

2 (02/16) Haulage of material to areas of fill shall proceed only when sufficient spread in and compaction plant is operating at the place of deposition to ensure compliance with Clause 612.

3 (02/16) No excavated acceptable material or unacceptable material required to be processed, other than surplus to the requirements of the contract, shall be removed from the site unless indicated otherwise in contract specific Appendix 6/1. Material which is unacceptable only by reason of being frozen shall be retained on site when in that condition. Where the Contractor is permitted to remove acceptable material, or unacceptable material required to be processed, from the site to suit his operational procedure, then he shall make good any consequent deficit of material arising therefrom. Environmental requirements for processing of Class UIB material, in terms of limiting values of contaminants or other requirements, shall be set out in contract specific Appendix 6/1 in the earthworks Class for which the processed material is to be used.

4 (02/16) If any acceptable material or unacceptable material required to be processed is, where permitted by contract specific Appendix 6/1, used by the Contractor for purposes other than for general fill, sufficient acceptable fill material to occupy, after full compaction, a volume corresponding to that which the excavated material occupied shall be provided by the Contractor.

5 (02/16) Acceptable material (other than Class 5A or any Class 5B material replacing Class 5A material in accordance with sub-Clause 3 of this Clause) surplus to the total requirements of the permanent works and all unacceptable material Class UIA not required to be processed shall, unless indicated otherwise in contract specific Appendix 6/1, be run to spoil in tips provided by the Contractor. In the case of unacceptable material, Class UIB and Class U2, the Contractor shall comply with any specific requirements for disposal described in contract specific Appendix 6/2.

6 (02/16) Where the excavation reveals a combination of acceptable and unacceptable materials the Contractor shall, unless indicated otherwise in contract specific Appendix 6/3, carry out the excavation in such a manner that the acceptable materials are excavated separately for use in the permanent works without contamination by the unacceptable materials. Unless otherwise described in the contract classes of fill material required to be deposited separately shall be excavated separately without contamination by other Classes of material.

7 (02/16) The Contractor shall make his own arrangements for stockpiling of acceptable material, and unacceptable material to be processed, and for the provision of sites for the purpose.

8 (02/16) The Contractor shall ensure that he does not adversely affect the stability of excavations or fills by his methods of stockpiling materials, use of plant or siting of temporary buildings or structures.

8. EARTHWORKS METHOD SPECIFICATION (OUTSIDE ADOPTED HIGHWAY AREAS)

- 8.1. The objective of the earthworks strategy is to use site won materials as general fill below plots, driveways and gardens, the fill will be placed with nominal compaction.
- 8.2. Such compaction is designed to prevent excessive settlement in gardens, and to ensure a competent founding material for drives and new infrastructure.
- 8.3. Prior to infilling operations, all vegetation and topsoil is to be removed and formation levels inspected by the site manager. Any areas of wet ground or soft spots are to be excavated and replaced with suitable material.
- 8.4. The site won material should be placed with nominal compaction, typically comprising 200mm layers with at least 4 passes of a towed vibratory roller of at least 2,900kg/m width or similar.
- 8.5. Using a smaller roller such as a Bomag 138, the layers should be reduced to 150mm and rolled with at least 4 passes.
- 8.6. If different compaction plant is to be used please contact SB Homes or HHA to confirm the required layer thickness and number of passes.
- 8.7. As previously stated such compaction is designed to prevent excessive settlement in gardens, and to ensure a competent founding material for drives and new infrastructure.
- 8.8. Following re-engineering we would recommend that a series of CBR tests should be undertaken to confirm compaction levels have achieved a minimum of 3% CBR figures.
- 8.9. If following nominal compaction, the ground does not provide a competent founding material for plots, drives or gardens, further advice should be sought from SB Homes or HHA.

9. HIGHWAY WORKS SPECIFICATION

- 9.1. Highway formation to be inspected by Engineers prior to fill materials. It should be free from soft areas, water, mud and slurry and should be agreed by Highway Engineer and have been compacted by at least 4 passes of a smooth wheeled roller having a mass/in roll of 4.4 – 6.0 tonnes.
- 9.2. Soft spots will be identifiable by excessive deformation from the roller weight during proof-rolling. The extent of soft spots will be determined by inspection during proof-rolling. Any soft spots identified should be excavated to a depth of 600mm below the formation and brought back up in 150mm nom. size clean stone.
- 9.3. The contractor must ensure that the area is kept free from water during the progress of the works and provide permanent land drainage if required to do so by the engineer.
- 9.4. Due to the unsuitability of the material on site, clean 6F5 material could be imported to site for use below adopted highway areas.
- 9.5. All materials to be rolled and consolidated in accordance with DoT Specification for Earthworks (see attached). If in doubt type of compaction plant to be confirmed to HHA and advice sought.

- 9.6. Capping layer thickness to be determined by formation CBR values, as per Kirklees Council standard details. The capping layer should consist of well graded natural sand, gravel crushed rock, crushed concrete. The material should be compacted in accordance with Kirklees Council Highways Standards. On completion CBR tests on the completed capping layer should exceed 5%.
- 9.7. Please note if this is not reached additional capping thickness below highway areas may be required by Kirklees Council.

M. Huddleston. MEng

© Copyright: Haigh, Huddleston & Associates

TABLE 6/1: (02/16) Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (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			
2	Wet 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 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 1377: Part 2 See Note 4	PL -4%	App 6/1			
				(iv) MCV	Clause 632	App 6/1	App 6/1			
				(v) Undrained shear strength of remoulded material	Clause 633	App 6/1	App 6/1			
				(vi) Undrained shear strength of remoulded material	Clause 633	App 6/1	App 6/1			
2	Dry 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	B
				(ii) plastic limit (PL)	BS 1377: Part 2	–	–			
				(iii) mc	BS 1377: Part 2 See Note 4	App 6/1	PL -4%			
				(iv) MCV	Clause 632	App 6/1	App 6/1			
				(v) undrained shear strength of remoulded material	Clause 633	App 6/1	App 6/1			
				(vi) Undrained shear strength of remoulded material	Clause 633	App 6/1	App 6/1			
2	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 1377: Part 2 See Note 4	App 6/1	App 6/1			
				(iv) MCV	Clause 632	App 6/1	–			
				(v) Undrained shear strength of remoulded material	Clause 633	App 6/1	–			
				(vi) Undrained shear strength of remoulded material	Clause 633	App 6/1	–			

G

E

N

E

R

A

L

C

O

H

E

S

I

V

E

F

I

L

L

TABLE 6/1: (02/16) Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (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:					
6	A	Below water	Natural gravel, natural sand, crushed gravel, crushed rock other than argillaceous rock, crushed concrete, chalk, well burnt colliery spoil or any combination thereof. (Properties (i) and (ii) in next column, shall not apply to chalk.) Recycled aggregate Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9, and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A (construction and demolition recycling industries); G1 (red coal shale) G3 (pre-selected all-in from quarrying/mining)	(i) grading	BS 1377: Part 2 (On-site)	Tab 6/2	Tab 6/2	No compaction	6	A	–
S E L E C T E D	(ii) uniformity	See Note 5		10	–	Non-plastic					
	(iii) SMC of chalk index	Clause 634		–	20%						
	(iv) plasticity index	BS 1377: Part 2									
6	B	Starter layer	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, chalk, well burnt colliery spoil, slag or any combination thereof. (Properties (ii) and (iii) in next column, shall not apply to chalk.) Recycled aggregate Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9, and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A (construction and demolition recycling industries); D2 (air cooled blast furnace slag) D3 (basic oxygen furnace slag) D4 (electric arc furnace slag (EAF C)) G1 (red coal shale) G3 (pre-selected all-in from quarrying/mining)	(i) grading	BS 1377: Part 2 (On-site)	Tab 6/2	Tab 6/2	Tab 6/4 Method 5	6	B	–
G R A N U L A R	Selected coarse granular material			(ii) plasticity index	BS 1377: Part 2	Non-plastic					
				(iii) Los Angeles coefficient	Clause 635	–	50				
				(iv) mc	BS 1377: Part 2 See Note 4	App 6/1	App 6/1				
F I L L											

TABLE 6/1: (02/16) Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (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:		Upper	Lower		Tab 6/2	Tab 6/2
S E L E C T E D G R	Selected granular material (coarse grading)	Capping	Any material, or combination of materials - including recycled aggregates with not more than 50% by mass of recycled bituminous planings and granulated asphalt, but excluding materials contaminated with tar and tar-bitumen binders, unburnt colliery spoil and argillaceous rock. Property (i) in the next column shall not apply to chalk. Property (vi) in the next column shall not apply if the Class Ra (asphalt) content of any recycled aggregate is 20% or less. Where material in this Class is imported onto site it shall be classified as Class 6F5 and comply with the requirements for that material.	(i) grading	BS 1377: Part 2 (On site materials only)	Tab 6/2	Tab 6/2	Tab 6/2	Tab 6/4 Method 6	6	F	2
				(ii) optimum mc	BS 1377: Part 4 (vibrating hammer method)	–	–	–	–	–		
				(iii) mc	BS 1377: Part 2 See Note 4	Optimum mc - 2%	Optimum mc	Optimum mc	–	–		
				(iv) Los Angeles coefficient	Clause 635	–	–	–	50	–		
				(v) Class Ra (asphalt) content	Clause 710	–	–	–	50%	–		
				(vi) bitumen content	BS EN 12697-1 or BS EN 12697-39	–	–	–	2.0%	–		
A N U L A R F I N E L L	Selected granular material	Capping	Any material, or combination of materials with not less than 50% by mass of recycled bituminous planings and granulated asphalt, but excluding materials contaminated with tar and tar-bitumen binders, unburnt colliery spoil and argillaceous rock. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from the following source codes, see Notes 8, 9 and 10: A1 (reclaimed asphalt) A4 (mixed recycled aggregate) Aggregates from source code A4 shall contain at least 50% of constituents in Class Ra (bituminous materials).	(i) grading	BS 1377: Part 2 (On-site)	Tab 6/2	Tab 6/2	Tab 6/2	Tab 6/4 Method 6 Maximum Compacted layer thickness shall be 200 mm	6	F	3
				(ii) optimum mc	Clause 613	–	–	–	–	–		
				(iii) mc	Clause 613 See Note 4	Optimum mc -2%	Optimum mc	Optimum mc	–	–		
				(iv) Class Ra (asphalt) content	Clause 710	50%	–	–	–	–		
				(v) bitumen content	BS EN 12697-1 or BS EN 12697-39	–	–	–	10%	–		

TABLE 6/1: (02/16) Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (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:			6	N
						Lower	Upper			
S	Selected well graded granular material	Fill to structures	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, slag, well burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. Recycled aggregate except recycled asphalt. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A2 (crushed concrete) A3 (crushed bricks, masonry) D2 (air cooled blast furnace slag) G1 (red coal shale).	(i) grading	BS 1377: Part 2 (On-site)	Tab 6/2	Tab 6/2	End product 95% of maximum dry density of BS 1377: Part 4 (vibrating hammer method)	6	N
E				BS EN 933-2 (Imported onto site)	Tab 6/5	Tab 6/5				
L				See Note 5	10	–				
E				(ii) uniformity coefficient	–	40				
C				(iii) Los Angeles coefficient	–	40				
T				(iv) undrained shear parameters (c and ϕ)	App 6/1	–				
E				(v) effective angle of internal friction (ϕ') and effective cohesion (c')	App 6/1	–				
D				(vi) permeability	App 6/1	–				
G				(vii) mc	App 6/1	App 6/1				
R				(viii) MCV	App 6/1	App 6/1				
A				(ix) slope stability test (where required in App 6/6)	App 6/6	App 6/6				
N										
U										
L										
A										
R										
F										
I										
L										
L										

TABLE 6/2: (02/17) Grading Requirements for Acceptable Earthworks Materials Other Than Classes 6F4, 6F5 and 6S

Class		Percentage by Mass Passing the Size Shown																Size (microns) BS Series				Size (microns)	Class
		500	300	125	90	75	37.5	28	20	14	10	6.3	5	3.35	2	1.18	600	300	150	63	2		
1A			100	95-100																	<15		1A
1B				100																	<15		1B
1C	100			10-95													0-25			15			1C
2A & 2B				100											80-100					15-100			2A & 2B
2C				100											15-80					15-80			2C
2D				100																80-100	0-20		2D
6A	100										0-100		0-85				0-45			0-5			6A
6B	100			0-10																			6B
6C				100			0-100					0-100			0-35	0-10	0-2						6C
6D											100		89-100			30-100	15-80	5-48	0-15 except 0-20 for crushed rock				6D
6E & 6R				100	85-100						25-100						10-100				<15		6E & 6R
6F1						100	75-100				40-95		30-85				10-50			<15			6F1
6F2				100	80-100	65-100	45-100				15-60		10-45				0-25			0-12			6F2
6F3				100	80-100	65-100	45-100				15-60		10-45				0-25			0-12			6F3
6H									100				60-100			15-45	0-25		0-5				6H
6I & 6J				100		85-100				25-100					15-100		9-100			<15			6I & 6J
6K									100											0-10			6K
6L											100		89-100		60-100	30-100	15-100	5-70	0-15 except 0-20 for crushed rock				6L

TABLE 6/2: (02/16) Grading Requirements for Acceptable Earthworks Materials (continued)

Percentage by Mass Passing the Size Shown																					
Class	Size (mm)		Size (mm) BS Series													Size (microns) BS Series				Size (microns)	Class
	500	300	125	90	75	37.5	28	20	14	10	6.3	5	3.35	2	1.18	600	300	150	63		
6M					100														0-10		6M
6N & 6P					100														<15		6N & 6P
6S					100									60-100		30-90		4-45	0-16		6S
7A					100														15-100		7A
7C			100		85-100				83-100					80-100		60-100			15-45	0-20	7C
7D			100		85-100				40-90					15-79		15-75			15-45	0-20	7D
7E					100											95-100			15-100		7E
7F			100																15-100		7F
7I					100											95-100			15-100		7I

TABLE 6/4: (02/16) Method Compaction for Earthworks Materials: Plant and Methods (Method 1 to Method 6)
(This Table is to be read in conjunction with sub-Clause 612.10) (Continued)

Type of Compaction Plant	Ref No.	Category	Method 1		Method 2		Method 3		Method 4		Method 5		Method 6		
			D	N#	D	N#	D	N#	Δ	N	D	N	N for D = 110 mm	N for D = 150 mm	N for D = 250 mm
Vibratory roller		Mass per metre width of vibratory roll:													
	1	over 270 kg up to 450 kg	unsuitable		75	16	150	16	unsuitable		unsuitable		unsuitable	unsuitable	unsuitable
	2	over 450 kg up to 700 kg	unsuitable		75	12	150	12	unsuitable		unsuitable		unsuitable	unsuitable	unsuitable
	3	over 700 kg up to 1300 kg	100	12	125	10	150	6	125	10	unsuitable		16	unsuitable	unsuitable
	4	over 1300 kg up to 1800 kg	125	8	150	8	200	10*	175	4	unsuitable		6	16	unsuitable
	5	over 1800 kg up to 2300 kg	150	4	150	4	225	12*	unsuitable		unsuitable		4	6	12
	6	over 2300 kg up to 2900 kg	175	4	175	4	250	10*	unsuitable		400	5	3	5	11
	7	over 2900 kg up to 3600 kg	200	4	200	4	275	8*	unsuitable		500	5	3	5	10
	8	over 3600 kg up to 4300 kg	225	4	225	4	300	8*	unsuitable		600	5	2	4	8
	9	over 4300 kg up to 5000 kg	250	4	250	4	300	6*	unsuitable		700	5	2	4	7
	10	over 5000 kg	275	4	275	4	300	4*	unsuitable		800	5	2	3	6
Vibrating plate compactor		Mass per m ² of base plate:													
	1	over 880 kg up to 1100 kg	unsuitable		unsuitable		75	6	unsuitable		unsuitable		unsuitable	unsuitable	unsuitable
	2	over 1100 kg up to 1200 kg	unsuitable		75	10	100	6	75	10	unsuitable		unsuitable	unsuitable	unsuitable
	3	over 1200 kg up to 1400 kg	unsuitable		75	6	150	6	150	8	unsuitable		unsuitable	unsuitable	unsuitable
	4	over 1400 kg up to 1800 kg	100	6	125	6	150	4	unsuitable		unsuitable		8	unsuitable	unsuitable
	5	over 1800 kg up to 2100 kg	150	6	150	5	200	4	unsuitable		unsuitable		5	8	unsuitable
	6	over 2100 kg	200	6	200	5	250	4	unsuitable		unsuitable		3	6	12
Vibro-tamper		Mass:													
	1	over 50 kg up to 65 kg	100	3	100	3	150	3	125	3	unsuitable		4	8	unsuitable
	2	over 65 kg up to 75 kg	125	3	125	3	200	3	150	3	unsuitable		3	6	12
	3	over 75 kg up to 100 kg	150	3	150	3	225	3	175	3	unsuitable		2	4	10
	4	over 100 kg	225	3	200	3	225	3	250	3	unsuitable		2	4	10
Power rammer		Mass:													
	1	100 kg up to 500 kg	150	4	150	6	unsuitable		200	4	unsuitable		5	8	unsuitable
	2	over 500 kg	275	8	275	12	unsuitable		400	4	unsuitable		5	8	14
Dropping-weight compactor		Mass of rammer over 500 kg weight drop:													
	1	over 1 m up to 2 m	600	4	600	8	450	8	unsuitable		unsuitable		unsuitable	unsuitable	unsuitable
	2	over 2 m	600	2	600	8	unsuitable		unsuitable		unsuitable		unsuitable	unsuitable	unsuitable