

Trial Pit Photographs



Soil Mechanics



Trial Pit E2

Notes:	Project	Coed Darcy Urban Village, Junction 43 Improvements	Figure E33
	Project No.	H1065-11	
	Carried out for	Dawnus Construction Ltd.	

Trial Pit Photographs



Soil Mechanics



Trial Pit E2

Notes:	Project	Coed Darcy Urban Village, Junction 43 Improvements	Figure E34
	Project No.	H1065-11	
	Carried out for	Dawnus Construction Ltd.	

Window Sample Photographs



Soil Mechanics



Window Sample D1



Window Sample D2

Notes:

Project Coed Darcy Urban Village, Junction 43 Improvements
Project No. H1065-11
Carried out for Dawnus Construction Ltd.

Figure

E35

Window Sample Photographs



Window Sample E1



Window Sample E2

Notes:	Project	Coed Darcy Urban Village, Junction 43 Improvements	Figure E36
	Project No.	H1065-11	
	Carried out for	Dawnus Construction Ltd.	

Core Photographs



BHA1

Notes:	Project	Coed Darcy Urban Village, Junction 43 Improvements	Figure E37
	Project No.	H1065-11	
	Carried out for	Dawnus Construction Ltd.	

Core Photographs



Window Sample E1



BHA1

Notes:	Project	Coed Darcy Urban Village, Junction 43 Improvements	Figure E38
	Project No.	H1065-11	
	Carried out for	Dawnus Construction Ltd.	

Core Photographs



BHA1

Notes:	Project	Coed Darcy Urban Village, Junction 43 Improvements	Figure E39
	Project No.	H1065-11	
	Carried out for	Dawnus Construction Ltd.	

Core Photographs



BHA1

Notes:	Project	Coed Darcy Urban Village, Junction 43 Improvements	Figure E40
	Project No.	H1065-11	
	Carried out for	Dawnus Construction Ltd.	

Core Photographs



BHA1

Notes:	Project	Coed Darcy Urban Village, Junction 43 Improvements	Figure E41
	Project No.	H1065-11	
	Carried out for	Dawnus Construction Ltd.	

Core Photographs



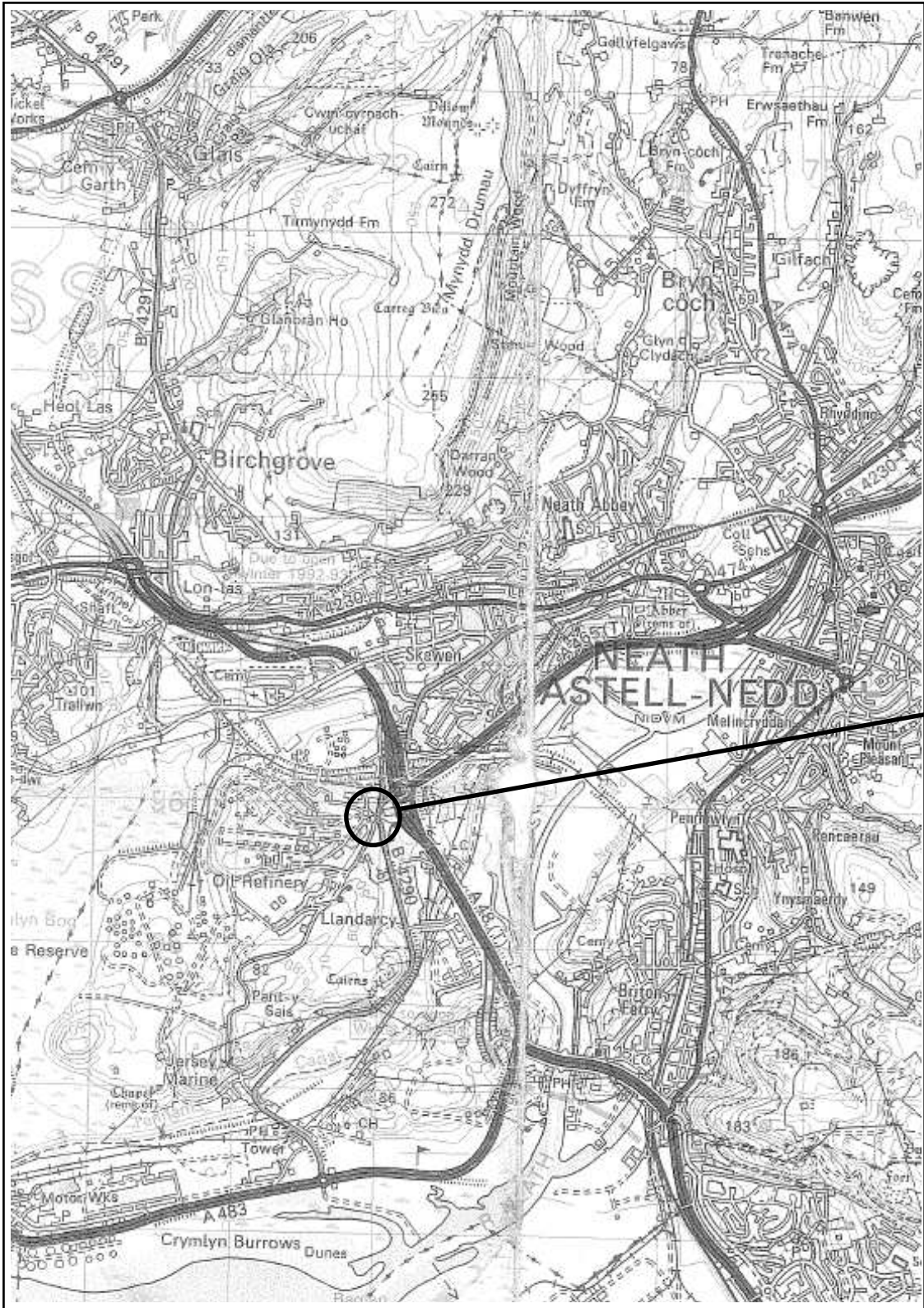
BHA1

Notes:	Project	Coed Darcy Urban Village, Junction 43 Improvements	Figure E42
	Project No.	H1065-11	
	Carried out for	Dawnus Construction Ltd.	

**ENCLOSURE F
DRAWINGS**

Site Location Plan
Exploratory Hole Location Plan
Trial Pit Cross Section Drawings

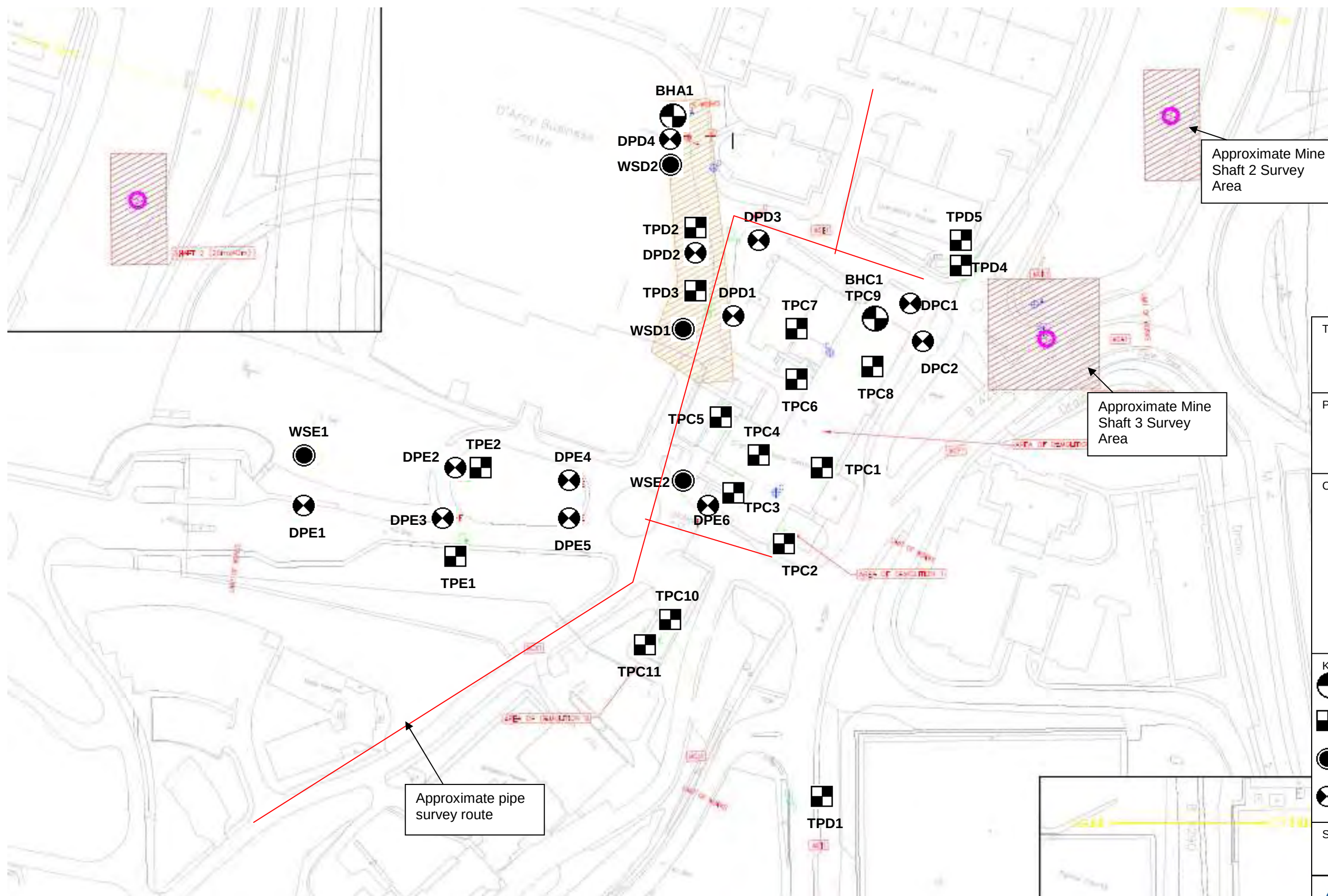
F1
F2
F3 to F4



THE SITE

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Notes: Scale 1:50 000	Project	Coed Darcy Urban Village, Junction 43 Improvements	Figure F1
	Project No.	H1065-11	
	Carried out for	Dawnus Construction Ltd.	

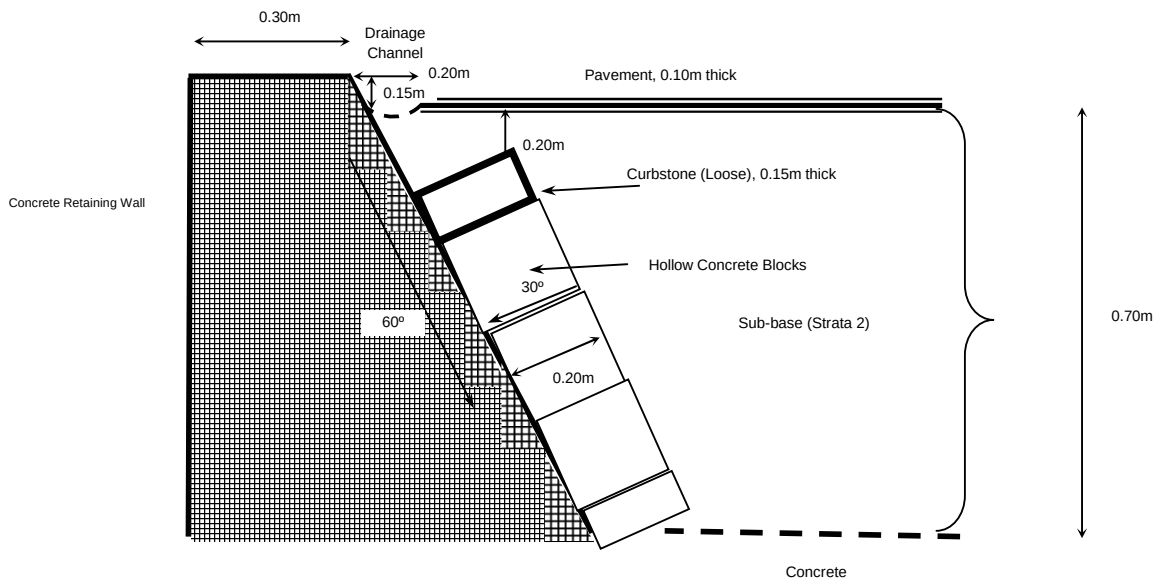


Title		Exploratory Hole Location plan	
Project		Coed Darcy Urban Village, Junction 43 Improvements	
Client		Dawnus Construction Ltd.	
Key		Borehole Trial Pit Window Sample Dynamic Probe	
Scale		NTS	
		 Soil Mechanics	
Project No		H1065-11	Figure No
			F2

Trial Pit Drawing



Soil Mechanics



CROSS SECTION

Notes:
NOT TO SCALE

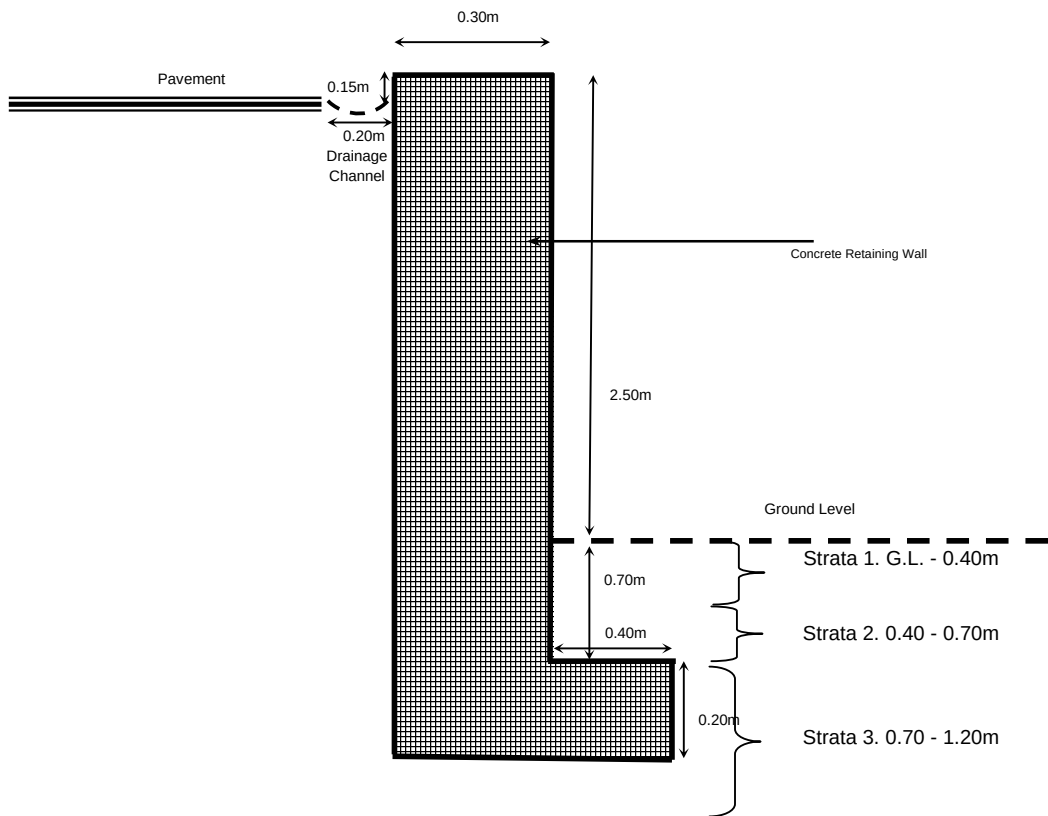
Project Coed Darcy Urban Village, Junction 43 Improvements
Project No. H0065-11
Carried out for Dawnus Construction Ltd.

Trial Pit
TPD4 / F3

Trial Pit Drawing



Soil Mechanics



CROSS SECTION

Notes:	Project	Coed Darcy Urban Village, Junction 43 Improvements	Trial Pit
NOT TO SCALE	Project No.	H0065-11	TPD5 / F4
	Carried out for	Dawnus Construction Ltd.	

Appendix D. Atkins Specification

Coed Darcy NAR and J43 Improvement Works

SERIES

Earthworks

February

Notice

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JOB NUMBER: 5137836			DOCUMENT REF: 5137836/51/DG/008			
A	Construction	TS	AG	AG	GS	26/02/2015
		Originated	Checked	Reviewed	Authorised	Date
Revision	Purpose Description	 				

ACCEPTABILITY LIMITS FOR EARTHWORKS MATERIALS

1. Acceptable Limits for Fills

1.1 The permitted classes of construction materials are defined in the following tables:

- Table 1/5 Testing Requirements
- Table 6/1 Classification and Compaction Requirements
- Table 6/2 Grading Requirements

2. Requirements for Determining Acceptability

2.1 The Contractor shall be responsible for the classification and testing of materials to validate the Acceptability Limits identified within Table 6/1 and Table 6/2. The classification and confirmation of acceptability for all earthworks materials shall be carried out by the Contractor at point of excavation for on-site materials and at the point of deposition for imported materials.

2.2 Trial pit locations for classification and contamination purposes shall be spread across the area of intended excavation to give representative samples of the material for testing. Two copies of all test results and their interpretation to material class shall be submitted to the satisfaction of the Employers Representative (ER) within 24 hours of the tests being completed.

2.3 The Contractor shall undertake source approval testing for all fill materials. To obtain source approval the Contractor shall notify the ER of the location of the proposed source and provide details of the proposed material including the location, supplier, material type proposed for import, volume of material available, whether it will be from a stockpile or excavation and carry out a full range of the tests detailed in Tables 1/5 for the class of fill on at least 3 representative samples for each material type to demonstrate compliance. The testing undertaken shall be sufficient to satisfy the objectives of "Relationship Testing" set out in HA44/91 and to enable the ER to confirm that the acceptability limits included within Table 6/1 are appropriate. The ER may request a site visit to observe the proposed source prior to providing approval of the source.

2.4 All unacceptable material shall be classified into one of three material types, these being:

2.4.1 Class U1A, material which does not comply with the permitted constituents and material properties of Table 6/1 and material containing significant quantities of:

- Peat, material from swamp and bogs
- Logs, stumps and perishable material
- Clay having liquid limit exceeding 90 or plasticity index exceeding 65
- Material susceptible to spontaneous combustion.

2.4.2 **Class B**, material that is contaminated including controlled waste whose level of contamination is above that given in either Appendix 6/14 or 6/15, but excluding hazardous waste and radioactive waste.

2.4.3 **Class C**, material that is hazardous wastes and radioactive waste.

2.5 The works shall be undertaken so as to minimise the quantity of Class 4 and Class U1A materials generated.

2.6 The Contractor shall maintain full records relating to the export or import of fill materials to the site, including the disposal of unacceptable materials to suitably licensed facilities. Details relating to the movement of any materials during the works will be provided to the ER on a weekly basis.

2.7 If, in the opinion of the ER, the material at the time of excavation, deposition or compaction is not of the previously determined classification or has become unacceptable, the ER may require the

Contractor to repeat the classification and acceptability tests given in Table 6/1. The rate of further testing required shall be sufficient to ensure the correct classification of materials taking into account the variations in their properties.

3. **Designation of material as Class**

Not used.

4. **Processing to Render unacceptable material to Acceptable material**

4.1 Site based processing to render unacceptable Class U1 material acceptable material shall only be implemented with the prior approval of the ER.

4.2 The Contractor shall undertake such work by methods that minimise the quantity of Class U1A material generated.

4.3 Where the Contractor wishes to implement processing to render unacceptable material acceptable, he shall submit a detailed method statement and testing regime to the satisfaction of the ER at least 2 weeks prior to commencement of the processing works.

5. **Requirements for groundwater Lowering or Other Treatment**

5.1 Construction areas shall be kept free of groundwater, infiltration and the effects of weather, and every means shall be taken to ensure that the sub-grade is protected.

5.2 In the presence of groundwater, the Contractor shall undertake excavation works with pumps installed in sumps in close proximity to the excavation to ensure any groundwater encountered can be pumped away from the working area without resulting in saturation of other material that is to be excavated or jeopardising the stability of slopes and excavation. The sump shall be lined with geotextile and partially filled with Type B filter material to prevent washing out of fines from the adjacent soils.

6. **Permitted use of Rapid Assessment procedure for material Acceptability**

6.1 The use of the rapid assessment procedure for material acceptability is not permitted.

7. **Requirements for Removal of material Off Site or Retention of Surplus material On Site**

7.1 Class U1B and U2 material, not acceptable for treatment or re-use on the Site, shall be dealt with as detailed in Appendix 6/2. Waste transfer notices shall be provided to the ER for all material removed from site.

8. **Requirements for unburnt Colliery Spoil**

8.1 Unburnt colliery spoil will not be permitted for use in the Permanent Works.

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ACCE TABLE ATERIAL

- 1.1 The nearby oil refinery site was bombed on several occasions during the Second World War (WWII). As the site has been developed since WWII the risk of unexploded ordnance and bombs (UXB) is perceived to be low. However, the Contractor shall make his own assessment of the risk from UXB. Where there is a perceived risk of UXB ordnance the Contractor shall implement suitable mitigation measures and working methods to minimise the risk of encountering UXB ordnance during the works.
- 1.2 Contamination testing was undertaken as a component of both historical and recent site investigation works. Although investigations have been restricted by existing structures, it is likely that the site is largely free of gross contamination. However, given the proximity of the adjacent Coed Darcy site it is considered possible that a degree of contamination may be encountered during works, some of which may be classifiable as 'Unacceptable'. The most likely manifestation of contamination will be in the form of grey/black hydrocarbon staining accompanied by slight to moderate odours and localised sheens and mobile free product. .
- 1.3 The proposed road levels will lie above current ground levels in some areas. Where poor ground is present at formation of the proposed embankments this material will be excavated and replaced with the suitable fill. Due to the shallow depth of made ground in some areas, a proposed reduction in levels could result in the removal of the majority of made ground.
- 1.4 If in the view of the Contractor that, following a visual assessment of the excavated soils, the presence of Class U1B and/or Class U2 materials is suspected, materials should be segregated as detailed in the Contractor's Material Management Plan (MMP) and validated by the ER or other suitably qualified person appointed by the Contractor. These works should not interfere with progress wherever practical. Appropriate contamination testing shall be agreed by the Contractor and ER and the results reviewed to assess the appropriate course of action, prior to the re-commencement of works in the area where the suspect materials were identified.
- 1.5 The management of materials shall be in accordance with the MMP. In general the contractor shall maintain adequate records of the works which shall include, but not be limited to:
 - o Records to establish the volume of materials excavated
 - o Location of the source of any re-usable stockpiled materials excavated from site
 - o Testing records relating to the re-used materials
 - o Location where stockpiled materials are reused
 - o Where appropriate, the classification of any wastes generated
 - o Where appropriate, the disposal methods undertaken
- 1.6 In addition, the contractor shall provide instruction and appropriate training to relevant workers to allow them to identify visual/olfactory indicators of contamination and when to inform the ER of the presence of U1B and U2 materials.

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General

- 1.1 The Contractor shall construct the Earthworks in accordance with the following Contract Drawings:

Drawing Number	Drawing Name
5137836/M4J43/600	M4 J43 Earthworks General Arrangement
5137836/NAR/600	NAR Earthwork General Arrangement
5137836/STD/120	Earthworks Typical Sections and Standard Details

Blasting

- 2.1 Blasting is not required and shall not be permitted on site.

Cutting Faces

- 3.1 Cuttings into existing earthwork slopes shall be constructed in accordance with Clause 603 of the Specification and the following sub-Clauses.
- 3.2 The proposed cutting slopes shall only be undercut where required on the Contract Drawings for excavations. It shall be the responsibility of the Contractor to ensure that undercutting does not result in risk to the temporary or permanent Works and/or road users.
- 3.3 All cutting and embankment slopes shall be topsoiled in accordance with SED 3
- 3.4 Isolated patches of soft, fragmented or insecure material in cut slopes to receive topsoil shall be excavated and filled in accordance with the following :
- Filled by well ramming in a class of fill with similar characteristics as the surrounding intact material.
- 3.5 Prior to topsoiling earthwork cut and embankment slopes shall be harrowed in accordance with the following:
- To a depth of 50mm. Such harrowing shall be carried out immediately prior to topsoiling, diagonally, at an angle between 5° and 45° to the line of the toe, measured on the plane of the slope.
- 3.6 Where reconstruction of carriageways is required, the faces of the excavations shall be formed by saw cutting with an asphalt saw through all bituminous materials. Faces of sub-base materials shall be formed and trimmed vertical, and shall be free from loose material.
- 3.7 Watercourses including ditches
- 3.8 For locations of new or modified existing watercourses including ditches and redundant or abandoned ditches refer to Drawings 5137836/M4J43/600 and 5137836/NAR/600.
- 3.9 For details of new or modified existing watercourses including ditches and redundant or abandoned ditches refer to Drawing 5137836/STD/120.
- 3.10 For locations of gully connections to be removed and backfilled refer to Drawings 5137836/M4J43/600 and 5137836/NAR/600.
- 3.11 Gully connections to be removed shall be backfilled in accordance with Appendix 2/2.

Embankment Construction

- 5.1 Embankments shall be constructed in accordance with Clause 608 of the Specification. The works shall be protected against weather in accordance with the relevant sub-clauses. Fill placed to form embankments shall not at any stage of construction have side slopes steeper than 1V:2H or as detailed

on the Earthwork Drawings. Temporary over-widening to achieve adequate compaction of the shoulders of the embankment is permitted.

- 5.2 Staged construction of fills is not required.
- 5.3 Surcharging at embankments or other areas of fill is not required. The construction of a reduced thickness of sub-base as a weather protection layer in accordance with Specification for Highways Clause 608.9 (i)b is not permitted.
- 5.4 A starter layer is required at all embankment locations and shall consist of Class 6C material. Starter layer details are indicated on the Earthworks Series Drawing 5137836/STD/120 in particular Detail SED10.
- 5.5 Topsoil stripping shall be carried out over the full extent of all earthwork foundations unless otherwise indicated on the drawings.
- 5.6 All areas of embankment foundations and pavement formation and sub formation levels shall be proof-rolled prior to fill placement. Soft spots in embankment foundations or pavement formation/sub formation levels shall be defined as areas where the soil does not support the roller weight during proof-rolling, or where the soil shear strength $c_u < 40 \text{ kPa}$. The extent of soft spots shall be determined and agreed with the ER by inspection during proof-rolling. The proof-rolling shall consist of at least one pass of a smooth-wheeled vibratory roller having a minimum mass per metre roll width of 2100 kg, or other suitable method agreed with the ER. The soft spots shall be treated in accordance with the Earthworks Series Drawing 5137836/STD/120 and in particular Detail SED6.
- 5.7 Existing paved areas which are to be left in situ, below embankments and other areas of fill, shall be excavated down to the underside of the bound layer or perforated and left in place in accordance with the Drawings 5137836/M4J43/600 and 5137836/NAR/600.
- 5.8 Cohesive / granular fill interfaces shall be constructed such that drainage of the interface is towards the embankment edge. The slope of the interface shall be such that any water drains towards the embankment outside edge. No pockets of granular material shall be formed within cohesive material.

Compaction

- 6.1 General
 - (a) Compaction of fills shall be carried out using method compaction to Clause 612 of the Specification.
- 6.2 Method Compaction
 - (a) Testing is required to confirm that the "method" is appropriate for the fill material used (as defined in HA 70/94) at the minimum rate shown in Appendix 1/5.
 - (b) The Contractor shall carry out Field Dry Density Testing in accordance with BS1377 Part 9 except that nuclear methods shall not be used.
 - (c) Extra compaction in the top 600mm for Class 1/2 Material over the full width of the embankments to Clause 612.10 is required. To ensure proper compaction of embankment edges and slopes, a minimum temporary increase in width of 0.5m from the finished sub-soil profile is required on each side, which shall be removed on completion of compaction.

Limiting distance for deposition of materials

The limits will be 1500mm in the case of sub-clauses 601.13 and 601.14. The use of pulverised fuel ash is not permitted.

Locations of excavations that are permitted to be battered OT SE

Locations where excavation supports are to be left in position OT SE

Benching

- 10.1 Benching is required into natural or existing earthwork slope faces to receive fill where the slope is steeper than 1v:5h to ensure adequate compaction of fill. Benching requirements are shown on Drawing 5137836/STD/120.

- 10.2 Fill materials in areas of benching shall be carefully placed and compacted to ensure that no voids occur at the upright steps of benching.
- 10.3 Placing and compaction of the fill material shall continue to a level above an adjacent bench before material is placed upon that bench.
- 10.4 Four additional compaction passes shall be made to each compaction layer within two metres lateral offset of temporary works faces.

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- 1.1 Where required, a Site Waste Management Plan (SWMP) may be prepared to comply with BREEAM rating standards only and NOT as a statutory requirement because the Site Waste Management Plan Regulations 2008 were repealed on the 1st of December 2013, and no longer apply. The proposals shall include reference to the following waste management options, to be agreed prior to the start of any works:
 - Segregation of recoverable material streams and no recoverable wastes. Recoverable materials comprising principally concrete and brickwork may be crushed for potential reuse.
- 1.2 Unsuitable materials will be removed from site to an appropriate recycling or landfill facility. Any wastes generated during the works shall be dealt with in full compliance with the statutory Duty of Care, as defined in the Environmental Protection Act 1990 and all subsequent amendments.
- 1.3 Where the re-use or treatment of excavated soils is proposed then this may be carried out in accordance with the CL:AIRE Voluntary Code of Practice 'The Definition of Waste: Development Industry Code of Practice, version 2.
- 1.4 Where the CL:AIRE CoP is to be implemented, the Contractor will need to prepare a Materials Management Plan for the works and a relevant declaration signed by an appropriate Qualified Person and submitted to the Environment Agency.
- 1.5 All materials that are to be recycled/processed for re-use as aggregates in the Works shall be reclaimed in accordance with the WRAP Protocol.

A E I EOTE TILES SE TO SE ARATE EART OR S ATERIAL**eneral**

- 1.1 Drawing References: The locations at which geotextiles are to be used in earthworks and drainage works shall be as indicated on the Drainage Drawings (5137836/M4J43/500 & 5137836/NAR/500) and Earthworks Drawing 5137836/STD/120 and relevant specification appendices.
- 1.2 Geotextiles shall be synthetic non-woven, thermally bonded or mechanically needled fabric composed of UV stabilised polypropylene or polyester filaments.
- 1.3 All geotextiles and geocomposites which are to be incorporated in the permanent works shall have a minimum design life of 60 years.
- 1.4 Testing of geotextiles and geocomposites shall be in accordance with the Specification and relevant European Standards to confirm the supplier specifications. The frequency of testing of geotextiles and geocomposites shall be as shown in Table 1/5.
- 1.5 Geotextiles Filter/Separator materials shall meet the following criteria:

• Mean wide width strip tensile strength	14.5 kN/m minimum	BSEN ISO 10319:1996
• Mean CBR puncture resistance	2750 N minimum	BSEN ISO 12236:1996
• Mean trapezoidal tear resistance	575 N minimum	ASTM D4533
• Mean AOS O90 pore size	0.10 – 0.30 mm	BSEN ISO 12956:1999
• Permeability, 5 cm head	50 litres/m ² sec min.	BSEN ISO 11058:1999
- 1.6 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.

Supply and handling

- 2.1 Geotextile 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).
- 2.2 Items within consignments of geotextile 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.
- 2.3 Geotextile may be stored in the open (outdoors) provided that such storage is safe, secure and free from hazard. . Geotextile shall not, by virtue of their storage environment, be subject to temperature extremes or other harmful conditions. Geotextile shall be stored on a flat and level surface.
- 2.4 Geotextile shall be stockpiled or stored in such a way that the weight of overlying material does not damage that which is below. Any geotextile 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.

Installation procedure

- 3.1 The Contractor shall implement all manufacturers installation procedures and incorporate the following requirements sub clauses:

- 3.2 The geotextile 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 geotextile 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 geotextile prior to placing the fill.
- 3.3 The fabrication and installation shall be planned and implemented taking into account existing or diverted services and drainage works.
- 3.4 Jointing shall be by overlapping only and all overlaps shall be a minimum of 500mm unless shown otherwise on the Contract drawings. Any punctures or damage to geotextiles shall be made good by overlaying with geotextile having an overlap of at least 500 mm from the edge of the damaged area. The number of joints shall be kept to an absolute minimum

Requirement for Laying and Compaction of Fill

- 4.1 The layer or surface against which the geotextile is to be placed shall not have protrusions or sharp projections that are likely to damage the geotextile during installation or in service. It shall be free from stumps, stones or other large protrusions that could cause damage to the geotextile.
- 4.2 If during excavation soft spots are encountered they shall be excavated and replaced by either general fill or capping material.
- 4.3 Placing and compaction of fill shall be carried out so that the geotextile 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 geotextile is to be placed shall comply with the surface level tolerance in Clause 616.
- 4.4 Fill shall not be tipped directly onto the geotextile. Fill or type 1 sub-base material shall be carefully spread onto previously placed geotextile and shall be taken forward and placed by hand-raking or suitable plant with a bucket type that causes the covering material to cascade onto the geotextile. The fill shall be deposited and spread to prevent segregation. Operation of construction plant directly on the installed geotextile is not permitted and its covering with fill material shall be carried out immediately after laying and jointing.
- 4.5 During placing and compaction of fill, care shall be taken to avoid displacing the geotextile. At overlaps, the top piece of geotextile shall be the first to be covered by fill and no fill shall be permitted to come between overlapping layers.
- 4.6 The frequency of sampling and testing of geotextiles shall be as shown in Table 1/5. Samples for testing in accordance with Clause 609 shall be taken in accordance with the prescriptions of BS EN 963 'Geotextiles - Sampling and Preparation of Test Specimens'. The sampling report shall be sent with the samples to the test laboratory and a copy shall be delivered to the ER within 3 days of the sampling.
- 4.7 Full documentation of each proposed geotextile shall be provided including manufacturer's specification, quality assurance procedures and test records and durability certificates. Samples are to be retained by the Contractor for a minimum of 12 months.

A E I FILL TO STRUCTURES A FILL ABOVE STRUCTURAL FOUNDATIONS

1. Details of fill to structures and fill above structural foundations will be shown on the Drawings 5137836/M4J43/1700 and 5137836/M4J43/1702.
2. Full scale determination of stable slope (Clause 610.6) is not required.

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1. Capping and Sub Formation

- (i) Sub-base and capping thicknesses have been specified on Drawings 5137836/M4J43/700 & 5137836/NAR/700.
- (ii) The Contractor shall check and agree with the ER that the Design CBR value and ground conditions encountered at formation are as assumed. The Design CBR values have been assessed in accordance with IAN73/06 (Draft HD25) restricted designs to Figures 3.1 and 3.2 and anticipated ground conditions.
- (iii) Capping shall be Class 6F1, 6F2, 6F3, 6F4, or 6F5 to MCHW Series 600 Table 6/1.
- (iv) Capping layer will be constructed in accordance with the procedure set out in sub clauses 613.11(i) and 613.12 (i) as appropriate.
- (v) Preparation and surface treatment of Sub-Formation and Formation, including tolerances, shall be in accordance with Clause 616. Treatment described in sub clause 616.4 are not required.
- (vi) Sub-formation shall have the same longitudinal gradient, cross fall and surface level tolerances as formation.

2. Formation and Sub Formation Inspection and Testing

- 2.1 Formation is anticipated to comprise engineered fill or existing made ground across the site. Design CBR values have been assigned based on the anticipated formation material and have been identified on Drawings 5137836/M4J43/700 & 5137836/NAR/700. The typical design CBR values across the site are anticipated to fall between 2% and 5%, with possibility of localised areas less than 2% with an equilibrium CBR value of 1% or less. Where weathered rock or rock is anticipated, a CBR value of 5% to greater than 15% and greater than 15% respectively have been assumed.
- 2.2 The Contractor shall undertake in-situ CBR testing as detailed in sub clause 2.5 at the time of trimming formation and sub formation. This information shall be assessed by the Contractor to confirm whether the ground conditions and design CBR values detailed on Drawings 5137836/M4J43/700 & 5137836/NAR/700 are satisfied by the conditions encountered in-situ.
- 2.3 The sub-grade inspection shall include a visual inspection, sampling and appropriate laboratory testing undertaken by a suitably experienced member of the Contractors site team who shall identify and agree the sub-grade soil type, consistency, density and groundwater conditions. The soil types are to be divided into the following categories :
 - Cohesive if the fines content (material passing 0.063mm sieve) is greater than 15%
 - Granular if the soil has a fines content less than 5%
 - Marginal granular material where fines content is between 5% and 15%
- 2.4 To identify soft spots within the formation, the formation shall be "proof rolled" prior to placement of sub-base materials. The extent of soft spots shall be determined by inspection during proof-rolling. The proof-rolling shall consist of at least one pass of a smooth-wheeled vibratory roller having a minimum mass per metre roll width of 2100 kg, or other suitable method agreed with the ER.
- 2.5 The Contractor shall undertake in-situ CBR testing to confirm whether the sub-grade design assumptions and Design CBR value are satisfied by the conditions encountered in-situ. In-situ CBR testing shall be carried out by TRL CBR probe (otherwise known as Farnell Dynamic Cone Penetrometer "DCP" or a Clegg Impact Soil Tester - Type CIST 882) and undertaken by a UKAS/EAL accredited laboratory. The testing shall be undertaken by Contractor's technicians trained in the use of the equipment, and the Contractor shall maintain a list of operatives

approved for undertaking this testing. Testing shall commence at or above formation level and the test completion depth shall be 1.0m below formation or sub-formation level. Testing shall be undertaken at 20m maximum centres along the carriageway Centreline and both kerb lines.

- 2.6 The result of the subgrade inspection, sampling, laboratory testing, proof rolling and in-situ CBR testing and agreed remediation or revision to the pavement foundation construction shall be recorded by the Contractor.
 - 2.7 Where in situ CBR values are encountered that are lower than the Design CBR values, the pavement foundation shall be increased to cater for the lower values by choosing the appropriate foundation thicknesses detailed on Drawings 5137836/M4J43/700 & 5137836/NAR/700.
 - 2.8 Areas of low sub-grade strength (CBR < 2.5%) shall be excavated and replaced to a maximum depth of 1m below sub-formation level as detailed on Drawing 5137836/STD/120 Detail SED 6. Alternatively, the Contractor may utilise geo-grid reinforcement to Detail SED 11.
 - 2.9 Where the results of the in-situ testing and inspections indicates an in situ CBR value higher than the Design CBR values, the pavement foundation thickness shall remain as stated for the Design CBR value unless otherwise agreed with the ER. Where the Contractor wishes to reduce the pavement foundation thickness, he shall demonstrate that the equilibrium m/c CBR and In situ CBR are in excess of the Design CBR value.
 - 2.10 At the interface between existing and proposed sub-base, the new sub-base material shall be placed to ensure continuity of the pavement foundation drainage.
3. Preparation of formation on existing sub-base material shall be in accordance with the requirements of Clause 616 for the preparation of formation on non-sub-base material.
 4. Demonstration areas are not required
 5. Lime stabilisation is not permitted

A E I TO SOIL

1. Topsoiling and seeding shall be in accordance with Clause 618 of the Specification.
2. All earthwork slopes and verges, including those formed within rock, shall be topsoiled with site won Class 5 topsoil. Where insufficient site won Class 5 topsoil is generated then imported Class 5 topsoil may be utilised following agreement with the ER.
3. Topsoil shall remain in place beneath areas that are not to receive permanent works. Topsoil is not required to be stripped as turf.
4. The full thickness of in situ topsoil shall be removed from locations where topsoil stripping is required.
5. Site won Class 5 topsoil, which is surplus to the requirements for topsoiling, shall be retained on site and incorporated into the permanent works at locations agreed with the ER. Where this is not possible, surplus site won Class 5 topsoil shall be disposed of by the Contractor.
6. Use of imported Class 5 topsoil shall only be permitted in the event of a shortfall in site won Class 5 topsoil.
7. Imported material shall meet the requirements of Class 5B - BS 3882 General Purpose Grade. Any deviation from that must be agreed by the engineer prior to importation on site. A certification of source, analysis, suitability for purpose, rectification to meet the required standard and absence of harmful substances to plant, animal and human health shall be submitted.
8. Stones and other debris removed from topsoil with dimensions greater than 100mm equivalent diameter shall be removed and disposed off Site by the Contractor.
9. The thickness of topsoil to be deposited shall be as indicated on the Earthwork Drawing 5137836/STD/120.

APPENDIX A – GENERAL REQUIREMENTS

General

- 1.1 The proposed works are known to be underlain by previously worked coal seams that are at circa 40m to 90m depth. As outlined in the Coal Authority Report for Bath House – Ref 00040665-08, dated June 2008 – In appendix C of the Atkins Preliminary Sources Study Report updated in March 2012
- 1.2 Based on the Ground Investigations undertaken by Soil Mechanics in September 2011 and by Quantum Geotechnical in May 2014, where no coal seams were encountered between ground level and 40m below ground level, the presence of these worked seams has been deemed a low geotechnical risk to the Project and unlikely to adversely affect the performance of the proposed works.
- 1.3 Mine shafts are recorded to exist within the general vicinity of the proposed works (refer to Drawing 5137836/M4J43/620).
- 1.4 A mine shaft, which is recorded to have been filled to an unknown specification and capped in June 1972 (Coal Authority reference 272196-001), was located during the Ground Investigation undertaken by Quantum Geotechnical in May 2014.
- 1.5 The existing shaft treatment was shown by the ground investigation to comprise a reinforced concrete cap 4.2m by 6.2m in plan and 0.8m thick with a concrete plug below that to a depth of 3.8m below ground level (bgl). The shaft beneath the base of the plug is shown to be in-filled with a generally granular fill which contains some voids. The size and number of voids is greatest above groundwater level which was encountered at 19.5mbgl and rose to 9.5mbgl. The base of the shaft was found to be at 86.5mbgl.
- 1.6 Although the shaft has already been treated, additional works are proposed due to the proposed change in ground level, and to recognise that the realigned highway will be above the shaft location. The scope of the proposed works will address two main issues; a reduction in the level of the shaft cap to avoid conflict with the proposed pavement foundation, and additional grouting of the shaft above rock head level in order to infill the existing voids encountered during the ground investigation. Appropriate permission for the works shall be obtained from the Coal Authority by the Contractor.

Scope of works

- 2.1 The works are required to follow the following sequence;
 - Exposing the existing surface cap;
 - Commence grouting of the shaft between the base of the concrete plug which underlies the cap and rock head (10.5m bgl). This shall take place through the existing cap to minimise the risk of a collapse;
 - Once grouting is complete the existing cap will be broken out to 1m below road formation level and construction of a new reinforced concrete slab with the same dimensions shall commence.
 - Details of the treatment works are included in Drawing 5137836/M4J43/620 (General Arrangement) and Drawing 5137836/M4J43/640 (RC details).
- 2.2 The Contractor shall include in his tender return a method statement outlining his proposed method of working. This shall include the details of the following:
 - Site arrangements and safety measures proposed in order to address potential shaft collapse, the presence of ground-borne gas, temporary works and traffic management.
 - Method and materials proposed to complete the grouting, including any measures considered necessary to mitigate grout loss;
 - Details of the drilling programme and procedures to be used during the Grouting Works;
 - Means of monitoring grout pressures and volumes injected;
 - Method for collecting any mine water displaced during the Grouting Works and;
 - Method for treating displaced mine water to remove sediment before discharge.

- 2.3 To accompany the above and make allowance for re-measurable items the Contractor shall also include a detailed breakdown of costs in his tender return clearly identifying those items which are assumed to be re-measurable (e.g. grout quantities, number and length of grouting holes etc.).
- 2.4 All treatment works shall be undertaken to the satisfaction of the Coal Authority, South Wales Trunk Road Agents and the ER.

General Safety

- 3.1 The Grouting Works and all Contractor employees must conform to the CDM Regulations and site rules.
- 3.2 The Contractor shall be aware of the danger from gas which may be present in the ground whilst undertaking the Works. The Contractor shall take all necessary precautions in this respect including the supply, maintenance and operation, in accordance with the manufacturer's recommendations, of suitable equipment for monitoring the emissions of flammable or noxious gases.
- 3.3 The Contractor shall be aware of the hazards associated with the respective constituent grout materials and take appropriate precautions in the delivery, storage and use of these materials in the Works to protect the health, safety and welfare of people, animals and the environment.
- 3.4 The Contractor's attention is drawn to the possibility of collapse of the shaft, whilst drilling and grouting. The Contractor shall provide with his Method Statement details of the safety measures he proposes to implement in order to manage this risk, including contingency plans in the case of shaft collapse. The Contractor is expected to take all necessary safety precautions to safeguard his equipment, employees and the public from risks associated with the works.
- 3.5 Unless explicitly varied herein, the Works shall be carried out in accordance with the requirements of the appropriate British Standards Specification and Codes of Practice, or equivalent.
- 3.6 The Contractor must comply with prevailing good practices and Standards including the following:
- Where reference is made to any British Standards Specification, Code of Practice, or equivalent, or any other publication, the edition implied is the last published, with all amendments, before the tender return date.
 - Where applicable the Contractor shall comply with all current Statutes and all Orders and Regulations relevant to this Contract.
 - Nothing contained in this Specification shall be construed as overriding or limiting the rights of the Authority or the obligations of the Contractor under the Health and Safety at Work Act 1974 or any other statute, regulation, rule, order or bye-law.
 - All equipment used by the Contractor shall comply with current statutory Regulations.
 - The Contractor shall be responsible for all equipment employed on the Contract, whether directly owned by the Contractor, or sub-contracted, or on hire, lease or loan.
 - The site for the duration of the Works will be in compliance with the CDM /Drilling Regulations and will be subject to all the requirements stated under those regulations. The Contractor shall include in his rates the costs for compliance with this regulation and for all site requirements.
 - The Contractor shall ensure that, where relevant, the terms and conditions of this Specification and the Conditions of Contract are brought to the attention of all site operatives, and are strictly observed.

Pollution Control

- 4.1 The Contractor shall take every precaution to prevent contamination of surface-water systems and the surrounding environment. In particular the Contractor shall be aware of the hazards from grout residues to surface-water courses. The Contractor shall comply with current environmental best practice and the following specific requirements for the Works:

- Appropriate bunding shall be provided around all work areas including any grout batching areas to reduce the risk of any uncontrolled run off of displaced untreated mine water or grouting materials.
 - Throughout the grouting works the Contractor shall undertake regular visual inspections of the surrounding area including nearby drainage ditches for mine water discharges induced by the grouting works. In the event that mine water discharges are identified the Contractor shall temporarily suspend grouting operations. Grouting operations shall not be recommenced until the Contractor has implemented measures to capture and treat the mine water to remove sediment and discharge it back into the mine workings
- 4.2 All Works shall be carried out without unreasonable noise and disturbance to the site and its environs and shall comply with the noise control requirements of Welsh Government/Neath Port Talbot County Borough Council; the Contractor shall liaise with the relevant council department to ensure compliance with these requirements.
- 4.3 Although not anticipated, if artesian groundwater conditions are encountered, measures shall be taken to ensure that no permanent connection/pathway exists between the artesian water source and ground surface.

Access and Security

- 5.1 Access will be from the existing B4290 to the location of the shaft and the Contractor will be responsible for preparing his working area.
- 5.2 The Contractor shall also be responsible for the security of the working area and all plant and equipment used in the Works.

Services

- 6.1 Service information obtained for the site is included the main works information.
- 6.2 Of particular note is the High Pressure Gas Main which is located approximately 6m to the west of the shaft. The Contractor shall contact Wales and West utilities to agree the method of working in this area so as to limit the impact of the works on the Gas Main.
- 6.3 The Contractor shall take every precaution to avoid damage to, or interference with, Statutory Bodies, Undertakers and Companies apparatus and supplies and shall at his own expense rectify any damage done. He shall relieve the Employer of all claims in respect of any interruption or loss arising from such damage irrespective of whether or not the Contractor was notified of such Statutory Bodies, Undertakers and Companies apparatus.

rilling

- 7.1 Records from previous ground investigations which indicate the ground conditions likely to be encountered during drilling Works are included in the works information pack.
- 7.2 The Contractor must design the drilling of the required boreholes he feels necessary to undertake the grouting of the shaft required.
- 7.3 Boreholes shall be drilled with a minimum diameter of 100mm.
- 7.4 All boreholes shall be kept open over their full depth to enable them to be used for the injection of grouting materials under pressure into the sub-surface voids and also into all breaks and fissures in the rock strata. Collapsed or obstructed holes shall be re-drilled, including the insertion of casing through the obstruction if necessary.
- 7.5 The Contractor shall make every effort to remove any metal casing used. If the abandonment of any casing, or part of any casing, is unavoidable then the casing shall be grouted and cut below the base of the new concrete cap. The position and of any abandoned casing shall be recorded.

routing

- 8.1 Grout supply pipes shall be of such design that a free outlet is available to check the flow of the grout and that a grout pressure meter can be attached for the duration of the grouting process.
- 8.2 Immediately before commencing or re-commencing grouting of any borehole the Contractor shall ensure that it remains open over its full depth and that no collapse has taken place. Where an obstruction is encountered the borehole shall be re-drilled and, if necessary, cased through the blockage. Should the injection pipes be blocked then they shall be removed immediately and cleared.
- 8.3 Grout shall be injected into the sub-surface voids via a steel or semi rigid pipe placed to the bottom of the injection boreholes. Injection pressures, measured at ground level, should not exceed the lesser of 10kN/m² per metre of overburden or a maximum pressure of 200kN/m² unless agreed otherwise with the Engineer. A suitably graduated pressure gauge with an appropriate full scale deflection shall be incorporated within the grout line near the top of the hole. The applied pressure shall be monitored on this gauge, care being taken to reduce any risk of ground heave.
- 8.4 The grout pipe is to be raised during progress of injection as limiting pressures are reached or as grout appears at the borehole surface. As soon as the grout appears at the point of injection, then final pressurisation shall take place using a pressure gauge and grout connection fitted directly to the top of the casing.
- 8.5 Boreholes shall be topped-up to ground level during or immediately after withdrawal of the casing in such a manner as to prevent the overburden collapsing in the hole and to ensure the structure and strength of the grout column. Bores shall be completely filled so that no settlement will occur, or subsequent depression form, in the superficial deposits.

routing Batching and pumping plant

- 9.1 Grout mixing plant shall be capable of producing a homogenous mix with all particles thoroughly wetted and with no segregation.
- 9.2 It is essential that the mixer is fitted with a reliable automatic weigh batching device capable of consistently measuring the weight of component materials in the approved proportions.
- 9.3 Water supply to the mix shall be properly monitored by means of a suitable metering device incorporated in the mixer in order to ensure accurate control of the mixing water fed into each batch of dry materials.
- 9.4 After mixing the grout shall be fed into storage tanks fitted with powered agitators sufficient to ensure that no segregation of component materials occurs and that a continuous flow of grout is maintained at the insertion point.
- 9.5 Injection of the pre-mixed grouts shall be by means of positive displacement pumps and suitable pressure gauges shall be incorporated in the system to facilitate control of pressures.
- 9.6 Three valves shall be provided at each junction point to provide means for diversion of the grout away from the injection point when necessary and to prevent undue wastage of grout during transfer of the delivery line from one injection point to another.

routing materials

- 10.1 Cement shall be Ordinary Portland Cement and shall comply with British Standard Specification BS12:1991 having a compressive strength class (Table 1) of 42.5N/mm² or greater. The cement shall be suitably stored to prevent damage from the weather.
- 10.2 Sand for grouting shall be clean washed natural sand, complying with the requirements of Table 5 of BS882:1992, Grading Zone M (Medium).
- 10.3 Pulverised Fuel Ash (PFA) shall be fine grained complying with BS3892 Part 2:1984, Specification for PFA for use in grouts, be of a type suitable as a constituent for grout, meet grout workability and pumpability requirements and obtained from an approved supplier. Pulverised Fuel Ash in storage shall

be protected by tarpaulins, other covering or stored in a suitable container to prevent contamination with dust, protect the material from the effects of weather and prevent it becoming an airborne hazard.

10.4 The Contractor shall ensure the use of PFA grouts satisfy the following guidelines:

10.5 Environment Agency, September 2011. Position Statement 030, Version 3, the environmental regulation of the production and use of Pulverised Fuel Ash (PFA) and Furnace Bottom Ash (FBA).

10.6 Waste & Resources Action Programme and Environment Agency, October 2010. Quality Protocol: Pulverised Fuel Ash (PFA) - End of waste criteria for the production of pulverised fuel ash (PFA) and furnace bottom ash (FBA) for use in bound and grout applications in specified construction and manufacturing uses.

10.7 Pea Gravel if used shall be a single sized 10mm natural gravel and comply with requirements of BS882:1992.

10.8 All materials shall be kept free from contamination with deleterious matter. Stockpiles of materials shall be kept adequately separated from one another.

Water

11.1 A clean fresh water supply shall be used.

Grout Mixes

12.1 The Contractor shall be responsible for the design of all grout mixes and shall propose different mixes where he considers specific ground conditions require them.

12.2 All mixes shall be appropriate for the groundwater conditions and groundwater chemistry encountered in the voided ground or fractured material.

12.3 The Contractor shall check for each of his proposed grout mixes that 7, 14 and 28 day cube strength test results and flow test results to ensure compliance with his proposed design.

12.4 The minimum 28 day crushing strength shall be 1MN/m².

12.5 All grout used in connection with the Contract shall contain cement.

12.6 Grout introduced at infill hole locations shall have a cement content of between 80 and 100kg per cubic metre of mixed volume.

12.7 Using a "Colcrete" Flowmeter the following criteria shall apply with regard to grout flow properties. Grout shall flow within the limits 300mm to 600mm. Testing shall be undertaken every morning and every afternoon during the Works and at the discretion of the Engineer.

12.8 The bleed of the grout shall be tested by means of a graduated beaker. The bleed of the curing grout shall not exceed 5% two hours after sampling. Testing shall be undertaken every morning and every afternoon during the Works and at the discretion of the Engineer.

12.9 The Contractor shall undertake testing of grout mix proportions and materials. Results of these tests shall be verified for compliance with his proposed grout design before any grouting is commenced.

Grout Tests

13.1 Throughout the course of grouting operations the Contractor shall take 100mm cubes in sets of six at regular intervals. The cubes shall be cured and crushed at a NAMAS/UKAS accredited laboratory. The cubes shall be uplifted and transported to the laboratory within 36 hours of their casting. One cube shall be crushed at 7 days, one at 14 days and two at 28 days. The test will be taken as conforming if both 28 day strengths exceed the minimum requirement of 1MN/m² contained in this technical specification.

13.2 Cubes shall be permanently and clearly marked for identification and records shall be kept which shall indicate exactly the location of the grout or concrete, the flow test readings of the mix, the date of placing

and mix reference. The marking of cubes, handling, storage and testing shall be in accordance with BS1881.

- 13.3 The Contractor shall test the flow and bleed properties of each batch of mixed grout in accordance with this technical specification relating to grout mixes before it is injected and shall carry out such additional random tests may be required to ensure compliance with his grout design.

Testing of Completed routing or s

- 14.1 The Contractor shall provide details of his proposed testing programme including numbers and locations of test holes to the Engineer prior to undertaking the testing.
- 14.2 For the completed Works test holes shall be undertaken at a minimum of 3 holes. Testing shall not be undertaken until a minimum of 48 hours has elapsed since the completion of treatment in the area to be tested.
- 14.3 Tests shall consist of injecting grout into the test holes in the normal fashion and noting the quantity required to produce an injection pressure adequate to prove the effectiveness of the grouting in accordance with the Contractors proposed design.
- 14.4 Test shall only be deemed successful where the quantity of grout injected at any test hole is less than 0.2 tonnes and where the pressure has not dropped by more than 10% in three minutes.
- 14.5 The Contractor shall ensure that a good seal is maintained at rockhead during testing. Losses of grout and hence pressure at rockhead or into poorly consolidated fissures shall cause the test to fail.
- 14.6 The supervising Engineer may in addition require core samples to be taken by rotary coring to check the adequacy of the grouting operation. Rotary coring shall be carried out in accordance with the Specification for Ground Investigation, published by Thomas Telford.
- 14.7 Should any of the tests reveal incomplete grouting works or other defect, the Contractor shall make good such Works in order to comply with the requirements of the Contract.

astage

- 15.1 Payment shall be authorized only for grout materials properly mixed and injected down the boreholes as defined by this Technical Specification.

Cold eather

- 16.1 When the temperature of the air is near or below the freezing point of water, Grouting Works shall only be permitted at the entire risk of the Contractor, who shall take precautions to ensure that the materials are free from frost and to protect the grout or concrete from freezing.
- 16.2 The Contractor shall make good any Works which may be damaged by frost. For the purpose of recording the air temperature a reliable maximum/minimum thermometer is to be located on Site. Precautions against cold weather conditions shall be such as to ensure that the grout shall, at no time during mixing, depositing, delivery to a point of injection or setting reach a temperature of, or below, 5 degrees Centigrade.
- 16.3 The Contractor shall be deemed to have included in his schedule of rates and prices for all measures necessary to comply with the aforementioned requirements.

Setting Out and Labelling

- 17.1 The location of the shaft is as shown on the general arrangement drawings and the existing cap should be exposed in advance of the grouting Works.
- 17.2 For ease of reference, each borehole used in the grouting Works shall be clearly marked on the Site with its reference number, depth and inclination. This labelling shall remain legible until the casing has been withdrawn and the bore is complete.

17.3 Setting out stations and reference lines used in the location of borehole positions shall be established on the Site by means of permanent markers, clearly visible at all times.

17.4 A system shall be employed to record those boreholes which are completed and those which continue to accept grout. This system shall operate both at the borehole and in the Contractor's office.

Personnel for routing or s

18.1 The Contractor shall employ personnel who have relevant experience of Grouting Works.

Daily Records

19.1 The Contractor shall prepare, and keep available for inspection on site, plans showing the positions and surface levels of all holes, and sections through the rows of holes to show the results of the Works. All levels shall be given with reference to an agreed datum.

19.2 As the Works proceed the Contractor shall maintain Daily Records for Drilling, Grouting and for Plant and Materials received in a form for provision to the Engineer. The daily records signed by the Contractors agent shall be submitted each day to the Engineer.

19.3 As a minimum the daily drilling record shall record the following information:

- a) Job name and location
- b) Unique drill hole reference number
- c) Date
- d) Contractors name
- e) Plant in use, crew members, and hours worked
- f) Method of drilling and flushing medium
- g) Type of bit used
- h) Type, diameter and depth of casing used
- i) Depth and diameter of borehole at beginning and end of each working day or shift
- j) Depths at which ground water is encountered (if apparent) and level at which water was standing at the commencement and end of each day's work
- k) The depths at which any samples were taken
- l) Details of any loose ground or voids penetrated
- m) Details of any loss of flushing medium
- n) Details of time spent in overcoming obstructions
- o) Details of services or drains located
- p) Details of any emission of gas, water, foul air etc.
- q) Details of any settlement or ground heave adjacent to boreholes
- r) Daily and cumulative quantities of drilling
- s) Surface level above Ordnance Datum of each borehole
- t) Depth of completed borehole

The daily grouting records shall record the following information:

- a) Job name and location
- b) Unique drill hole reference number
- c) Date
- d) Contractors name

- e) Plant in use, crew members, and hours worked
- f) Details of plumbing and depth of borehole
- g) Details of quantity grout constituents injected into each borehole
- h) Total daily and cumulative quantities of each constituent of grout mixes
- i) Details of grouting pressures recorded, and corresponding depths
- j) Details of casing abandoned in boreholes with appropriate reference numbers
- k) Details of grouting materials delivered to site on daily and cumulative basis together with copies of receipts or invoices
- l) Details of Polyethylene Oxide used
- m) Measurements of methane and carbon dioxide levels
- n) Reasons for any suspension of the grout injection operation
- o) Details of type of injection and type of dimensions.

19.4 The plans and sections shall be updated daily in conformity with the records required above and provided to the Engineer no later than 12 noon the working day after the Works have been completed.

A E I I STR E TATIO A O ITORI

1. The Contractor shall implement applicable monitoring for the safe operation of the works. .

A E I L I T I A L E S F O R O L L T I O O F C O T R O L L E A T E R S

1. In the event that olfactory and visual contamination of excavated soils are identified during the Works by the Contractor, the ER shall be informed immediately and work temporarily suspended in the area concerned. Appropriate contamination testing shall then be agreed with the ER to assess the appropriate course of action including as required the determination of limiting values for contamination to prevent the pollution of controlled waters.
2. Should any leachate, contaminated groundwater or bodies of free product be encountered, the ER shall be informed who may specify testing and determine an adequate mitigation strategy.

A E I L I T I A L E S F O R A R T O A E A L T A T E E I R O E T

1. In the event that olfactory and visual contamination of excavated soils are identified during the Works by the Contractor, the ER shall be informed immediately and work temporarily suspended in the area concerned. Appropriate contamination testing shall then be agreed with the ER to assess the appropriate course of action, in line with the range of determinants listed in Table 1.
2. Where no Soil Organic Matter (SOM) values are not known then the values for a 1% SOM should be adopted until otherwise confirmed.

Specification for the Construction of NAR and J43 Improvement Works, Coed Darcy

Title **SS s derived using CLEA for** **SO** **and sand soil type** **Commercial land use**

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Compound	SS mg g	otes
1,1,1-Trichloroethane	325	
1,1,1,2-Tetrachloroethane	52.4	
1,1,2,2-Tetrachloroethane	131	
1,1,2-Trichloroethane	42.5	
1,1-Dichloroethane	122	
1,1-Dichloroethene	12.6	
1,2-Dichloroethane	0.294	
1,2,4-Trimethylbenzene	175	
1,2-Dichloropropane	1.43	
2,4-Dichloro-o-cresol	55000	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 861 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
2,4-Dimethylphenol	35600	The dermal approach published by EIC has been followed. In the phenol SGV report, additional consideration was given to localised dermal effects. This may be applicable to phenol derivatives but has not been considered. The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 1330 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
2,4-Dinitrotoluene	3740	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 132 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
2,6-bis(1,1-dimethyl)-4-(1-methylpropyl)-phenol	2170	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 18.7 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
2,6-Dinitrotoluene	1850	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 271 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
2-Chloronaphthalene	60200	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 113 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
2-Methylphenol	187000	The dermal approach published by EIC has been followed. In the phenol SGV report, additional consideration was given to localised dermal effects. This may be applicable to phenol derivatives but has not been considered. Users must consider total exposure from all methylphenol isomers and not consider them in isolation. In line with the approach published by EIC when assessing total cresols, the lowest SSV of each methylphenol isomer may be chosen to compare to the total methylphenol concentration. The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 14200 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
3-Methylphenol	187000	The dermal approach published by EIC has been followed. In the phenol SGV report, additional consideration was given to localised dermal effects. This may be applicable to phenol derivatives but has not been considered. Users must consider total exposure from all methylphenol isomers and not consider them in isolation. In line with the approach published by EIC when assessing total cresols, the lowest SSV of each methylphenol isomer may be chosen to compare to the total methylphenol concentration. The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 25300 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.

Specification for the Construction of NAR and J43 Improvement Works, Coed Darcy

Author
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31/03/2011

Title

SS s derived using CLEA for SO and sand soil type Commercial land use

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Compound	SS mg g	otes
4-Methylphenol	185000	The dermal approach published by EIC has been followed. In the phenol SGV report, additional consideration was given to localised dermal effects. This may be applicable to phenol derivatives but has not been considered. Users must consider total exposure from all methylphenol isomers and not consider them in isolation. In line with the approach published by EIC when assessing total cresols, the lowest SSV of each methylphenol isomer may be chosen to compare to the total methylphenol concentration. The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 25800 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Acenaphthene	109000	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 157 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Anthracene	536000	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 3.48 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Antimony	4830	
Arsenic	640	Value presented is the Environment Agency Arsenic SGV published in May 2009. The commercial assessment criterion will not change with soil type or SOM. The SGV is the lower of the oral or inhalation assessment criteria.
Barium	22100	
Benzene	13.1	Based on information within the Environment Agency Benzene SGV report published in March 2009.
Benzo(a)anthracene	131	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 1.71 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Benzo(a)pyrene	14.3	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 0.911 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Benzo(b)fluoranthene	142	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 1.22 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Benzo(g,h,i)perylene	1440	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 0.0187 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Benzo(k)fluoranthene	1430	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 0.686 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Beryllium	1010	
Biphenyl	71900	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 34.1 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.

Bis (2-ethylhexyl) phthalate	85200	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 8.66 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value. In line with the EIC report section 3.7, where the toxicity effects are the same, the potential additivity of phthalates should be considered by assessors when using the SSV for these substances. Guidance on additivity is provided in the Environment Agency for England and Wales SR2 document.
Bromobenzene	44.7	
Bromodichloromethane	0.907	
Bromoform	347	

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Compound	SS mg g	otes
Butyl benzyl phthalate	941000	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 26.1 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value. In line with the EIC report section 3.7, where the toxicity effects are the same, the potential additivity of phthalates should be considered by assessors when using the SSV for these substances. Guidance on additivity is provided in the Environment Agency for England and Wales SR2 document .
Cadmium	230	Value presented is the Environment Agency Cadmium SGV published in July 2009. The commercial assessment criterion will not change with soil type or SOM.
Carbon disulphide	11.6	
Carbon tetrachloride	1.44	
Chlorobenzene	533	
Chloroethane	463	
Chloroform / Trichloromethane	48.0	
Chloromethane	0.480	
Chromium III	213000	
Chromium VI	330	
Chrysene	14000	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 0.44 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Cis-1,2-dichloroethene	6.37	
Copper	109000	
Cyanide	34.0	Based on acute exposure for a 0-6 year old child, using 5th percentile bodyweight from CLR10. Information is not available in SR3 and supporting documents regarding the 5th percentile bodyweight of SR3 bodyweight data. It is not considered likely that new data would significantly affect the SSV.
DDD	984	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 49.9 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Dibenz(a,h)anthracene	14.3	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 0.00393 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Dibromochloromethane	9.83	
Dichloromethane	116	
Diethyl phthalate	377000	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 12.8 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value. In line with the EIC report section 3.7, where the toxicity effects are the same, the potential additivity of phthalates should be considered by assessors when using the SSV for these substances. Guidance on additivity is provided in the Environment Agency for England and Wales SR2 document .
Di-n-butyl phthalate	15400	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 4.62 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value. In line with the approach published by the EIC, the lower of the oral and inhalation assessment criteria has been selected. In line with the EIC report section 3.7, where the toxicity effects are the same, the potential additivity of phthalates should be considered by assessors when using the SSV for these substances. Guidance on additivity is provided in the Environment Agency for England and Wales SR2 document .

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Di-n-octyl phthalate	89100	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 32.6 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value. In line with the EIC report section 3.7, where the toxicity effects are the same, the potential additivity of phthalates should be considered by assessors when using the SSV for these substances. Guidance on additivity is provided in the Environment Agency for England and Wales SR2 document.
Dinoseb	7.53	

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Compound	SS mg g	otes
Ethylbenzene	180000	Based on information within the Environment Agency Ethylbenzene SGV report published in March 2009. The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 508 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Fluoranthene	72300	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 18.9 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Fluorene	66800	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 125 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Formaldehyde	463	
Hexachloroethane	510	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 8.13 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Indeno(1,2,3-c,d)pyrene	142	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 0.0614 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Iso-propylbenzene	180000	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 388 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Lead	6490	
Mercury (elemental)	4.30	Based on information in the Environment Agency Mercury SGV report published in March 2009. The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the lower of the aqueous and the vapour saturation based limit as calculations are based on inhalation exposure only.
Mercury (inorganic)	3600	Value presented is the Environment Agency inorganic mercury SGV published in March 2009. The commercial assessment criterion will not change with soil type or SOM.
Mercury (methyl)	414	Based on information in the Environment Agency Mercury SGV report published in March 2009. The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 66.4 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Methyl tert-butyl ether	3340	
Molybdenum	17700	
m-Xylene	276000	Based on information within the Environment Agency Xylene SGV report published in March 2009. Users must consider total exposure from all xylene isomers and not consider them in isolation. The lowest SSV of each xylene isomer may be chosen to compare to the total xylene concentration. The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 613 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Naphthalene	8180	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 75 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Nickel	1800	Value presented is the Environment Agency Nickel SGV published in May 2009. The commercial assessment criterion will not change with soil type or SOM. The oral and inhalation assessment criteria are derived independently and the SGV is the lower value of the two.
Nicotine	857	

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o-Xylene	296000	Based on information within the Environment Agency Xylene SGV report published in March 2009. Users must consider total exposure from all xylene isomers and not consider them in isolation. The lowest SSV of each xylene isomer may be chosen to compare to the total xylene concentration. The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 467 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
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Compound	SS mg/g	Notes
Phenol	686	Based on information within the Environment Agency Phenol SGV report published in July 2009. The SSV presented assumes 1% soil organic matter and uses the linear media partitioning model within the CLEA software which estimates the corresponding soil water concentration for phenol to be 1% by weight. The value presented is based on a threshold protective of direct skin contact with phenol. A long term exposure value of 28900 mg/kg was derived by the CLEA v.1.04 model and is provided for illustration only. Derived by comparing oral exposure to the oral HCV, and dermal and inhalation exposure to the inhalation HCV.
Prochloraz	12500	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 0.116 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Propylbenzene	187000	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 399 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
p-Xylene	279000	Based on information within the Environment Agency Xylene SGV report published in March 2009. Users must consider total exposure from all xylene isomers and not consider them in isolation. The lowest SSV of each xylene isomer may be chosen to compare to the total xylene concentration. The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 564 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Pyrene	54200	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 2.20 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Selenium	13000	Value presented is the Environment Agency selenium SGV published in March 2009. The commercial assessment criterion will not change with soil type or SOM.
Styrene	22200	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 607 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Sum of PCDDs, PCDFs and dioxin-like PCBs	No SSV. Due to publication of the Dioxins, Furans and Dioxin-like PCB SGVs in September 2009, please see the Frequently Asked Questions for more information.	
Tetrachloroethene	75.8	
Toluene	414000	Based on information within the Environment Agency Toluene SGV report published in March 2009. The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 835 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
TPH aliphatic C10-C12	171000	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 49.9 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
TPH aliphatic C12-C16	171000	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 21.0 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
TPH aliphatic C16-C35	≤ 1 kg/kg	This fraction is not considered volatile and the inhalation of vapour pathways have not been considered (TPHCWG, 1997). Modelling indicates that a chronic long term risk would not be present at concentrations above this. However at >1 kg/kg free product would be anticipated and further assessment may be required (e.g. this value is unlikely to be protective of dermal contact). Please see the Frequently Asked Questions for more information on free product.
TPH aliphatic C5-C6	≤ 1 kg/kg	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Modelling indicates that a chronic long term risk would not be present at concentrations above this. However at >1 kg/kg free product would be anticipated and further assessment may be required (e.g. this value is unlikely to be protective of dermal contact). Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 327 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.

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TPH aliphatic C6-C8	≤ 1 kg/kg	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Modelling indicates that a chronic long term risk would not be present at concentrations above this. However at >1 kg/kg free product would be anticipated and further assessment may be required (e.g. this value is unlikely to be protective of dermal contact). Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 158 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
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Compound	SS mg g	otes
TPH aliphatic C8-C10	167000	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 82.5 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
TPH aromatic C10-C12	68300	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 370 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
TPH aromatic C12-C16	68400	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 155 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
TPH aromatic C16-C21	28400	This fraction is not considered volatile and the inhalation of vapour pathways have not been considered (TPHCWG, 1997).
TPH aromatic C21-C35	28400	This fraction is not considered volatile and the inhalation of vapour pathways have not been considered (TPHCWG, 1997).
TPH aromatic C5-C7	13.1	Benzene is the only constituent of this fraction (TPHCWG 1997). Based on information within the Environment Agency Benzene SGV report published in March 2009.
TPH aromatic C7-C8	414000	Toluene is the only constituent of this fraction (TPHCWG 1997). Based on information in the Environment Agency Toluene SGV report published in March 2009. The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 835 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
TPH aromatic C8-C10	58600	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 614 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Trans-1,2-dichloroethene	10.1	
Tributyl tin oxide	123	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 40.9 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Trichloroethene	5.48	
Trichloromethylbenzene	0.0266	
Vanadium	7530	
Vinyl chloride	0.0329	
Zinc	≤1 kg/kg	

Note:

All values provided are rounded to 3 significant figures.

It is noted for some compounds that the SSV is sufficiently high that free product is likely to be encountered. Please see the Frequently Asked Questions for more advice. In some instances the risk based value may be lower than the laboratory detection limit. Please see the Frequently Asked Questions for more advice.

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ame	Commercial S mg L	otes
1,1,2 Trichloroethane	208	d
1,1 Dichloroethane	1110	c
1,1 Dichloroethene	65.6	d
1,2,4 Trimethylbenzene	9.83	d
1,2 Dichloropropane	11.1	b
2,4 Dimethylphenol	30900	a
2,4 Dinitrotoluene	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
2,6 Dinitrotoluene	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
2 Chloronaphthalene	62.7	a
Total Methylphenols	1620000	a The value presented is the lowest risk based number for the three methylphenol isomers. Users must consider total exposure from all methylphenol isomers and not consider them in isolation. In line with the approach published by EIC when assessing total cresols, the lowest WSV of each methylphenol isomer may be chosen to compare to the total methylphenol concentration.
Biphenyl	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
Bis (2 ethylhexyl) phthalate	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate. In line with the EIC report section 3.7, where the toxicity effects are the same, the potential additivity of phthalates should be considered by assessors when using the WSV for these substances. Guidance on additivity is provided in the Environment Agency for England and Wales SR2 document.
Bromobenzene	87.7	c
Bromodichloromethane	6.82	b
Bromoform	1770	c
Butyl benzyl phthalate	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate. In line with the EIC report section 3.7, where the toxicity effects are the same, the potential additivity of phthalates should be considered by assessors when using the WSV for these substances. Guidance on additivity is provided in the Environment Agency for England and Wales SR2 document.
Chloroethane	4180	c
Chloromethane	5.50	b
Cis 1,2 Dichloroethene	54.6	b
Dichloromethane	1500	d
Diethyl Phthalate	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate. In line with the EIC report section 3.7, where the toxicity effects are the same, the potential additivity of phthalates should be considered by assessors when using the WSV for these substances. Guidance on additivity is provided in the Environment Agency for England and Wales SR2 document.
Di n butyl phthalate	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate. In line with the EIC report section 3.7, where the toxicity effects are the same, the potential additivity of phthalates should be considered by assessors when using the WSV for these substances. Guidance on additivity is provided in the Environment Agency for England and Wales SR2 document.
Di n octyl phthalate	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate. In line with the EIC report section 3.7, where the toxicity effects are the same, the potential additivity of phthalates should be considered by assessors when using the WSV for these substances. Guidance on additivity is provided in the Environment Agency for England and Wales SR2 document.
Hexachloroethane	>50	f The saturation limit has been exceeded in the calculation. The WSV presented is the aqueous solubility limit.
Iso propylbenzene	389	a
Methyl tert butyl ether	33800	c
Propylbenzene	1100	a
Styrene	3530	a
Trans 1,2 Dichloroethene	65.7	b
Tributyl tin oxide	54.5	a
Acenaphthene	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
Anthracene	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
Benzo(a)anthracene	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
Benzo(a)pyrene	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
Benzo(b)fluoranthene	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
Benzo(g,h,i)perylene	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
Benzo(k)fluoranthene	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.

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ame	Commercial S mg L	otes
Chrysene	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
Dibenz(ah)anthracene	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
Fluoranthene	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
Fluorene	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
Indeno(1,2,3 cd)pyrene	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
Pyrene	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
Benzene	8.46	b
Toluene	9090	a
Ethylbenzene	1250	a
o xylene	503	a Based on information in the Environment Agency Xylene SGV report published in March 2009. Users must consider exposure from all xylene isomers and not consider them in isolation. The lowest xylene WSV could be chosen to compare to the sum of xylene concentrations.
m xylene	413	a Based on information in the Environment Agency Xylene SGV report published in March 2009. Users must consider exposure from all xylene isomers and not consider them in isolation. The lowest xylene WSV could be chosen to compare to the sum of xylene concentrations.
p xylene	432	a Based on information in the Environment Agency Xylene SGV report published in March 2009. Users must consider exposure from all xylene isomers and not consider them in isolation. The lowest xylene WSV could be chosen to compare to the sum of xylene concentrations.
Phenol	269000	a
Mercury (methyl)	5660	a
Mercury (elemental)	0.428	a
TPH aromatic C5-C7	8.46	b Benzene is the only constituent of this fraction (TPHCWG 1997). Based on information within the Environment Agency Benzene SGV report published in March 2009
TPH aromatic C7-C8	9090	a Toluene is the only constituent of this fraction (TPHCWG 1997). Based on information within the Environment Agency Toluene SGV report published in March 2009.
TPH aromatic C8-C10	96.5	a
TPH aromatic C10-C12	380	a
TPH aromatic C12-C16	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
TPH aliphatic C5-C6	198	a
TPH aliphatic C6-C8	144	a
TPH aliphatic C8-C10	2.90	a
TPH aliphatic C10-C12	2.23	a
TPH aliphatic C12-C16	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
1,2 dichloroethane	3.54	b
1,1,1 Trichloroethane	1270	c
1,1,1,2 Tetrachloroethane	96.7	d
1,1,2,2 Tetrachloroethane	650	c
Carbon tetrachloride	3.31	b
Chlorobenzene (mono)	1300	a
Tetrachloroethene	174	c
Trichloroethene	20.7	b
Vinyl chloride	0.249	b
Naphthalene	99.8	a
Chloroform/Trichloromethane	369	d
Dinoseb	>52	f The saturation limit has been exceeded in the calculation. The WSV presented is the aqueous solubility limit.
Trichloromethylbenzene	0.0609	b
Nicotine	58900	b
Formaldehyde	2360	b
Prochloraz	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
2,6-bis(1,1-dimethyl)-4-(1-met	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
2,4-Dichloro-o-cresol	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.
Dibromochloromethane	38.7	b
DDD	No WSV	e The saturation limit has been exceeded in the calculation. At the aqueous solubility limit the hazard quotient for both indoor and outdoor pathways was less than 0.01 and therefore no risk based number is considered appropriate.

otes	
a	Where both indoor and outdoor values derived by RBCA were greater than the saturation limit, the hazard quotient for the indoor pathway was considered. If the hazard quotient was greater than 0.01, the hazard quotients were used to calculate a risk based value (not limited by the saturation limit). The calculated indoor and calculated outdoor values have been integrated in line with SNIFFER (2003).
b	Where indoor and outdoor values were presented by RBCA, these have been integrated in line with SNIFFER (2003).
c	Where indoor values were presented by RBCA, and the outdoor values were greater than the saturation limit, the hazard quotient for the outdoor pathway was considered. If the hazard quotient for the outdoor pathway was less than 0.1, the indoor values have been presented as the WSV.

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ame	Commercial S mg L	otes
d		Where indoor values were presented by RBCA, and the outdoor values were greater than the saturation limit, the hazard quotient for the outdoor pathway was considered. If the hazard quotient for the outdoor pathway was greater than 0.1 but less than 1, the hazard quotient was used to calculate a risk based value (not limited by the saturation limit). The indoor and calculated outdoor values were integrated in line with SNIFFER (2003).
e		Where the indoor and outdoor values derived by RBCA were greater than the saturation limit, the hazard quotient for the indoor pathway was considered. The hazard quotient was less than 0.01 and no risk based number is considered appropriate. In this case 'no WSV' is presented.
f		Due to the limitations in the RBCA software, a hazard quotient could not be calculated for the inhalation of indoor air. The WSV presented is the aqueous solubility limit. Further assessment is recommended should the aqueous solubility limit be exceeded.

Only inhalation exposure pathways are considered as presented within the input parameters.

The potential presence of free product should be assessed to ensure no further risk assessment is required. TPH >C16 are not considered to be volatile according to TPHCWG. Consequently no WSV have been derived. All values provided are rounded to 3 significant figures.

In some instances the risk based value may be lower than the laboratory detection limit or the drinking water standard. Please see the Frequently Asked Questions for more advice.

A E I TESTI TO BE CARRIE O T B T E CO TRACTOR

Testing

- 1.1 Requirements for testing and commissioning are given below. The Contractor will be responsible for all on-site and off-site testing.
- 1.2 The minimum testing requirements specified in Table 1/1 of the Notes for Guidance have been entered in Appendix 1/5. Testing requirements to include all on-site and off-site testing and indicate where testing is to be carried out off-site.
- 1.3 All tests will be performed in a laboratory accredited by UKAS, or its European equivalent, and the Contractor is required to comply in all respects with UKAS standards, publications and guidance notes.
- 1.4 The Contractor's testing arrangements shall be included in the Contractor's Construction Quality Plan. Except where agreed with the Employer's Agent, tests listed in Advice Note SA3 (DMRB 0.3.3) as suitable for accreditation by UKAS shall be performed in a laboratory accredited by UKAS, or equivalent, for such tests.
- 1.5 The Contractor shall submit weekly a programme of his anticipated testing regime for the following week's work and copies of all the preceding weeks test results, including a commentary on any failures. This programme shall be submitted by 12.00 on the Friday preceding the week's testing.
- 1.6 Routine tests carried out by manufacturers and suppliers in compliance with British Standards or other standards and specifications have not been entered in Appendix 1/5. Test certificates provided by suppliers will be indicated.
- 1.7 Comparable tests to the standards specified elsewhere in the Appendix 1/5 will be done on any equivalent work, goods or materials proposed by the Contractor.
- 1.8 The (N) indicates that a UKAS or equivalent accredited laboratory sampling and test report or certificate is required.
- 1.9 The Contractor shall give unfettered access to the Contractor's laboratory during working hours for the purpose of carrying out audit testing.

Clause	or oods or aterial	Test	Frequency of Testing	Test Certificate	Comments
Series					
306	Permanent Fencing				Quality management scheme applies
	Concrete components (BS 1722)	Cover to reinforcement	1 per consignment (maximum 1 per 100 components) (BS 1722)		
308	Gates and stiles				Quality management scheme applies
	Reinforced concrete posts (BS 3470)	Cover to reinforcement	1 per consignment (maximum 1 per 100 components) (BS 3470)		
308 & 311	Preservation of timber	Full sapwood penetration	As required in sub-Clause 311.2(v)	Required for each batch	Quality management scheme applies
Series					
402	Welding	Welding procedures (Manufacturers tests)	Every seven years		Quality Management scheme applies
		Welder qualification (Manufacturer's tests)	Every two years		
		Production testing (Manufacturer's tests)	As required in sub-Clause 402.5 (iv)		
	Welded Joints	Destructive testing	Samples selected by Supervisor		++[See Notes]
403	Anchorage and attachment systems for use in drilled holes	Ultimate tensile load (Manufacturer tests)		Required	To provide well attested and documented evidence
404	Anchorage in drilled holed	Loading test on site	Requirements included in Appendix 4/1		
	Post foundations				+ [See Notes]
406	Vehicle parapets			Required (BS 6779-1 1998 (Amd. No. 14290, 21 March 2003))	Quality management scheme applies
408	Welding	Welding procedures (Manufacturers tests)			
		Welder qualification (Manufacturer's tests)			
		Production testing (Manufacturer's tests)			
	Welded joints	Destructive testing			
409	Vehicle parapet posts	Production testing as specified in BS 6779-1 1998 (Amd No 14290, 21 March 2003) (Manufacturer's tests)		Required	Certification in accordance with Clause 409 is required

Clause	or oods or aterial	Test	Frequency of Testing	Test Certificate	Comments
410	Anchorage in drilled holes	Loading test on site		Required	Anchorage should hold a current BBA HAPAS Roads and Bridges Certificate (or fully equivalent scheme) conforming to the specification
Series					
501	Pipes for drainage and service ducts				
	Vitrified clay*				Product certification scheme applies
	Concrete PC/SRC	Not exceeding 900 mm dia			
	Concrete – Prestressed				
	Iron-cast				
	Iron-ductile				
	PVC-U				Product certification scheme applies
	GRP				
	Plastics See Table 5/1	Ultimate pipe stiffness tested to BS 4962		Required	The Contractor to submit test certificates to Overseeing Organisation prior to the installation of plastic pipes
	Corrugated Steel	Manufacturer's test		Required (AASHTO)	
	Corrugated steel bitumen protection				
	Concrete PC/SRC exceeding 900 mm dia	Proof load Maximum load Chloride ion Cube strength (manufacturer's tests)	Sub-Clause 509.9	Required (AASHTO)	Product certification scheme applies
	Other materials			Required	BBA certification applies
503	Pipe bedding	Grading and fines content	1 per week up to 500 tonnes and 1 additional per 500 tonnes thereafter. (min 3)	Required	
		Water-soluble sulphate (WS) content (N)	5 per source*		

Clause	Materials	Test	Frequency of Testing	Test Certificate	Comments
		Oxidisable sulphides (OS) content and total potential sulphate (TPS) content(N)	5 per source		
		Resistance to fragmentation (N)	1 per source*		
		Plastic index (N)	1 per source*		
505	Filter medium backfill	Resistance to fragmentation (N)	1 per source*	Required	
		Water-soluble sulphate (WS) content (N)	5 per source		
		Oxidisable sulphides (OS) content and total potential sulphate (TPS) content (N)	5 per source		
		Grading and fines content	1 per week up to 500 tonnes and 1 additional per 500 tonnes thereafter. (min 3)		
		Permeability (N)	1 per source*		
506	Sealing existing drains	In accordance with Appendix 5/1			
	Concrete				
	Grout				
507	Chambers				
	Precast concrete				Production certification scheme applies
	Corrugated galvanised steel	(Manufacturer's tests)		Required	Production certification scheme applies
	Manhole steps				
	Steel fitments				
	Covers, grates and frames				Production certification scheme applies
	Cover bolts				Quality Management scheme applies
508	Gullies and pipe junctions:-				Production certification Scheme applies
	Precast concrete				
	Clay				
	Cast iron and steel				
509	Water tightness of joints	Air test followed by water test if required	All pipelines with watertight joints	Required	
512	Backfill to pipe bays	Grading	1 per 50 tonnes (min of 3)*	Required	

Clause	Materials	Test	Frequency of Testing	Test Certificate	Comments
		Water-soluble sulphate (WS) content (N)	5 per source*		Minimum to allow for natural variability of sulphur compounds
		Oxidisable sulphides (OS) content and total potential sulphate (TPS) content (N)	5 per source*		
513	Permeable backing to earth retaining structures	Plastic Index (N)	1 per source*	Required	Minimum to allow for natural variability of sulphur compounds
		Water-soluble sulphate (WS) content (N)	5 per source	Required	
		Oxidisable sulphides (OS) content and total potential sulphate (TPS) content (N)	5 per source		
		Resistance to fragmentation (N)	1 per source*		
		Grading	1 per 200 tonnes (min of 3)*		
		Permeability (N)	1 per source*		
	Precast hollow concrete blocks	(Manufacturer's test)		Required	
514	Fin Drains	Manufacturer's tests		Required	BBA certification (or equivalent) applies
515	Narrow filter drains				
	Geotextile, pipes and fittings	(Manufacturer's tests)		Required	BBA certification (or equivalent) applies
	Granular fill	Plastic Index (N)	1 per source*		
		Resistance to fragmentation (N)			
		Water-soluble sulphate (WS) content (N)	5 per source		Minimum to allow for natural variability of sulphur compounds
		Oxidisable sulphides (OS) content and total potential sulphate (TPS) content (N)	5 per source		
		Grading and fines content	1 per week up to 500 tonnes and 1 additional per 500 tonnes thereafter. (min 3)		
		Permeability (N)	1 per source*		

Clause	or oods or aterial	Test	Frequency of Testing	Test Certificate	Comments
516	Combined drainage and kerb system	Load test	A minimum of 1 test and not less than 1 test per 1000m for each type and source	Required	Certification that the systems comply with Clause 516 is required
517	Linear drainage systems	Load test	A minimum of 1 test and not less than 1 test per 1000m for each type and source	Required	Certification that the systems comply with Clause 517 is required
518	Thermoplastics structured wall pipes and fittings	Manufacturer's tests		Required	BBA certification (or equivalent) applies
Series					
601, 631 to 637, 644	Acceptable material			Required	
	1	General granular fill	Grading/ uniformity coefficient		
			mc(N)		
			omc/mc (N)		
		1C Only	Resistance to fragmentation (N)		Los Angeles Coefficient. Frequency of testing to be reviewed after three weeks by the ESR
	2	General cohesive fill	Grading	Required	
			mc(N)		
			omc/mc/PL (N)		
			SMC (N)		
	4	Landscape fill	Grading	Required	
			Undrained shear strength of remoulded material		
	5	Site won topsoil	Grading	Required	
	6	Selected granular fill	Grading/ uniformity coefficient	Required	
			PI/LL (N)		
			Resistance to fragmentation (N)		
			mc (N)		
			omc/mc (N)		

Clause	or oods or aterial		Test	Frequency of Testing	Test Certificate	Comments	
			Organic matter/ water soluble or total sulphate content (N)	3 per source			
			Oxidisable Sulfides (OS) and Total Potential Sulphate (TPS) content (N)	3 per source			
			Undrained and drained shear parameters (N)	3 per source			
	6F4 and 6F5	Selected granular material	Size designation and overall grading category	1 per week	Required	Results of routine control tests form the factory production control system operated by the producer to be provided for Class 6F4 and 6F5 – see Annex C of BS EN 13242 and Annex D of BS EN 13285	
			Maximum fines and oversize grading categories	1 per week			
			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				Declared values form the factory production control system operated by the producer to be provided for Class 6F4 and Class 6F5 – see Annex D of BS EN 13285
			Water content				
	Fill adjacent to cementitious material or metallic items		Water-soluble Sulphate (WS) content, Oxidisable Sulfides (OS) and Total Potential Sulphate (TPS) content (N)	1 per 400 tonnes or per location if less than 400 tonnes	Required		
602	Earthworks material beneath paved road or paved central reserve		Frost heave (N)		Required	Previous test results for source material subject to approval of the Overseeing Organisation	
	(i) Off site source			1 test per source per material			
	(ii) On site source			1 test per source per material			
609	Geotextiles		Tensile load		Required		

Clause	or oods or aterial	Test	Frequency of Testing	Test Certificate	Comments
621		Permeability Pore Size	1 per 400m ³ up to a maximum of 3 tests per material type		Refer to Appendix 6/5 of this specification
612	Compaction of fills			Required	
	Method compaction	Field dry density (N)	1 per 200m ³ for compaction per compaction trial area		Additional field density tests may be requested by the Overseeing Organisation
	End product compaction	Optimum mc (4.5kg rammer/ vibrating hammer method) (N) Field dry density (N)	Each class or sub class of material 1 per 400 tonnes with a minimum of 3 at each bridge abutment		
Series					
710	Constituent materials in recycled aggregate	Quality control	Checks are to be carried out by the Contractor in accordance with the procedure set down in 'Quality Control – Production of Recycled Aggregates' and those in this cause	Required	This quality control procedure should be in accordance with the Quality Control – Production of Recycled Aggregates' published by Waste and Resources Action Programme is available from WRAP website, www.wrap.org.uk
711	Overbanding and inlaid crack sealing systems			Required	BBA certification (or equivalent) applies
Series					
801, 803, 804, 805, 806	General requirements for unbound mixtures for sub-base (other than slag) adjacent to cement bound materials, concrete pavements, structures or products	Water-soluble sulphate (WS) content (N)	1 per 400 tonnes or per location if less than 400 tonnes	Required	
		Oxidisable sulfides (OS) content and total potential sulphate (TPS) content (N)	1 per 400 tonnes or per location if less than 400 tonnes	Required	
	Unbound mixtures beneath surface of a road or paved central reserve	Frost heave (N)	1 per source	Required	
		Grading and fines content	1 per week		
		Plastic Index (N)			
		Resistance to fragmentation (N)	6 monthly		
		Resistance to wear – micro-Deval test			
		Resistance to freezing and thawing (magnesium sulphate soundness) (N)	1 per source		

Clause	or oods or aterial	Test	Frequency of Testing	Test Certificate	Comments
		Water absorption (N)	6 monthly		
		Volume stability of blast furnace slags			
		Volume stability of steel (BOF and EAF) slags	6 monthly		
		CBR (N)	1 per source and monthly		
		OMC/mc (N)			
		Density (N)			
		Water absorption (N)			
821, 822	Cement bound granular mixtures B	As required			
Series					
901 925 937 938 943	Aggregates for bituminous materials			Required	National quality management sector schemes apply
		Resistance to fragmentation (hardness)	Resistance to fragmentation (N)	Monthly*	
		Resistance to freezing and thawing (durability)	Soundness (N)	1 per source*	[Where required – See NG 901.21]
			Water absorption (N)	As required	
		Cleanliness	Sieve test (mass passing 0.063 mm sieve) (N)	Monthly*	Washing and sieving method to be used
		Shape	Flakiness index (N)	Monthly*	
		Blast furnace slag	Bulk density (N)	1 per 500 tonnes*	BS EN 1097-3
			Soundness (N)	Once every 4 months*	
			Dicalcium silicate disintegration (N)	1 per 500 tonnes*	These are for air-cooled blast furnace slag
			Iron disintegration (N)		
		Steel slag	Bulk density	1 per 500 tonnes*	
			Volume stability (N)		
		Coarse aggregate for wearing courses	Resistance to polishing (PSV) (N)	1 per source*	
			Resistance to surface abrasion (AAV) (N)	1 per source*	
		Binders for bituminous materials	Penetration (N)	1 per 750 tonnes*	National quality management sector schemes apply. Modified
			Softening point (N)	1 per 750 tonnes*	

Clause	or oods or aterial	Test	Frequency of Testing	Test Certificate	Comments
					binders should have a BBA HAPAS Roads and Bridges Certificate. In the event that no such Certificates have been issued, then in the interim, only modified binders undergoing BBA assessment should be considered for approval by the Overseeing Organisation. As a result more frequent testing and sampling should be scheduled for modified binders.
903 to 907, 909 to 912, 914, 916, 925, 926, 929, 937, 938, 942, 943, 946 to 948	Bituminous mixtures	Grading (N)	For Audit Test purpose only		National quality management sector schemes apply.
		Binder content (N)			Change to 1 per 200 tonnes if quality is well within specified tolerances
942	Thin wearing course systems				National Quality management sector schemes apply. BBA certification (or equivalent) applies
		Binder drainage test	In accordance with DD232		
929	Roadbase and Basecourse Macadams	In situ air void content (N)	As required	Required	
		Refusal air void content (N) (PRD Test)			
		Binder volume			
		Grading (N)			
		Binder content (N)			
		Binder drainage test	In accordance with DD 232:1996		
		Binder drainage test	In accordance with DD 232:1996		
943	Rolled asphalt surface course (performance-related design mix)			Required	National quality management sector schemes apply.
		Grading (N)	As required		
		Binder content (N)			

Clause	Materials		Test	Frequency of Testing	Test Certificate	Comments		
			Density (N)					
			Wheel-tracking rate (N)					
			Wheel-tracking rut depth (N)					
			Air voids content					
920	Bond coats, tack coats and other bituminous sprays							
		Binder	Product identification	1 per product per source	Required	Tests are expected to be repeated every two years		
			Vialit cohesion	1 per product per source	Required	Tests are expected to be repeated every two years		
			Accuracy of spread	1 for each binder and sprayer per month	Required	Not more than 6 weeks prior to start of work		
			Rate of spread	1 per week for each machine				
			Penetration at 25°C and 5°C (N)	Every manufactured batch		Manufacturer's QA test results maybe submitted		
919 922	Surface Dressing							
		Binder				Modified binders should have a BBA HAPAS Roads and Bridges Certificate. In the event that no such Certificates have been issued, then in the interim, only modified binders undergoing BBA assessment should be considered for approval by the Overseeing Organisation.		
			Product identification	1 per product per source	Required	Tests are expected to be repeated every two years		
			Vialit cohesion	1 per product per source	Required	Tests are expected to be repeated every two years		
			Accuracy of spread	1 for each binder and sprayer per week	Required	Not more than 6 weeks prior to start of work and one per week		
			Rate of spread	Every 1000 linear metres initially	Required	Frequency to be reduced to daily after 3 satisfactory results, but not less than 1 test per site.		
			Penetration at 25°C and 5°C (N)	Every batch		For cut back binders as supplied, manufacturer's QA viscosity test results may be submitted.		
			Chippings		Resistance to polishing (PSV) (N)	Source approval	Required	Less than 6 months prior to work

Clause	or oods or aterial	Test	Frequency of Testing	Test Certificate	Comments
		Resistance to surface abrasion (AAV) (N)	Source approval	Required	Less than 6 months prior to work
		Grading (N)	1 per 200 tonnes	Required	
		Binder content (N)	1 per 200 tonnes	Required	Coated chippings only
		Flakiness index (N)	1 per 200 tonnes	Required	
		Accuracy of spread (N)	1 for each chipping spreader for every change of chipping size or source	Required	Initial test not more than 6 weeks prior to start of work
		Rate of spread	Every 500 linear metres initially		Frequency to be reduced to daily after 3 satisfactory results, but not less than 1 test per lane per site.
	System	TAIT or BBA/HAPAS		Required	
	Rollers	Spray bars working	Before works starts and daily during works		
952	Deformation resistance of base and binder course	Wheel track tests in accordance with BS 598-110 Or, Vacuum Repeated Load Axial Test (RLAT) in accordance with DD226:1996 and TRL PA3287/97	In accordance with SHW CI 952.7 6 cores from first km-length per mixing plant, there after one core per lane-km		When modified binders are used the weather conditions applicable for laying the mixture shall comply with the BBA HAPAS certification
Series					
1001 1030 1044	Cement			Required	Quality management and product certification schemes apply
	Portland cement CEM I			Required (BS 6610)	Tests and test certificates are required
	Portland blastfurnace cement				
	Blast furnace cement CEM III/A				
	Portland pfa cement CEM II/B-V				
	Pozzolan cement CEM IV/A				
	Portland cement with microsilica			Required	BBA Roads and Bridges Certificate required for microsilica
	Pulverised-fuel ash				Tests and test certificates are required. Product certification schemes apply to pfa and slag.
	Ground granulated blast furnace slag				

Clause	Materials		Test	Frequency of Testing	Test Certificate	Comments
	Admixtures				Required	[Where required – See NG 1001.19]
	Mixing Water		Sulphate content (N)	Monthly		
	Aggregates		Resistance to freezing and thawing – magnesium sulphate soundness (N)	1 per source*		
			Water absorption (N)	As required		
			Flakiness index (N)	Monthly*		
			Shell content (N)	1 per source*		
			Resistance to fragmentation (N)	6 monthly		
			Resistance to polishing (PSV) (N)	1 per source*		
			Resistance to abrasion (AAV) (N)	1 per source*		
			Grading and fines content (N)	1 per week per source*		
			Chloride content (N)	Weekly (1 per source for CBM aggregate)		
			Total sulphur (TS) and acid-soluble sulphate (AS) content (N)	Every 6 months		
		Flint coarse aggregate containing white flints Sand (i.e. fine aggregate) Blast furnace slag	Water absorption (N)	3 per source thereafter weekly	Required	
			Acid-soluble material (N)	Monthly*		Not required for CBM aggregate
			Bulk density (N)	Every 6 months		
			Dicalcium silicate disintegration (N)	Every 6 months		These are for air-cooled blastfurnace slag
			Iron disintegration (N)	Every 6 months		
			Total sulphur (TS) and acid-soluble sulphate (AS) content (N)	Every 6 months		At least 5 per source for compounds
	Pulverised-fuel ash				Required (BS 3892: Part 2)	
1002 1003 1004 1044	Pavement Concrete		Air content test (N)	As required in Table 10/10	Required	Product certification scheme applies
		Density (N)	As required in Table 10/10			
		Strength (N)	As required in Table 10/10			
1005	Consistence (Workability)		Degree of Compactability (Compaction Index) (N)	As required in Table 10/10	Required	Also refer to sub-Clause 1005.2
		Vebe (N)				

Clause	Materials		Test	Frequency of Testing	Test Certificate	Comments
			Slump (N)			
1011 1012	Dowel bars Tie bars				Required (BS 4449)	Product certification scheme applies
		Dowel bars and supporting cradles	Load test	1 per arrangement*		Also refer to sub-Clauses 1011.5-7
		Sheathed dowel bars	Bond stress	4 bars		
		Cranked tie bars (coated)	Bend test	4 bars*		
			Salt fog cabinet	4 bars*		
1015	Joint filler board		Weathering test	3 per source	Required	Normally undertaken by manufacturer
			Compression and recovery	4 per source		
			Extrusion	1 per source		
		Cork filler board	Immersion in water	2 per source		
			Immersion in acid	2 per source		
1016 1017	Applied sealants				Required (BS 2499) (BS 5212: Part 1 and BS 51212: Part 2) (BS 4254)	
			Initial Penetration	1 per 1000m or 1 per day		
			Resilience	1 per 1000m or 1 per day		
	Compression seals				Required (ASTM D2628) (BS 2752) (BS 4443: Part 4, Method 10 and BS EN ISO 2440) (BS EN ISO 1856) (BS 903: Part A16 or BS ISO 1817)	
			Compression set	1 per type of seal*		
			Immersion in oil	1 per type of seal*		
	Self expanding cork seal		Tests specified in Clause 1017	1 per type of seal*		
1026 1044	Surface macrotexture		BS EN 13036-1 Volumetric Patch Technique (N)	1 per day (set of 10)*	Required	
1027	Aluminised curing compound		Efficiency index	1 per source*	Required	
1030	Wet lean concrete		Density	As required in Table 10/10	Required	
			Cube strength (N)			
1043	Foamed Concrete		Cube strength (N)	2 cubes per 12m³	Required	

Clause	Materials		Test	Frequency of Testing	Test Certificate	Comments
Series						
1101	Precast concrete kerbs, channels, edgings and quadrants		Bending strength	Minimum of 8 per 1000 units of each product (BS EN 1340)	Required	
1102	In situ asphalt kerbs		Grading	1 test per 500 metres laid*	Required	
			Binder content			
1104	Precast concrete flags		Bending strength	Minimum of 8 per 1000 m ² of each product (BS EN 1339)	Required	
	Bedding	Granular material				
		Mortar				
1107	Concrete block paving		Compressive strength	Minimum of 8 per 1000 m ² of each product (BS EN 1338)	Required	
1108	Clay pavers		Bending strength	Minimum of 8 per 1000 m ² of each product (BS EN 1344)	Required	
			Skid resistance	Minimum of 8 per 1000 m ² of each product (BS EN 1344)		
Series						
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.
1207	Anchorage in drilled holes to supports of traffic signs		Loading test on site			
1210	Holding down bolts and anchorages to bases of permanent bollards				Required	Certification that the holding down bolts and anchorages are capable of complying with the performance requirements of BS 873: Part 3 is required.
1212	Road markings					National quality management sector scheme applies. Procedures are given in BS EN 1824
			Tests specified in BS EN 1824		Required	
1214	Permanent traffic cones and traffic cylinders				Required	Certification that permanent traffic cones and cylinders have been tested and comply with BS EN 13422 is required
			Test specified in BS 873: Part 8	2 of each size and category/type*		
	Flat traffic delineators				Required	Certification that FTD's have been tested and comply with Clause 1214 is required

Clause	or oods or aterial		Test	Frequency of Testing	Test Certificate	Comments
			Tests specified in Clause 1214			
	Other traffic delineators				Required	Certification that the delineators have been tested and comply with Clause 1214 is required
			Tests specified in Appendix 12/4			
	Temporary cones, cylinders, FTD's and other delineators				Required	Certification that at least 1 in 500 of any batch of cones, cylinders, FTD's and other delineators to be used in the Temporary Works have passed the tests in Clause 1214 as appropriate is required
1217	Traffic signals					Quality management scheme applies. Statutory type approval of equipment applies
		Cables				Product certification scheme applies
	Controllers and other equipment		Test specified in Appendix 12/5	Each controller before delivery to Site and again after installation		
	Cabling		Tests a, b, c, e, f, g, h, j as defined in sub-Clause 1424.2	Each traffic signals installation	Required	Certification that the installation complies with BS7671 (the IEE Wiring Regulations) is required
1218	Detector Loops					
		Cable			Required	Certification that completed cables comply with specification TR 2029 is required
	Epoxy resin				Required	Certification that the epoxy resin complies with specification MCH 1540 is required
	Feeder cable				Required	Certification that completed cables comply with specification TR 2031 is required
	Joints		Pull test (4 kgf)	Each crimp		
	Installation	Series resistance		Each loop	Required	Certification in accordance with specification MCH 1540 is required
		Insulation resistance				
		Inductance				
Series						
1305	Anchorage for use in drilled holes		Tensile load (Manufacturer's tests)		Required	To provide well attested and documented evidence

Clause		or oods or aterial	Test	Frequency of Testing	Test Certificate	Comments
1306		Anchorage in drilled holes to columns and masts with flange plates	Loading test on site	As required		25% of Holding Down Bolts to be Tested
1310		Welding	Welding procedures (Manufacturer's tests)	(Every seven years)		Quality management scheme applies
		Welded joints	Welder qualification (Manufacturer's tests)	(Every two years)		
			Production testing (Manufacturer's tests)	Sub-Clause 1310 (7.1.4)		
			Destructive testing	Sub-Clause 1310 (7.1.5)		
1313		GFRP laminates	Loss on ignition	1 per 50 production columns		See sub-Clauses 1310.10-17
			Colour fastness	1 per batch		
			Electric strength			
			Water absorption			
			Impact strength			
1314	Brackets for laminated GFRP lighting columns				Required	
		Polyurethane foam	Bulk density	1 per batch		
			Surface hardness			
			Apparent bulk density	2 per batch		
			Impact strength			
			Flexural stress			
Series						
1421		Cable				Product certification scheme applies. Tests in accordance with BS6346
		Networks	Tests specified in Clause 1424	Each network	Required	+Certification that the installation complies with BS 7671 (see IEE Wiring Regulations) is required
Series						
1506	Copper Communications Cable				Required	Certification that each completed cable complies with specification TR 2150 or TR 2158, as appropriate, is required
	Energy cable				Required	Certification that each completed cable complies with specification TR 2153 or TR 2161, as appropriate, is required

Clause	or oods or aterial	Test	Frequency of Testing	Test Certificate	Comments
1513	Cable Joint Enclosures	Test specified in Clause 1513.12	Each CJE	Required	Certification that the CJE satisfies the air pressure test is required
1517	Earthing and Bonding	Testing as specified in BS 7671, BS 7430 and Appendix 15/1	Each instance	Required	Results shall be in accordance with BS 7671 and BS 7430
1518	Copper communications and power cable	Test specified in specification MCG 1022 or MCG 1099, as appropriate.	Each cable (Stage 1) As required in Appendix 15/1 (Stage 2)		Results to be reported in accordance with MCG 1022 or MCG 1099 and TR2150, as appropriate
1522	Motorway System				
	Steel posts			Required (BS6323)	
1526	Electrical Installations	Test specified in BS 7671	Each installation	Required	Certification that the installation complies with BS 7671 (the IEE Wiring Regulations) is required
1530	Cable ducts	Tests specified in BS EN 50086-1 and BS EN 50086-2-4	Each supplier	Required	Current British Board of Agrément Certificate is required
1532	Chamber for Motorway Communications	Test for chamber covers and frames specified in BS EN 124	Each supplier	Required	Certificate shall be provided to demonstrated compliance with BS EN 124.
1533	Cable ducts				
	Mandrel test	Test specified in Clause 1533	Each duct	Required	Certificate that each length of duct between chambers satisfies the mandrel test is required
Series					
1601	Soil samples In situ soil tests			Required	
1602 to 1606 1610 to 1615	Concrete Grout Reinforcement Prestressing Steelwork Welding Protection against corrosion			Required	
1606	Coatings for protection against corrosion	Adhesion	As required in Appendix 16/6		

Clause		or oods or aterial	Test	Frequency of Testing	Test Certificate	Comments
1607	Reduction of friction on piles					
1608	Integrity testing					
1616	Dynamic testing					
1609	Static load testing of piles				Required	
1612	Self hardening slurry mixes					
1617	Instrumentation					
1618	Support fluids		To be proposed by the Contractor			
Series						
TBC						
Series						
2401	Masonry cement				Required (BS EN 413-1)	Quality management scheme applies
			Chloride content	Monthly*	Required	Test to be carried out by the manufacturer and results included on the test certificate
2402	Sand				Required per consignment (BS EN 13139)	
			Chloride content	Monthly*		Test to be carried out by the manufacturer and results included on the test certificate
2403	Water		Test specified in BS EN 1008	As required		
2404	Mortar admixtures				Required BS EN 934-3)	
2405	Lime				Required (BS EN 459-1)	
2406/ 2417	Bricks					
		Clay	(Soluble salt content, Efflorescence, Compressive strength, Water absorption, Initial rate of suction) (BS 3921)			
		Calcium silicate			Required (BS 187)	
		Concrete			Required (BS 6073-1/ BS EN 772-2)	
2407	Blocks					

Clause	or oods or aterial	Test	Frequency of Testing	Test Certificate	Comments
	Concrete			Required (BS 6073-1/ BS EN 772-2)	
2408	Reconstituted stone				
2410 2411	Stainless steel				
	Wire/fabric			Required (BS EN 10088-1)	
	Bars			Required (BS 6744)	
	Ready mixed mortars			Required (BS 4721)	
	Mortars	Tests specified in Appendix A1 of BS EN 10521-1	1 set of tests per mix*		
Series					
2501	Materials for corrugated steel buried structures exceeding 900mm clear span or internal diameter				Type approval applies
	Steel components			Required as appropriate to the standard or specification listed in the type approval Certificate	
	Zinc coating				
	Protective coating				
	Paved invert system				BBA Roads and Bridges Certification applies
2502	Materials for reinforcing elements, prefabricated facing and capping units, and washers				BBA Roads and Bridges Certification applies
	Carbon steel strip			Required (BS 1449: Part 1.1 or BS EN 10025)	Silicon content and mechanical properties to be stated on the certificate
	Stainless steel strip			Required (BS EN 10029, 10048, 10051, 10258 and 10259)	Mechanical properties to be stated on the certificate
	Reinforcing bar for anchor elements			Required (BS 4449)	Tests scheduled under Clauses 1717 and 1909 are required for welding and galvanizing of anchor elements
	Materials for fasteners				
	Stainless steel			Required (BS EN 10088-1) (BS EN ISO 3506-1 and 3506-2)	

Clause	or oods or aterial	Test	Frequency of Testing	Test Certificate	Comments
	Bolts, screws, nuts and washers			Required (BS EN ISO 898, 4016, 4018, 4034)	Tests scheduled under Clause 1909 are required for hot dip galvanizing
2503	Materials for pocket type reinforced brickwork retaining wall structures				
	Clay bricks	Soluble salt content Efflorescence Compressive strength Water absorption Initial rate of suction (BS 3921/TRL Report 447) (N)	1 set of tests per type of brick*		
2504	Environmental barriers				Quality management scheme applies
	Timber				
	Concrete				
	Steel				
	Brickwork				
	Other materials				
	Barriers	Sound absorption Sound insulation	As required in Appendix 25/4		
	Post foundations	Loading test on site	As required Appendix 25/4		
2505, 2506	Drainage structures/buried rigid pipes for drainage structures Pipes for drains and culverts having diameters or clear span exceeding 900 mm				
	Vitrified clay				Product certification scheme applies Additional manufacturer's test are provided in the relevant BS but should not normally be required
	Concrete PC/SRC	(Manufacturer's test)			See sub-Clause 2506.28
	Iron				Certificates are provided for in the relevant BS but should not normally be required except for pipes which are not quality marked by a UKAS or equivalent accredited body listed in Appendix B of SHW
	Corrugated steel	(Manufacturer's test)			Type Approval Certificate and BBA Roads and Bridges Certificate apply
Series					

Clause	Materials	Test	Frequency of Testing	Test Certificate	Comments
2601	Bedding mortar materials			Required for each batch	Certification in accordance with Clause 2601 is required
	Bedding mortar	Flow cone test	Each Batch		+ Laboratory tests
		Flow between glass plates			
		Compressive strength			
		Expansion test			
		Water absorption			
		Elastic stability	1 per source		
		Flow cone test	Each load		Site control tests
		Compressive strength			
2604	Plastic coating to fencing posts, gates and ancillaries			Required (BS 1722: Part 16) applicator is required	Certificate by powder manufacturer and coating
2607	Granolithic concrete				Testing to be in accordance with Clauses 1702, 1703, 1707 and 1710
Series					
3001	Pesticides				Pesticide records to be submitted to the Overseeing Organisation as Appendix Clause 30/1.3.
	General				Inspection reports as required in Appendix Clause 30/1.3.
3002	Weed Control				Die-back shall be as for Specification Clause 3002.2.
3005	Grass seeding, wildflower seeding and turfing	Test certificates for germination and purity from Official Seed Testing Station as Specification Clause 3005.6.	1 per source, variety and mixture.	Required before sowing.	Written evidence of provenance required as Provenance Certificate pro-forma.
	Grass seed germination	Establishment achieved in accordance with Annex 3 of BS 3969.	Prior to completion.		
	Conventional sowing	Rate of spread of 'Amenity' grasses.	20g per square metre		
		Rate of spread of 'Wildflower' grasses.	5g per square metre		

Clause	Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
3006	Plants	Local Provenance	1 per source	Required before planting	Written evidence of provenance required as Provenance Certificate pro-forma.
	Topsoil	Conforms to general purpose grade BS 3882.	1 per source	As required	
	Compost	As Appendix Clause 30/6.8.	1 per source	As required	
	Fertiliser	NPK as Appendix Clause 30/6.9.	Rate per manufacturer's recommendations.	As required	

Notes to Table

1. Tests comparable to those specified in this Appendix will be necessary for any equivalent work, goods or materials proposed by the contractor (See sub-Clause 105.4).
2. (IL) indicates that an ILAB test report or certificate is required.
3. Unless otherwise shown in this Appendix tests for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.
4. Cube strength tests are not required for concrete complying with Clause 2602.

Unless otherwise shown in this Appendix test certificates for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.

Key

- + Indicates reference to the Specification for Highway Works (SHW) should be made.
- ++ Indicates that test results may be required by the Overseeing Organisation / Supervisor.
- * Indicates that the frequency of testing is recommended and the frequency should be reviewed by the Supervisor after the first results have become available. The frequency of testing could be increased or reduced depending on the consistency of the results.

TABLE 6/1: Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes)

Class		General Material Description	Typical Use	Permitted Constituents All subject to requirements of Clause and Appendix	Material Properties Required for Acceptability In Addition to Requirements on Use of Fill Materials in Clause and Testing in Clause				Compaction Requirements in Clause
					Property See Exceptions in previous Column	Refined and Tested in Accordance with	Acceptable Limits		
							Lower	Upper	
General granular Fill	1 A	Well graded granular material	General Fill	Any material, or combination of materials, other than chalk and material designated as Class 3 in the Contract. Recycled aggregate	(i) grading	BS1377: Part 2	Tab 6/2	Tab 6/2	Method Compaction Tab 6/4 Method 2
					(ii) uniformity coefficient	see Note 5	10	-	
					(iii) moisture content (see Note 4)	BS 1377: Part 2	see note 10	see note 10	
					(iv) Optimum mc/Max Dry Density (omc)	BS1377: Part 4 (2.5kg rammer method)	-	-	
	1 B	Uniformly graded granular material	General Fill	Any material, or combination of materials, other than chalk and material designated as Class 3 in the Contract. Recycled aggregate	(i) grading	BS1377: Part 2	Tab 6/2	Tab 6/2	Method Compaction Tab 6/4 Method 3
					(ii) uniformity coefficient	see Note 5	-	10	
					(iii) moisture content (see Note 4)	BS 1377: Part 2	see note 10	see note 10	
					(iv) Optimum mc/Max Dry Density (omc)	BS1377: Part 4 (2.5kg rammer method)	-	-	

Class		General material description	Typical use	Permitted Constituents All subject to requirements of Clause and Appendix	Material Properties Required for Acceptability In Addition to Requirements on use of Fill materials in Clause and Testing in Clause				Compaction Requirements in Clause
					Property See Exceptions in previous Column	Refined and Tested in Accordance with	Acceptable Limits		
							Lower	Upper	
General Cohesive Fill	2: A	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. (
					(ii) plastic limit (PL) and Liquid Limit (LL)	BS 1377: Part 2	-	-	
					(iii) moisture content (see Note 4)	Clause 632	PL-4%	see note 10	
					(iv) Moisture Condition Value (MCV)	Clause 632	8	13	
					(v) Optimum mc/Max Dry Density (omc)	BS1377: Part 4 (2.5kg rammer)	-	-	
					(vi) Undrained shear strength of remoulded material (see Note 8)	Clause 633	50kPa	150kPa	

Class		General material description	Typical use	Permitted Constituents All subject to requirements of Clause and Appendix	Material Properties Required for Acceptability In Addition to Requirements on use of Fill materials in Clause and Testing in Clause				Compaction Requirements in Clause
					Property See Exceptions in previous Column	Refined and Tested in Accordance with	Acceptable Limits		
							Lower	Upper	
General Cohesive Fill	2 B	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	Method Compaction Tab 6/4 Method 2
					(ii) plastic limit (PL) and Liquid Limit (LL)	BS 1377: Part 2	-	-	
					(iii) moisture content (see Note 4)	Clause 632	see note 10	PI-4%	
					(iv) Moisture Condition Value (MCV)	Clause 632	12	16	
					(v) Optimum mc/Max Dry Density (omc)	BS1377: Part 4 (2.5kg hammer)	-	-	
					(vi) Undrained shear strength of remoulded material (see Note 8)	Clause 633	50kPa	150kPa	
	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	Method Compaction Tab 6/4 Method 2
					(ii) plastic limit (PL) and Liquid Limit (LL)	BS 1377: Part 2	-	-	
					(iii) moisture content (see Note 4)	Clause 632	See note 10	see note 10	
					(iv) Optimum mc/Max Dry Density (omc)	BS1377: Part 4 (2.5kg hammer)	-	-	
					(v) undrained shear strength of remoulded material (see Note 8)	Clause 633	50kPa	150kPa	

Class			General Material Description	Typical Use	Permitted Constituents All subject to requirements of Clause and Appendix	Material Properties Required for Acceptability In Addition to Requirements on Use of Fill Materials in Clause and Testing in Clause				Compaction Requirements in Clause
						Property See Exceptions in previous Column	Refined and Tested in Accordance with	Acceptable Limits		
								Lower	Upper	
Topsoil	5		Topsoil, or turf existing on site or imported topsoil	Topsoiling	General purpose grade complying with BS 3882	(i) grading	Clause 618	-	Clause 618	Not Applicable
Selected Granular Fill	6	A	Selected well graded granular material	Below Water	Natural Gravel, natural sand, crushed gravel, crushed rock other than argillaceous rock, crushed concrete, well burnt colliery spoil, chalk or any combination thereof. Recycled aggregate	(i) grading	BS 1377: Part 2 (On-Site)	Tab 6/2	Tab 6/2	No Compaction
							BS 1377: Part 2 (Off-Site)	Tab 6/2	Tab 6/2	
						(ii) uniformity coefficient	see Note 5	10	-	
						(iii) plasticity index	BS 1377: Part 2	Non-Plastic		
	6	C	Selected uniformly graded granular material	Starter Layer	Natural Gravel, natural sand, crushed rock other than argillaceous rock or chalk, crushed concrete, well burnt colliery spoil or any combination thereof. Recycled aggregate	(i) grading	BS 1377: Part 2 (On-Site)	Tab 6/2	Tab 6/2	Tab 6/4 Method 3
							BS 1377: Part 2 (Off-Site)	Tab 6/2	Tab 6/2	
						(ii) uniformity coefficient	see Note 5	-	10	
						(iii) plasticity index	BS 1377: Part 2	Non-Plastic		
						(iv) Los Angeles Coefficient	BS EN 1097-2	-	50	
						(v) moisture content (see Note 4)	BS 1377: Part 2	omc-1%	omc+2%	
						(ii) Optimum Moisture Content (omc)	BS1377 : Part 4 (Vibrating Hammer)	-	-	

Class			General Material Description	Typical Use	Permitted Constituents All subject to requirements of Clause and Appendix	Material Properties Required for Acceptability In Addition to Requirements on Use of Fill Materials in Clause and Testing in Clause				Compaction Requirements in Clause	
						Property See Exceptions in previous Column	Refined and Tested in Accordance with	Acceptable Limits			
								Lower	Upper		
Selected Granular Fill	6	F	1	Selected Granular Material (Fine Grading)	Capping	Any material or combination of materials other than argillaceous rock chalk and unburnt colliery spoil	(i) grading	BS1377: Part 2 (On-Site)	Tab 6/2	Tab 6/2	Tab 6/4 Method 6
								BS EN 933-2 (Off-Site)	Tab 6/2	Tab 6/2	
							(ii) Optimum Moisture Content (omc)	BS1377 : Part 4 (Vibrating Hammer)	-	-	
							(iii) moisture content (see Note 4)	BS 1377: Part 2	omc - 2%	omc	
							(iv) Los Angeles Coefficient	BS EN 1097-2	-	60	
	6	F	2	Selected Granular Material (Coarse Grading)	Capping	Any material or combination of materials other than argillaceous rock chalk and unburnt colliery spoil	(i) grading	BS1377: Part 2 (On-Site)	Tab 6/2	Tab 6/2	Tab 6/4 Method 6
								BS EN 933-2 (Off-Site)	Tab 6/2	Tab 6/2	
							(ii) Optimum Moisture Content (omc)	BS1377 : Part 4 (Vibrating Hammer)	-	-	
							(iii) moisture content (see Note 4)	BS 1377: Part 2	omc - 2%	omc	
							(iv) Los Angeles Coefficient	BS EN 1097-2	-	50	
	6	F	3	Selected Granular Material	Capping	Recycled bituminous planings and granulated asphalt, but excluding materials containing tar or tar-bitumen binder. Recycled aggregates	(i) grading	BS1377: Part 2 (On-Site)	Tab 6/2	Tab 6/2	Tab 6/4 Method 6 Maximum compacted layer thickness shall be 200mm
								BS EN 933-2 (Off-Site)	Tab 6/2	Tab 6/2	
							(ii) Optimum Moisture Content (omc)	App 6/6 (1)	-	-	
							(iii) moisture content (see Note 4)		omc - 2%	omc	
							(iv) Bitumen Content	BS 598 : Part 102	-	0.1	

Selected granular Fill	6	N	-	Selected well graded granular material	Fill to structures	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, slag, well burn colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. Recycled aggregate except recycled asphalt.	(i) grading	BS 1377: Part 2 (Onsite)	Tab 6/2	Tab 6/2	End product 95% of maximum dry density of BS 1377: Part 4 (vibrating hammer method)
								BS EN 933-2 (Off-site)	Tab 6/5	Tab 6/5	
							(ii) uniformity coefficient	See Note 5	10	-	
							(iii) Los Angeles coefficient	Clause 635	-	40	
							(iv) undrained shear parameters (c and ϕ)	Clause 633	N/A	-	
							(v) effective angle of internal friction (ϕ') and effective cohesion (c')	Clause 636	35°	-	
							(vi) permeability	Clause 640	5 x10 ⁻⁵ m/s	-	
							(vii) mc	BS 1377 : Part 2	OMC-2%	OMC+1 %	
							(viii) MCV	Clause 632	N/A	N/A	
							(ix) slope stability test (where required in App 6/6)	Clause 610	Not required		

Footnotes to Table

1) App = Appendix

2) Tab = Table

3) Where in the Acceptable Limits column reference is made to App 6/1, only those properties having limits ascribed to them in Appendix 6/1 shall apply. Where Appendix 6/1 gives limits for other properties not listed in this Table such limits shall also apply

4) Where BS 1377: Part 2 is specified for mc, this shall mean BS 1377: Part 2 or BS EN 1097-5 as appropriate.

5) The Uniformity coefficient is defined as the ratio of the particle diameters D_{60} to D_{10} where:

D_{60} = particle diameter at which 60% of the soil by weight is finer

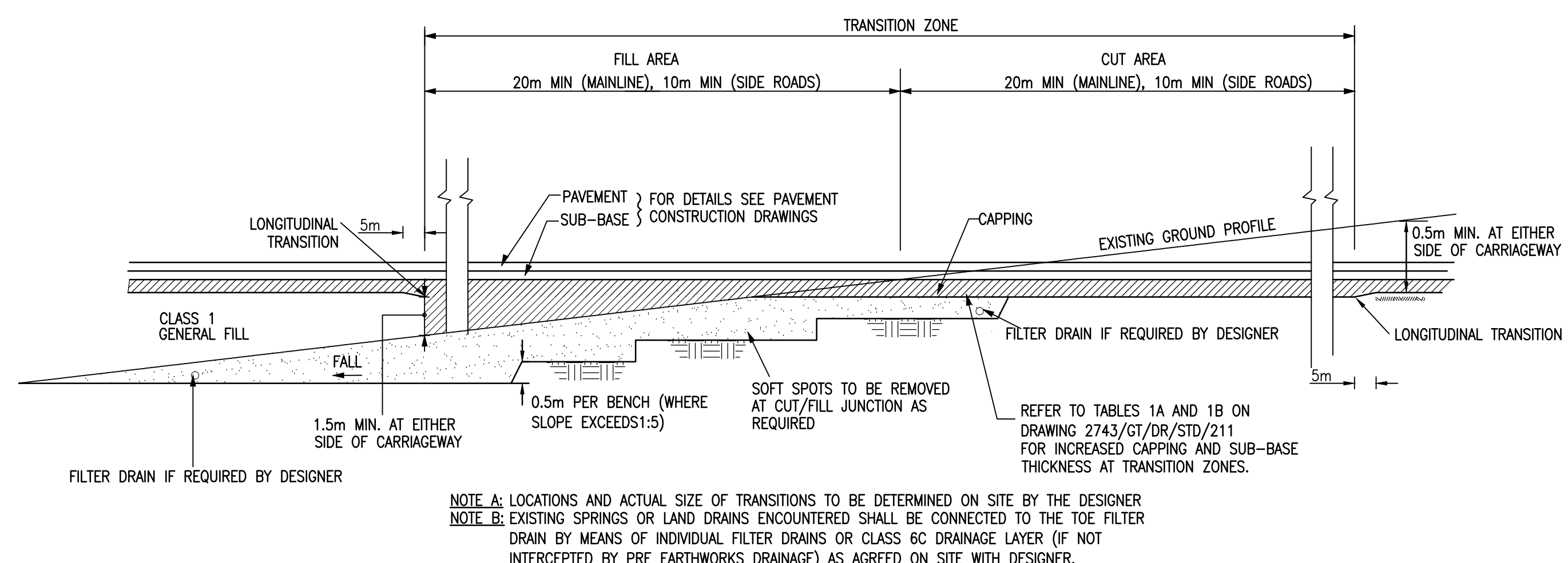
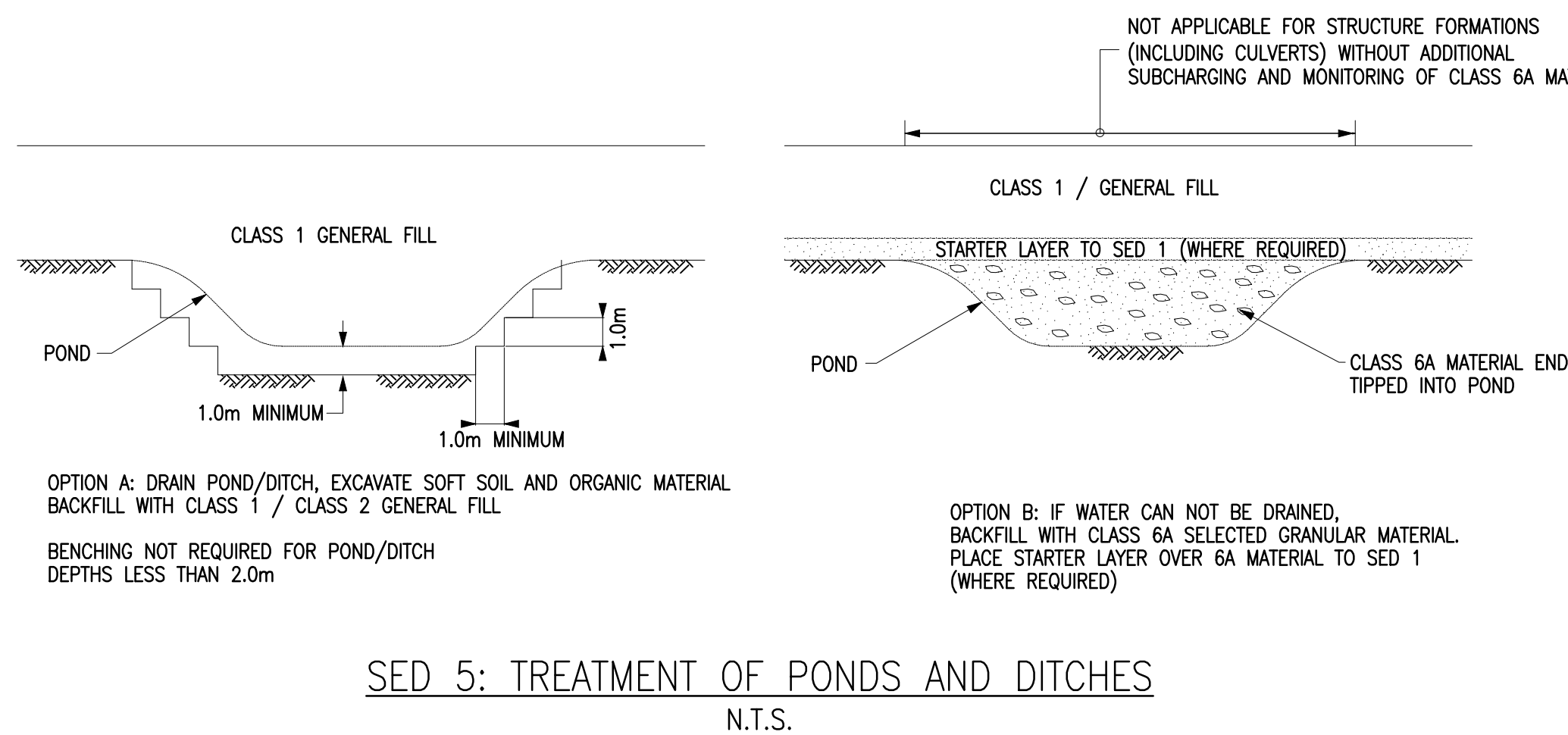
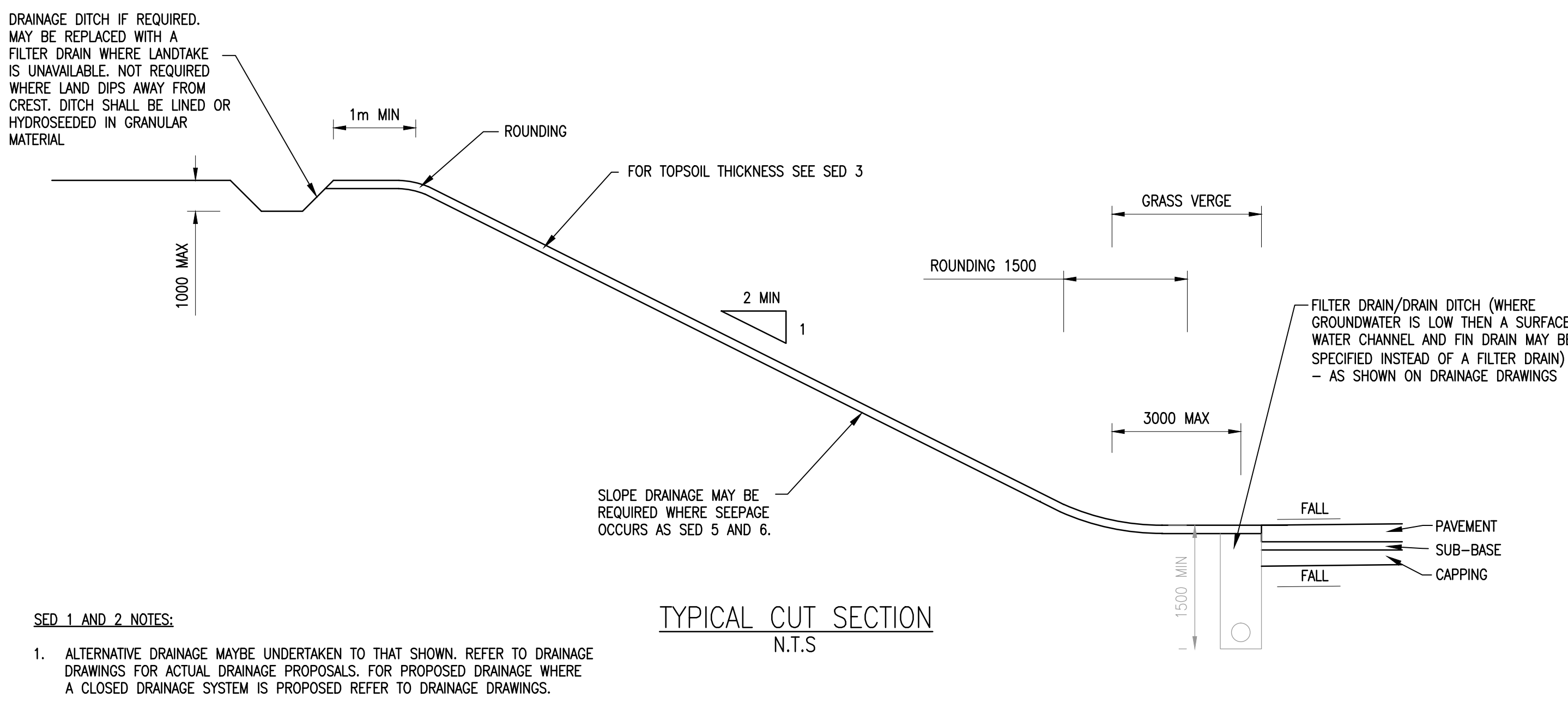
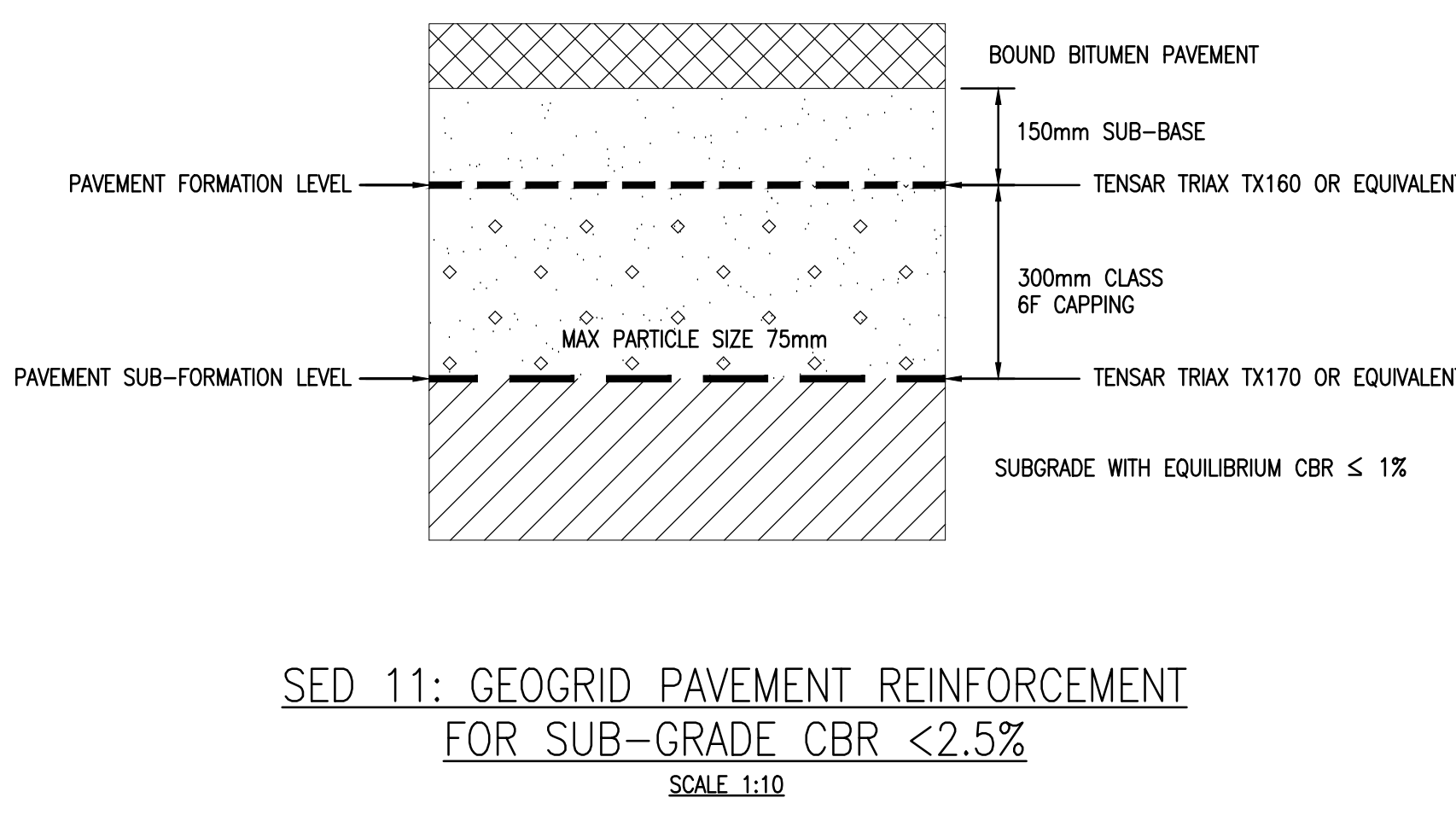
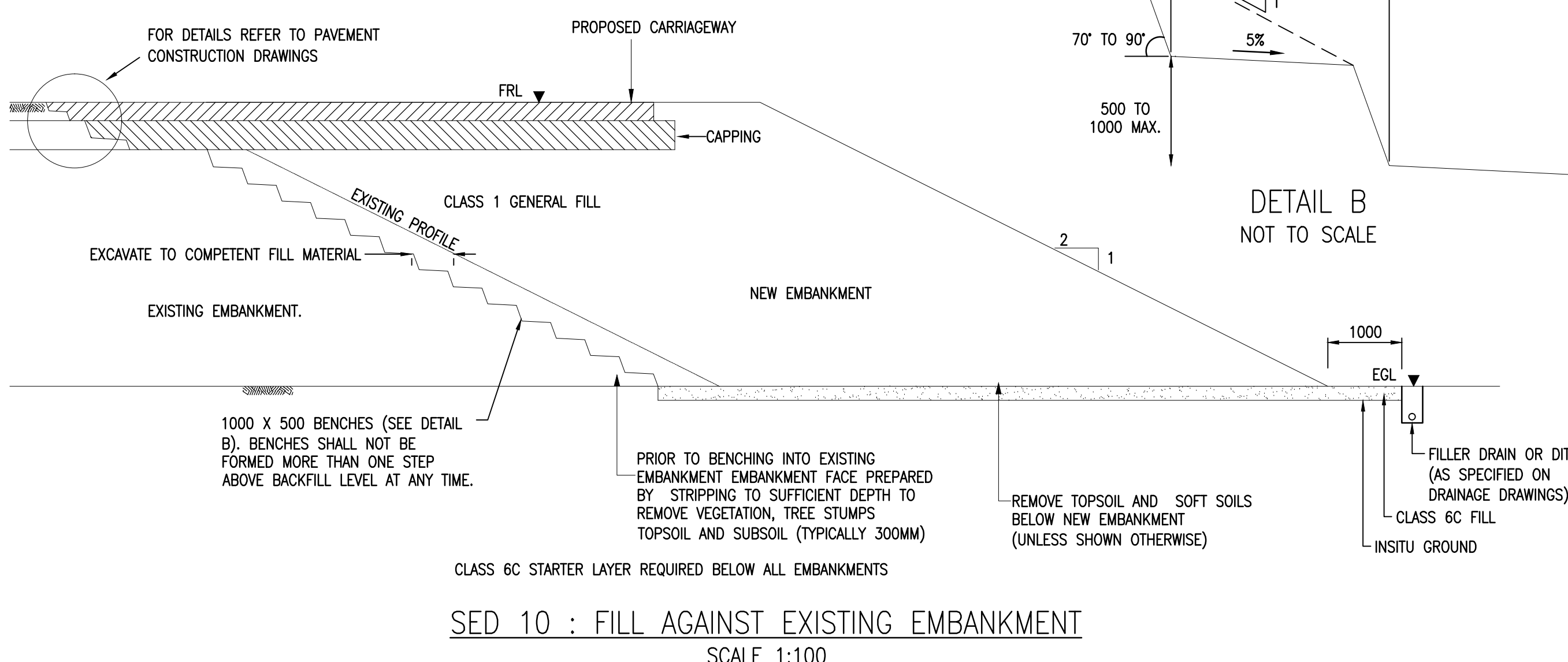
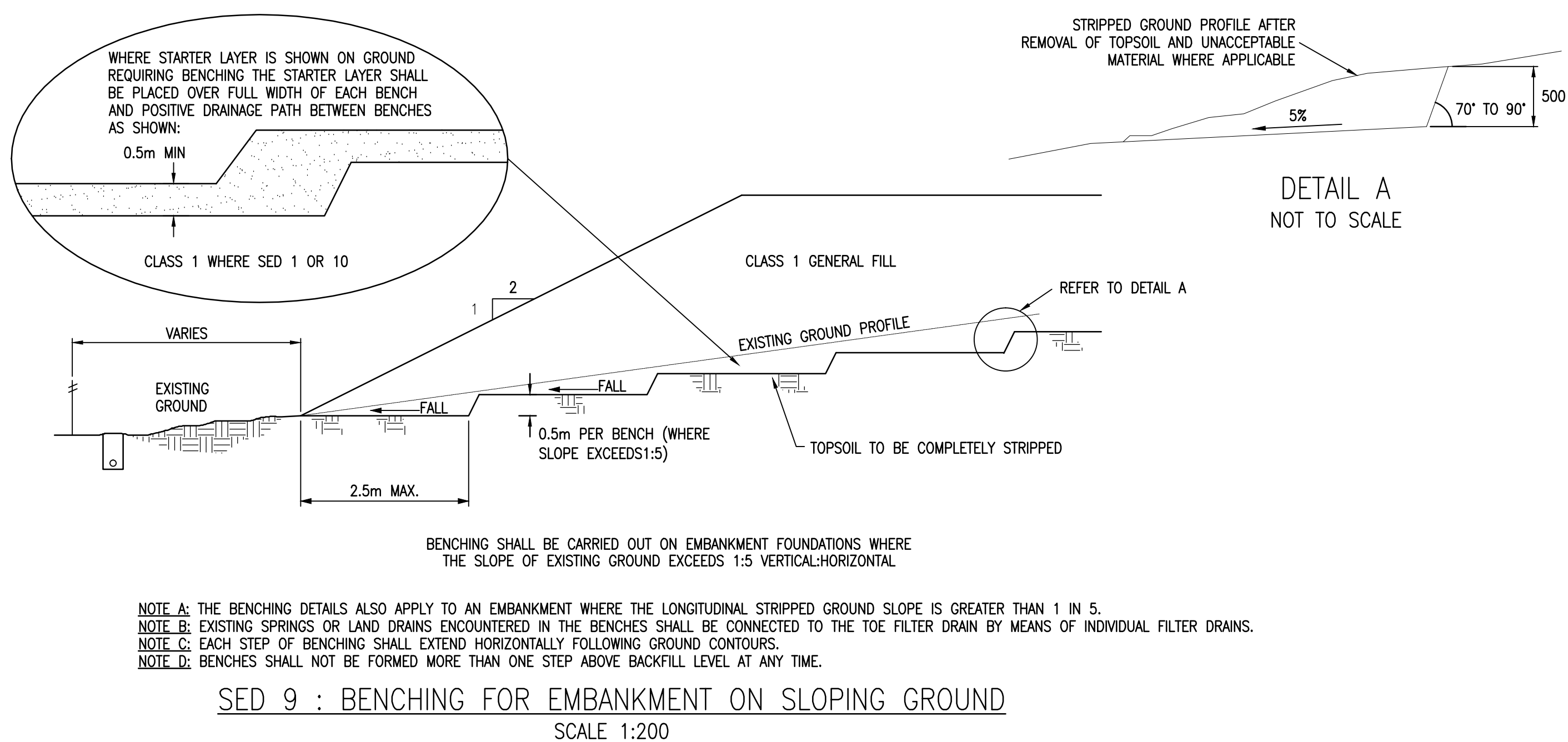
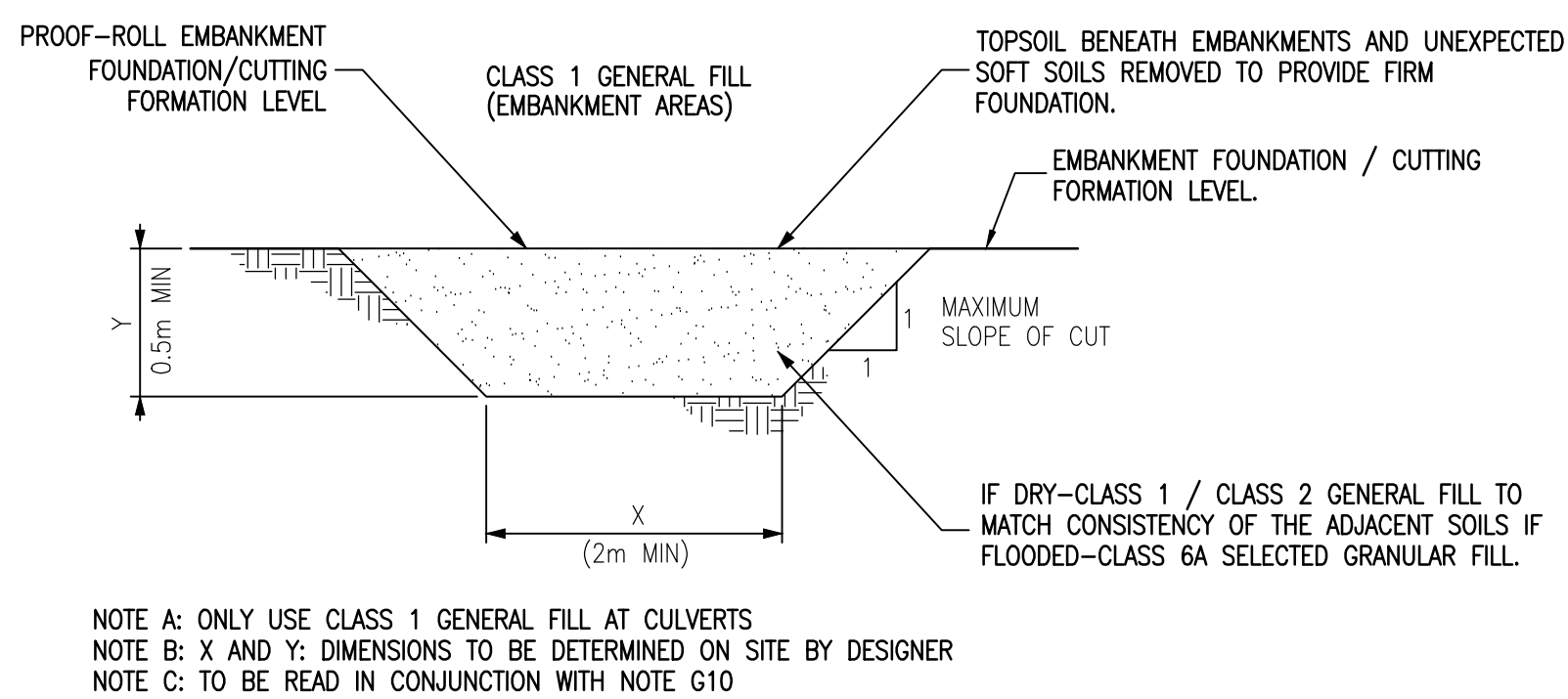
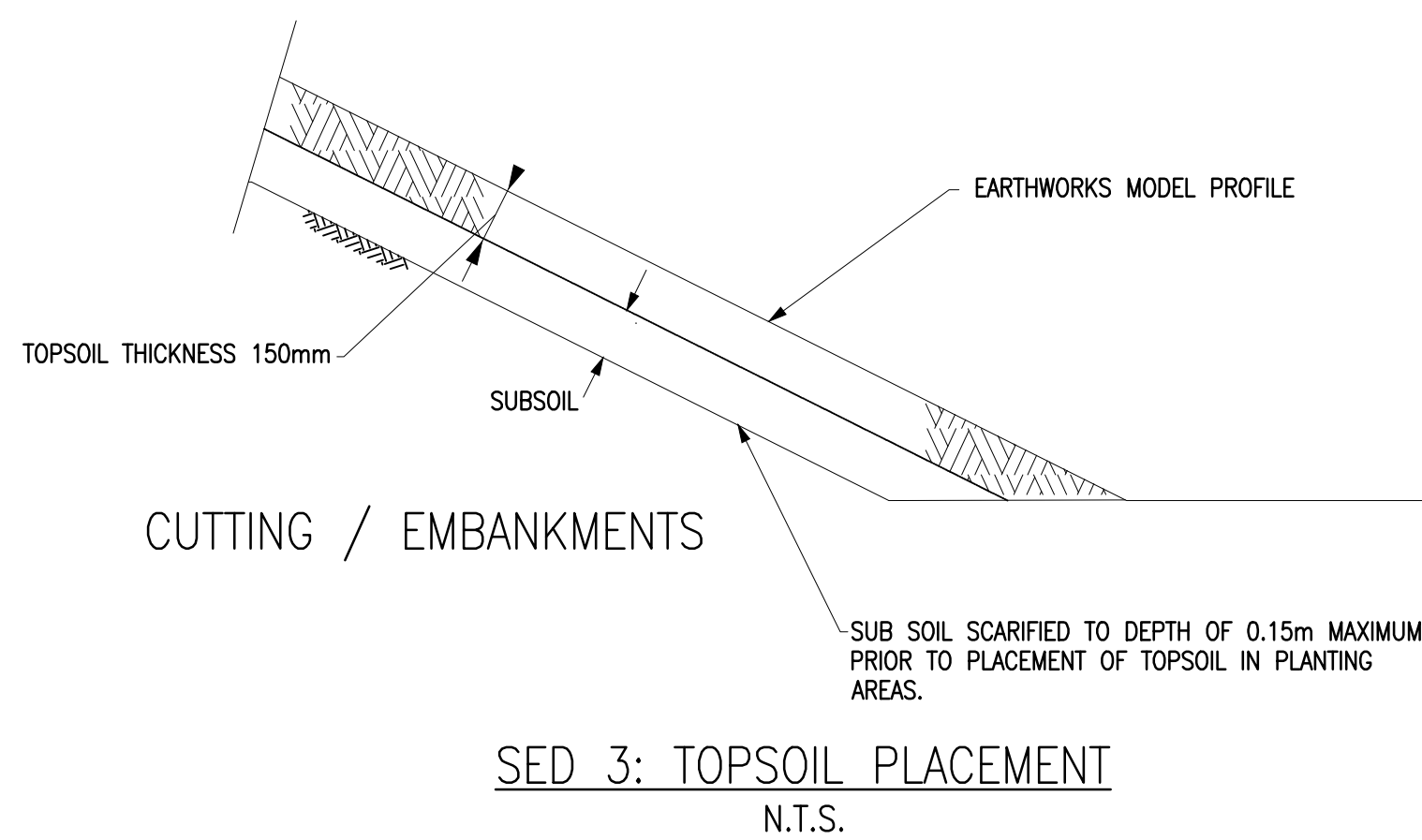
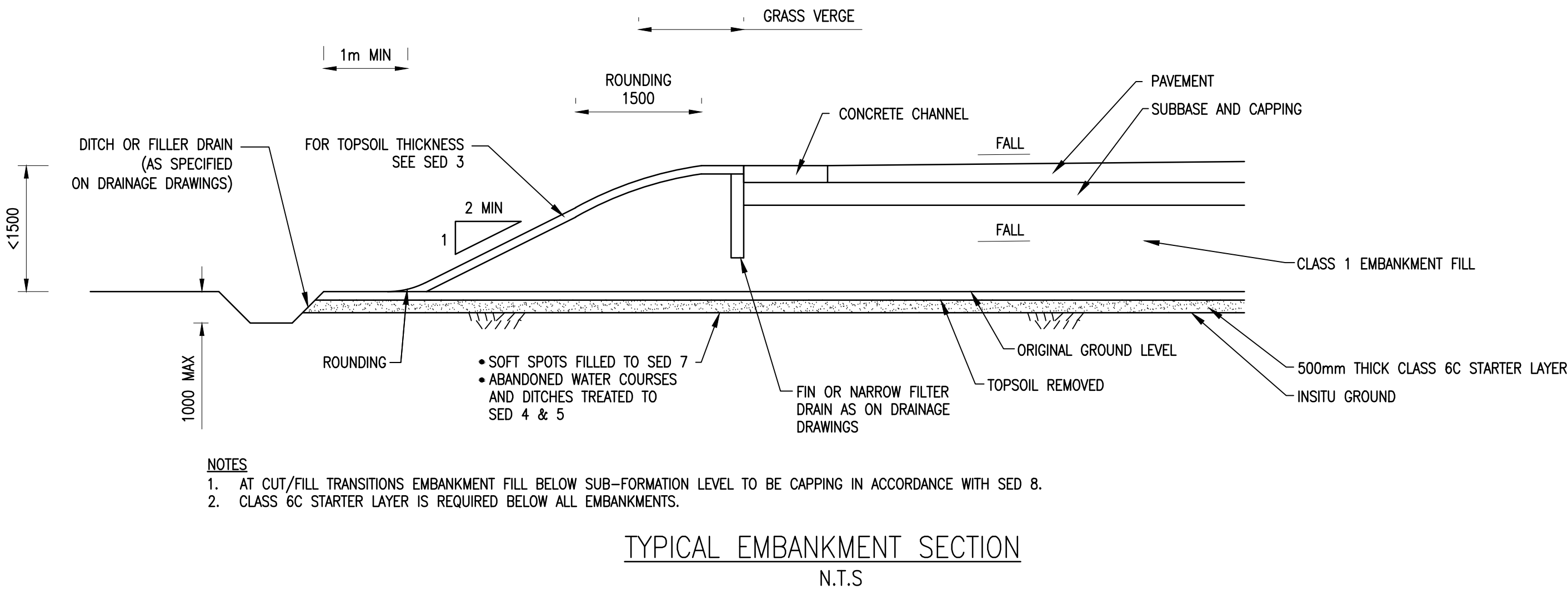
D_{10} = particle diameter at which 10% of the soil by weight is finer

6) The limiting values of Class U1B material are given in Appendix 6/14 and Appendix 6/15

- 7) Class 4 materials shall be such size that it can be deposited in horizontal layers each not exceeding 450mm loose depth. Isolated boulders may be incorporated in Class 4 material provided that the specified compaction is achieved.
- 8) Where undrained shear strength is specified as the method of material classification and control, the Contractor may use a hand vane provided that it is initially calibrated against the unconsolidated undrained shear strength laboratory triaxial test to BS 1377: Part 7 cl8 on 110 nominal diameter samples, and MCV test in accordance with BS1377:Part4. The Contractor shall submit details of his proposed hand vane calibration method to the ER for acceptance prior to the start of earthworks.
- 9) In accordance with BS 1377: Part 4 figures 1 & 2, Optimum Moisture Content testing shall not be applicable where the particle size distribution of the granular material lies within zone marked X .
- 10) The upper and lower moisture content acceptability limits for all Class 1 / Class 2 General fill material used for embankment construction will be determined from classification & compaction testing carried out prior to earthworks construction by the Contractor, in accordance with BS 1377:Part 4 (2.5kg hammer method).

Table 1 Grading Requirements for Acceptable Earthworks Material

Class	Percentage by mass passing the Sieve Shown																				Class
	Sieve mm		Sieve mm BS Series													Sieve microns BS Series				Sieve microns	
	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
6A		100								0-100		0-85				0-45			0-5		6A
6C			100							15-85						0-30			0-10		6C
6F1			100		65-100	45-100				15-75		10-60				0-30			0-15		6F1
6F2				100	65-100	45-100				15-75		10-60				0-30			0-15		6F2
6F3			100		65-100	45-100				15-95		10-70				0-45			0-15		6F3
6N & 6P					100														<15		6N & 6P



- NOTES:
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWINGS 5137836/MA/43/600 AND 5137836/NAR/600.
 - ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH "SPECIFICATION FOR HIGHWAYS WORKS".
 - [SED] REFERS TO STANDARD EARTHWORK DETAILS. SED 1 AND 2 NOT USED.
 - ALL EARTHWORKS SLOPES SHALL BE FORMED AT 1V:2H UNLESS OTHERWISE INDICATED ON THIS DRAWINGS.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAIL ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS:

CONSTRUCTION	REFER TO GENERAL ARRANGEMENT DRAWINGS
MAINTENANCE/CLEANING	NONE
USE	NONE
DECOMMISSIONING/DEMOLITION	NONE

C FOR CONSTRUCTION	270215	GS
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Rev	Description	By	Date	Auth
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A	FIRST ISSUE	GMS	270215	AM	GS
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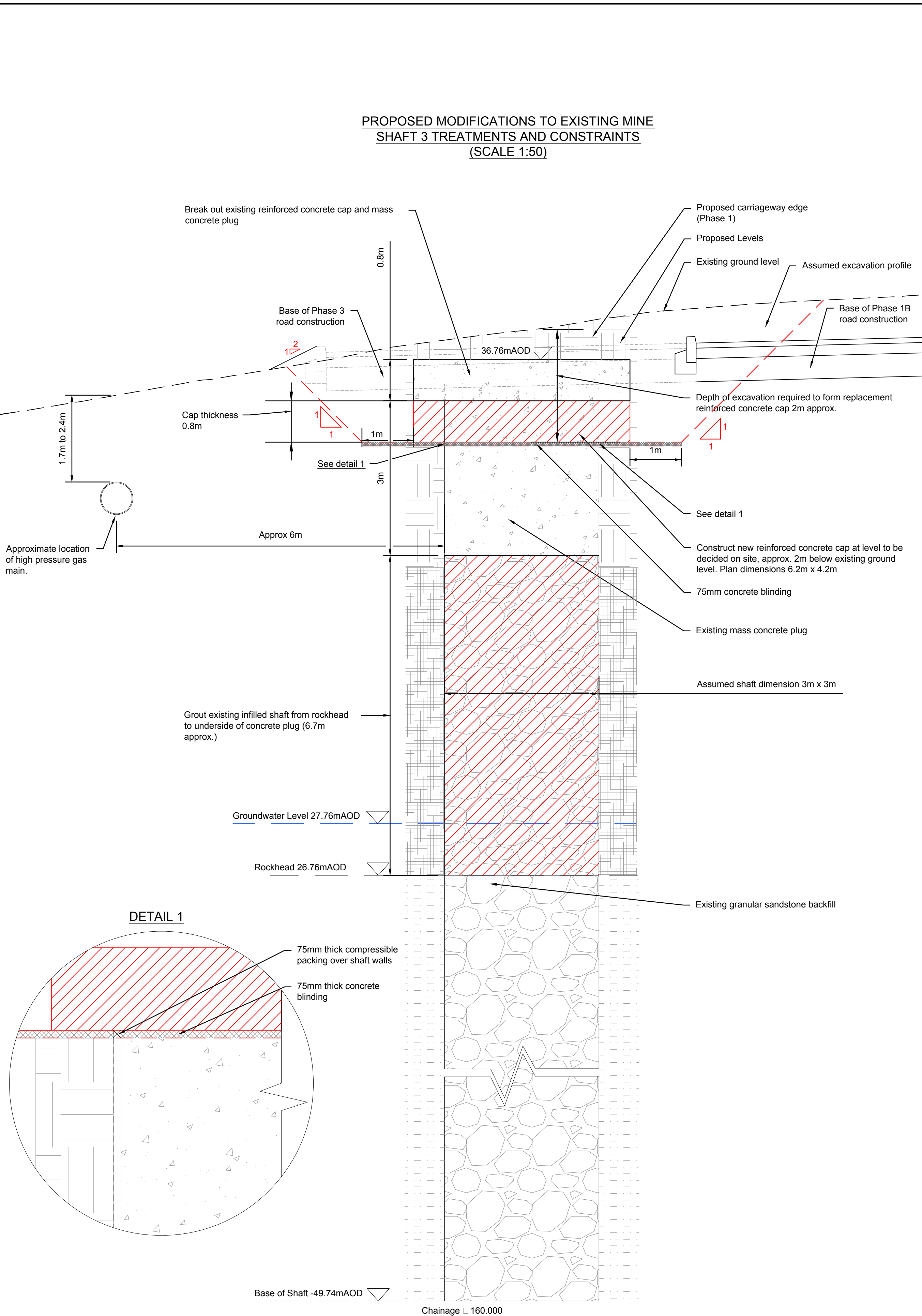
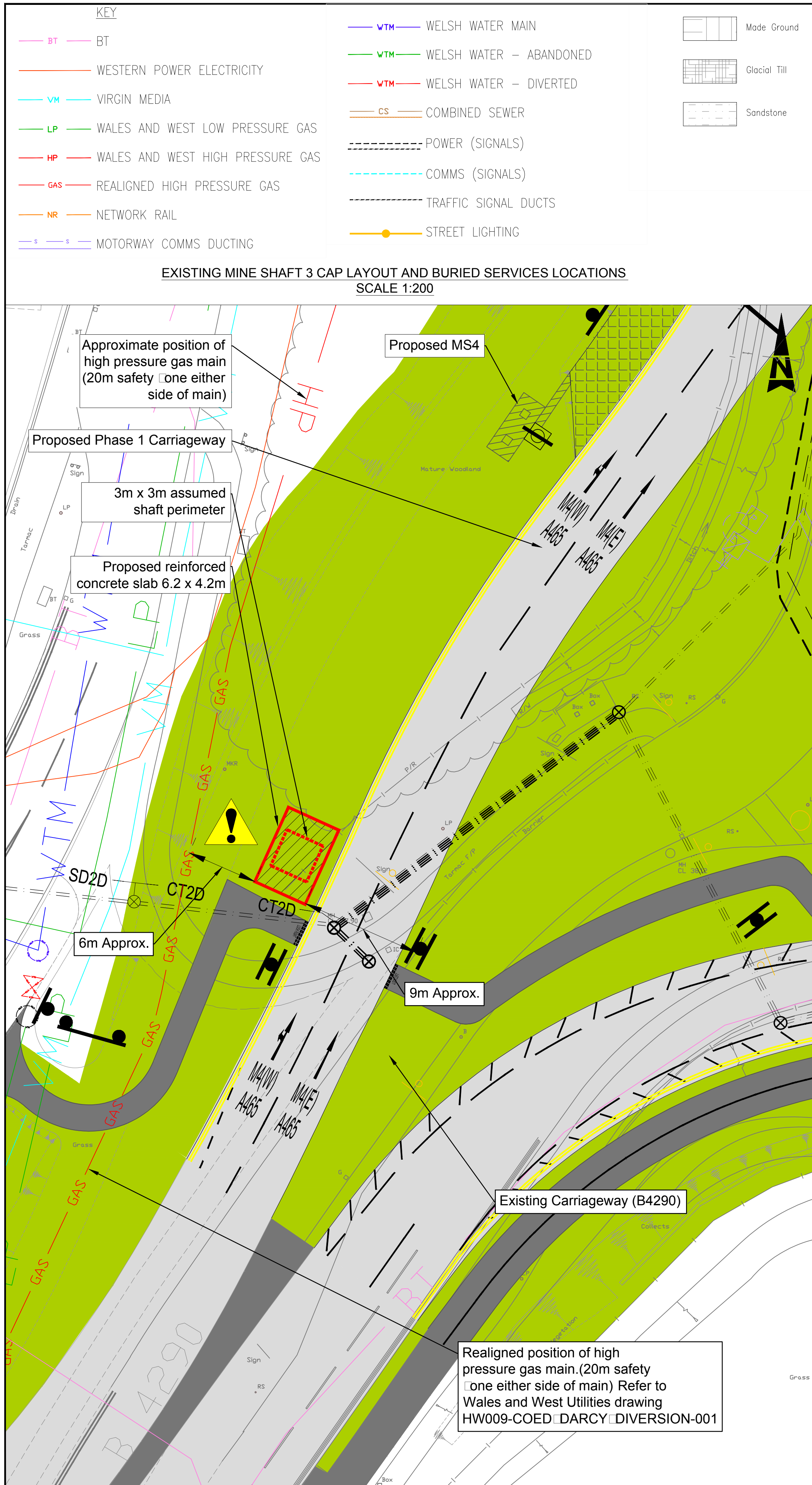
Atkins Limited
Consulting Engineers,
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ST.MODWEN GRIFFITHS
civil engineering and construction

Project: **COED DARCY (PHASE 1)**

Title: **JUNCTION 43 IMPROVEMENTS STANDARD DETAILS SHEET 3 OF 4 EARTHWORKS**

Sheet No	Original Scale	Designed/Drawn	Checked	Authorised
A0	1:500	GMS	AM	GS
A2	1:1000	date: 270215	date: 270215	date: 270215
Status	Drawing Number	Rev		
C	5137836/STD/120			A



ATKINS

Notes:

1. No as-built records from The Coal Authority in relation to the existing shaft treatment details are available, all existing shaft treatment dimensions are inferred based ground investigation carried out by Quantum Geotechnical Limited (report ref: G4293/FR dated July 2014).
2. Ground conditions are as indicated by ground investigation carried out by Quantum Geotechnical Limited (report ref: G4293/FR dated July 2014)
3. Proposed modifications to the shaft cap are based on matching existing. To be reviewed once existing slab is removed.
4. Shaft dimensions have been assumed based on the dimensions of the shaft cap and based on Coal Authority information relating to other nearby shafts.
5. It is assumed that the diameter of the existing mass concrete plug matches the assumed shaft dimensions
6. Shaft lining above rockhead is assumed to remain largely intact
7. Thickness of the existing reinforced shaft cap is based on rotary probehole information
8. Proposed levels shown are those relating to the Phase 1 junction improvements. Further modifications are proposed as part of later phases of work.
9. Contractor to liaise with statutory undertakers to ensure exclusion zones are maintained.
10. The location of the Wales & West Utilities High Pressure Gas Main is as shown on an as-built drawing provided by Wales & West Utilities (Drawing Number: HW009 Coed Darcy / Diversion / 001 Rev. 1)
11. A 20m safety zone associated with the High Pressure Gas is recommended by Wales & West Utilities. It may be possible for this to be reduced subject to the nature of the work and further consultation with Wales & West Utilities.
12. During construction of the slab provide adequate staging, fencing, barriers, safety harness and life lines, or other devices, as outlined in the Code of Safe Drilling Practice (BDA, 1992) and compliant with current Health and Safety requirements.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS

CONSTRUCTION

HIGH PRESSURE GAS MAIN IN VICINITY OF MINESHAFT/MINESHAFT

MAINTENANCE/CLEANING

NONE

USE

NONE

DECOMMISSIONING/DEMOLITION

NONE

[illegible]

C	FOR CONSTRUCTION	270215	CS
Stat	Purpose of Issue	Date	Aut

[illegible]

A	ORIGINAL DRAWING	GMS	270215	JD	GS
Rev	Description	By	Date	Chk'd	Aut

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Client



Project

COED DARCY
(PHASE 1)

Title	JUNCTION 43 IMPROVEMENTS MINESHAFT 3 PROPOSED MODIFICATION GENERAL ARRANGEMENT
-------	--

Sheet Size A1	Original Scale 1:200	Designed/Drawn	Checked	Authorised
		GMS	JD	GS
		Date 270215	Date 270215	Date 270215

Status	Drawing Number	Rev
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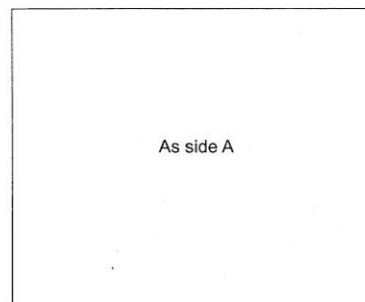
Appendix E. Exploratory Hole Logs

TRIAL PIT NUMBER: MSTP173
GROUND ELEVATION: -
DATE OF EXCAVATION: 19/6/98
WATER LEVEL: DRY
LOGGED BY: RF
APPROVED BY:

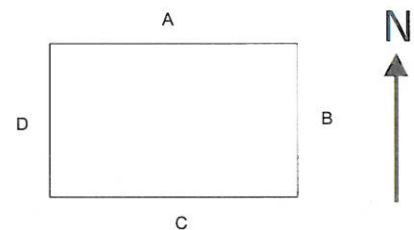
SIDE ELEVATIONS

SIDE D	SIDE A	SIDE B
	1 *	
0.9m		
	2	
1.4m		
1.6m	3	
1.7m	4	
1.8m	5	

SIDE C



PLAN



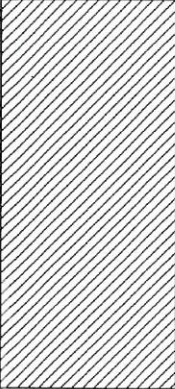
0 1 2m
Vertical Scale

Key:

- * Soil Sample location
- WA Water Sample
- HS Headspace Analysis
- Water Ingress

STRATA DESCRIPTIONS	COMMENTS	SAMPLES
1. Black, firm clay and coarse gravels (MADE GROUND) 2. Medium grained, black FLY ASH 3. Orange/brown, firm CLAY 4. Orange/brown, firm CLAY with medium gravels 5. Weathered, blue/grey SANDSTONE Trial pit terminated on refusal at 1.8 mbgl due to sandstone bedrock or boulders	a. Slight odour b. Window sampled due to access restrictions	<u>PID RESULTS</u> 0.5m - 1.3 ppm 1.0m - 0.8 ppm 1.5m - 0.6 ppm 1.8m - 0.4 ppm <u>SOIL SAMPLES</u> MSTP173-0.5m

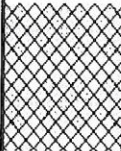
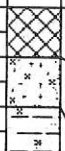
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Location:	LLANDARCY REFINERY	
Client:	BP LLANDARCY	
Job No:	39991-001-401	DRAFT
 DAMES & MOORE		

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSTP296		PAGE 1 of 1	
	NUMBER	TYPE					START DATE: 25/2/99		DRILLING METHOD: Window Sampling	
							FINISH DATE: 25/2/99		BOREHOLE DIAMETER: 100 mm	
							DRILLER: GEOTECHNICAL		SCREEN TYPE & DIAMETER: UPVC 50 mm	
						LOGGED BY: SG APPR'D BY:		SCREEN SLOT SIZE: 1 mm		
	MSTP296 0.5m		*0		0		Firm brown gravelly CLAY		No odour	
							Soft to firm orange brown sandy and silty CLAY		No odour	
							Borehole terminated at 1.35 mbgl on refusal		Damp at 1.3m	
					0.5					
					1.0					
					1.5					
					2.0					
					2.5					
					3.0					
					3.5					
					4.0					
					4.5					
					5.0					

LOCATION / NOTES: 1. All measurements in m below ground level (mbgl) 2. Borehole backfilled with bentonite on completion.		LEGEND  Disturbed Sample  Undisturbed Sample  * Headspace Analysis  † Down Borehole Analysis  ▼ Groundwater Table  ▼ Perched Water Table	BOREHOLE LOG Job Title SOIL & GROUNDWATER INVESTIGATION Location LLANDARCY REFINERY Client BP LLANDARCY LTD App'd DRAFT Ref. CR/DS/BIR/LON Date APRIL 99 Job No. 39991-004-401	 DAMES & MOORE GROUP
--	--	---	---	---

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: P1TP011		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 10/2/03		DRILLING METHODS : CAT excavator	
							DRILLER : Jason		BOREHOLE DIAMETER : N/A	
							LOGGED BY : LT		SCREEN TYPE & DIAM: N/A	
							CHECKED BY : TRR		SCREEN SLOT SIZE: N/A	
						DESCRIPTION	COMMENTS			
	P1TP011 - 0.35m		*0		0.0	Loose, brown, slightly clayey, sandy silt with frequent fine to coarse, angular to sub-rounded cobbles, boulders and rare boulder-sized concrete pieces with occasional roots and rootlets with some fine, grey sand and sandstone fragments from 0.9m Weathered sandstone bedrock arisings as tabular fragments up to 20cm, with fine to coarse, sandstone gravel fragments Terminated at 1.05m (refusal on bedrock)	Grassed surface. NVO, damp	0,0		
	P1TP011 - 0.75m		*0		0.5		NVO, damp	0,0		
	P1TP011 - 0.95m		*0		1.0		NVO, damp	0,0		
					1.5		Slight H/C odour on some bedrock fragments	2,0		
					2.0					
					2.5					
					3.0					
					3.5					
					4.0					
					4.5					
					5.0					

LOCATION / NOTES: NVO = No visual or olfactory evidence H/C = Hydrocarbon 4,2 = Scoring for (odour, visual) contamination	LEGEND  Disturbed Sample  Undisturbed Sample  Headspace Analysis  Down Borehole Analysis  Groundwater Table  Perched Water Table	BOREHOLE LOG Job Title: Phase 1 Investigation Works Location: BP Llandarcy Refinery, Neath Client: BP/WDA	
			App'd: _____ Date: February 2003 Drawn : ABB Ref: _____ Scale: _____ Job No: 39991-035-785 Drg. Size: _____ BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: P1TP012		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 10/2/03		DRILLING METHODS: CAT excavator	
							DRILLER: Jason		BOREHOLE DIAMETER: N/A	
		LOGGED BY: LT		SCREEN TYPE & DIAM: N/A						
		CHECKED BY: TR		SCREEN SLOT SIZE: N/A						
	P1TP012 - 0.15m		"0		0.0		DESCRIPTION		COMMENTS	
	P1TP012 - 0.3m		"0		0.5		Loose, dark brown, sandy silt/silty sand with frequent rootlets and occasional, angular, coarse gravel		Grassed surface NVO, damp	0,0
	P1TP012 - 0.5m & PSD		"0				Soft, brown, slightly clayey, sandy silt with occasional to frequent, angular to sub-rounded gravel and cobbles		NVO, damp	0,0
							Silt becoming more clayey and orange-brown at 0.4m (Sandstone bedrock, sloping to NE with flat surface reflecting topography.)		NVO	0,0
						1.0	Terminated at 0.6m (refusal)			
						1.5				
						2.0				
						2.5				
						3.0				
						3.5				
						4.0				
						4.5				
						5.0				

LOCATION / NOTES:

NVO = No visual or olfactory evidence
H/C = Hydrocarbon
4,2 = Scoring for (odour, visual) contamination

LEGEND

-  Disturbed Sample
-  Undisturbed Sample
-  Headspace Analysis
-  Down Borehole Analysis
-  Groundwater Table
-  Perched Water Table

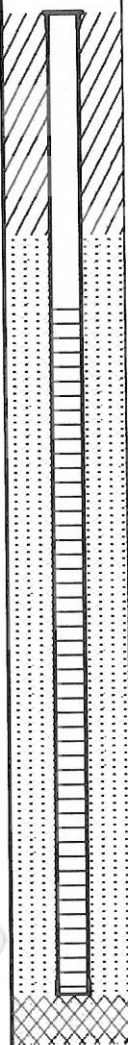
BOREHOLE LOG

Job Title: Phase 1 Investigation Works
Location: BP Llandarcy Refinery, Neath
Client: BP/WDA



App'd:	Date: February 2003
Drawn: ABB	Ref:
Scale:	Job No: 39991-035-785
Drg. Size:	BOREHOLE LOG

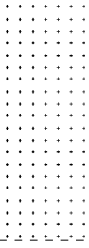
BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: P1BH006		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 11/2/03		DRILLING METHODS : Percussive / AF	
							DRILLER : APEX - Terry		BOREHOLE DIAMETER : 100mm	
							LOGGED BY : TRR		SCREEN TYPE & DIAM: 50mm uPVC	
							CHECKED BY : LT		SCREEN SLOT SIZE: 1mm	
							DESCRIPTION	COMMENTS		
	P1BH006 - 0.1m - 0.2m	X	*0		0.0	Soft, dark brown, clayey silt, with some rounded to sub-angular gravels and trace fine to medium grained sand, brick and concrete fragments	NVO,Damp NVO, moist	0,0		
	P1BH006 - 0.6m - 0.7m	X	*1.7		0.5	Firm to stiff, brown to grey clayey, fine to medium sand with some angular gravels and concrete fragments to 40mm. Lens of black ash @ 0.6m-0.7m	NVO, moist	0,0		
	P1BH006 - 0.9m-1.1m	X	*1		1.0	Stiff, orange to brown, sandy, slightly clayey silt with some fine to medium grained sand and occasional rounded sandstone gravels, increasing from 1.4m		0,0		
			*2.1		1.5			0,0		
			*0.7		2.0	Medium dense, brown to grey, sandy gravel, with fine to coarse sand and rounded gravels and cobbles.	NVO, becoming Wet	0,0		
	P1BH006 - 2.1m-2.2m	X	*0.2		2.5	Firm, brown to grey, silty, medium to coarse grained sand, with some rounded gravels to 10mm	Wet @ 2.1m NVO	0,0		
					3.0	Increasing gravel from 2.9m	Saturated @ 2.5m	0,0		
			*0		3.5	Medium dense to dense, brown to grey, fine to coarse grained sandy gravel. Gravel is rounded sandstone to 0.1m	Refusing in cobbles, AF from 3.6m - 4.0m NVO	0,0		
			*0		4.0	Increasing fines from 3.8m		0,0		
					4.5	Terminated at 4.2m, Refusing on cobbles				
LOCATION / NOTES: NVO = No visual or olfactory evidence H/C = Hydrocarbon 4,2 = Scoring for (odour, visual) contamination						LEGEND Disturbed Sample Undisturbed Sample Headspace Analysis Down Borehole Analysis Groundwater Table Perched Water Table		BOREHOLE LOG Job Title: Phase 1 Investigation Works Location: BP Llandarcy Refinery, Neath Client: BP/WDA App'd: LT Date: February 2003 Drawn : ABB Ref: Scale: Job No: 39991-035-785 Drg. Size: BOREHOLE LOG		

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: P1BH007		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 12/2/03		DRILLING METHODS : Percussive / AF	
							DRILLER : APEX - Terry		BOREHOLE DIAMETER : 100mm	
							LOGGED BY : TRR		SCREEN TYPE & DIAM: 50mm uPVC	
							CHECKED BY : LT		SCREEN SLOT SIZE: 1mm	
	P1BH007 - 0.4m - 0.5m		*0		0.0	Tarmacadam hardstanding	Asphalt. AF 0.0-0.4m	0,0		
	P1BH007 - 0.5m - 0.6m		*0		0.5	Loose to medium dense, grey to brown, sandy gravel, with angular sandstone, brick, slag and concrete fragments.	NVO, moist			
						With some black silty sand, red bricks and mortar @ 0.6m-0.9m	AF 0.6-0.8m			
			*0		1.0			0,0		
	P1BH007 - 1.7m - 1.8m		*0		1.5	Medium dense, grey to brown, gravelly sand, with angular to sub-angular sandstone fragments, grey slag and brick fragments and some brown silty sand	NVO, moist			
						Firm, grey to brown, clayey silt, with fine to medium sand and angular to sub-angular brick and sandstone gravels, with a layer of black ash @ 1.7m-1.8m	NVO, moist	0,0		
					2.0	Firm, grey to brown, clayey silt, with occasional fine to medium sand and orange to brown mottles	NVO, moist	0,0		
			*0		2.5		Possible water @ 2.75m	0,0		
						Grading to: Soft to firm, brown to grey, sandy clayey silt, with fine to medium grained sand	NVO, moist-wet	0,0		
	P1BH007 - 3.2m - 3.3m		*89		3.0	Soft, black to dark grey, organic rich, clayey silt, with some roots	Organic odour, wet	2,0		
					Firm to stiff, pale grey, orange mottled, sandy silt.	Wet at 3.3m	0,0			
		*0		3.5						
					Grading to: Stiff, pale grey, orange mottled, sandy clay, with fine to medium grained sand.	NVO	0,0			
				4.0	Medium dense, grey to brown, gravelly, slightly silty, fine to medium grained sand (orange mottled).	NVO				
				4.5	Terminated at 4.2m, Refusing on cobbles					
				5.0						

LOCATION / NOTES:		LEGEND		BOREHOLE LOG	
NVO = No visual or olfactory evidence H/C = Hydrocarbon 4,2 = Scoring for (odour, visual) contamination		 Disturbed Sample  Undisturbed Sample  Headspace Analysis  Down Borehole Analysis  Groundwater Table  Perched Water Table		Job Title: Phase 1 Investigation Works Location: BP Llandarcy Refinery, Neath Client: BP/WDA	
				App'd: LT Drawn : ABB Scale: Drg. Size:	Date: February 2003 Ref: Job No: 39991-035-785 BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: P1AF012 - PIT		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 10/2/03		DRILLING METHODS : CAT excavator	
							DRILLER : Jason		BOREHOLE DIAMETER : N/A	
							LOGGED BY : LT		SCREEN TYPE & DIAM: N/A	
							CHECKED BY : TR		SCREEN SLOT SIZE: N/A	
DESCRIPTION		COMMENTS								
 P1AF012 - PIT - 0.2m P1AF012 - PIT - 0.5m P1AF012 - PIT - 0.7m	☒	*0	0.0	Soft, dark brown, slightly clayey, sandy silt with frequent rootlets	Grassed surface with topsoil NVO, damp	0,0				
	☒	*0	0.5	Soft, brown, slightly clayey, slightly sandy silt with occasional to frequent sub-angular to sub-rounded gravel	NVO, damp Weathered bedrock.	0,0				
	☒	*0	0.7	becoming loose, brown-grey, very sandy silt with frequent fragments of sandstone	NVO, damp	0,0				
				Hard, grey, fine grained sandstone Terminated at 0.8m (refusal on sandstone)	NVO, damp					
LOCATION / NOTES:		LEGEND		BOREHOLE LOG						
NVO = No visual or olfactory evidence H/C = Hydrocarbon 4,2 = Scoring for (odour, visual) contamination		 Disturbed Sample  Undisturbed Sample  Headspace Analysis  Down Borehole Analysis  Groundwater Table  Perched Water Table		Job Title: Phase 1 Investigation Works Location: BP Llandarcy Refinery, Neath Client: BP/WDA 						
				App'd:	Date: February 2003					
				Drawn : LT	Ref:					
				Scale:	Job No: 39991-035-785					
				Drg. Size:	BOREHOLE LOG					

Site: Coed Darcy	Start Date: 30/09/2008	Ground Level: -
Client: St Modwen Developments Ltd	End Date: 30/09/2008	Easting: -
Project No: 5041216	Logged By: Howel Morris	Northing: -
Site National Grid Reference:	Excavation Method:	
Site Level (mOD): 0.000	Plant: 21 Tonne Excavator	
	Shoring/Support:	
	Trial Pit Length: -	Trial Pit Width: -

Samples & Tests			Strata Details			
Depth (m)	Type	HSV (m-kPa)	Thk	Legend	Depth	Description
0.20 0.40	ES		0.15		0.15	Grass and TOPSOIL
0.50 0.70	BLK		1.15			MADE GROUND. Loose, brown, slightly clayey, sandy gravel with occasional cobbles. Gravel is fine to coarse and sub angular. Sand is fine to coarse. Large sub angular boulder between 0.70m and 0.80m.
0.80 1.00	D				1.30	
1.00 1.20	ES		0.60			Grey, slightly silty, sandy CLAY. Sand is fine to coarse.
1.40 1.60	BLK				1.90	Moderate odour (2/3), light end odour.
	D					
	ES		1.60			Grey/brown, flags of SANDSTONE with rare matrix of sandy clay. Sand is fine to coarse. Moderate odour (2/3) and sheen on sandstone.
2.20 2.40	BLK					
	D					
	ES					
3.40 3.50	BLK				3.50	End of Trial Pit at 3.50 m

General Notes:

- All linear dimensions are in metres unless otherwise stated
- All relative density/shear strength descriptions are based only on field observations and available in-situ test data.

Groundwater Observations:

Stability:

Sides of TP were slightly unstable between 0.15m and 0.30m.

General Remarks:

No Groundwater. Pit terminated due to difficult dig.

Site: Coed Darcy	Start Date: 30/09/2008	Ground Level: -
Client: St Modwen Developments Ltd	End Date: 30/09/2008	Easting: -
Project No: 5041216	Logged By: Howel Morris	Northing: -
Site National Grid Reference:	Excavation Method:	
Site Level (mOD): 0.000	Plant: 21 Tonne Excavator	
	Shoring/Support:	
	Trial Pit Length: -	Trial Pit Width: -

Samples & Tests			Strata Details			
Depth (m)	Type	HSV (m-kPa)	Thk	Legend	Depth	Description
0.20 0.40	ES		0.10		0.10	Grass and TOPSOIL
0.50 0.70	BLK D					MADE GROUND. Loose, dark brown, slightly clayey, gravelly sand with occasional cobbles of concrete/sandstone. Sand is fine to coarse. Gravel is fine to coarse, sub angular.
1.00 1.20	ES		1.70			
1.70 1.90	BLK D		0.00		1.80	Grey, weathered SANDSTONE
						End of Trial Pit at 1.80 m

General Notes:

- All linear dimensions are in metres unless otherwise stated
- All relative density/shear strength descriptions are based only on field observations and available in-situ test data.

Groundwater Observations:

Stability:

Sides of TP were slightly unstable between 0.10m and 1.80m.

General Remarks:

No Groundwater. No odours. Pit terminated due to difficult dig.

Site: Coed Darcy	Start Date: 30/09/2008	Ground Level: -
Client: St Modwen Developments Ltd	End Date: 30/09/2008	Easting: -
Project No: 5041216	Logged By: Howel Morris	Northing: -
Site National Grid Reference:	Excavation Method:	
Site Level (mOD): 0.000	Plant: 21 Tonne Excavator	
	Shoring/Support:	
	Trial Pit Length: -	Trial Pit Width: -

Samples & Tests			Strata Details			
Depth (m)	Type	HSV (m-kPa)	Thk	Legend	Depth	Description
0.40 0.60 0.50 0.70	ES BLK D		0.05		0.05	Grass and TOPSOIL
			0.95			Loose, orange/brown, clayey, sandy GRAVEL. Gravel is fine to coarse, sub angular flags of weathered sandstone. Sand is fine to coarse.
			0.60		1.00	Grey, weathered flags of SANDSTONE with rare clay matrix.
					1.60	End of Trial Pit at 1.60 m

General Notes:

- All linear dimensions are in metres unless otherwise stated
- All relative density/shear strength descriptions are based only on field observations and available in-situ test data.

Groundwater Observations:

Stability:

Sides of TP were stable.

General Remarks:

No Groundwater. No odours. Pit terminated on bedrock.

Site: Coed Darcy	Start Date: 02/10/2008	Ground Level: -
Client: St Modwen Developments Ltd	End Date: 02/10/2008	Easting: -
Project No: 5041216	Logged By: Howel Morris	Northing: -
Site National Grid Reference:	Excavation Method:	
Site Level (mOD): 0.000	Plant: 7.5 Tonne Excavator	
	Shoring/Support:	
	Trial Pit Length: -	Trial Pit Width: -

Samples & Tests			Strata Details			
Depth (m)	Type	HSV (m-kPa)	Thk	Legend	Depth	Description
0.20 0.40	BLK		0.07		0.07	MADE GROUND. Tarmac.
0.40 0.60	ES					
0.50	D					
			1.63			MADE GROUND. Brown, slightly sandy, clayey gravel with occasional rounded cobbles. Gravel is fine to coarse and sub rounded. Sand is fine to coarse.
1.20 0.40	ES					
1.80 2.00	BLK		0.10		1.70	MADE GROUND. Compact, brown, slightly clayey, slightly sandy gravel with frequent rounded cobbles and occasional small rounded boulders. Gravel is medium to coarse, sub rounded to rounded. Sand is fine to coarse.
2.00 2.20	D		0.70		1.80	
	ES				2.50	
2.80 3.00	BLK		1.20			MADE GROUND. Concrete floor at 1.80m and concrete walls on sides, likely stairwell to bunker or basement.
3.00	D					
					3.70	MADE GROUND. Brown, sandy, gravel with frequent rounded cobbles and rare small rounded boulders. Gravel is fine to coarse, sub rounded. Sand is fine to coarse.
						End of Trial Pit at 3.70 m

General Notes:

- All linear dimensions are in metres unless otherwise stated
- All relative density/shear strength descriptions are based only on field observations and available in-situ test data.

Groundwater Observations:

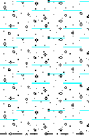
Stability:

Sides slightly collapsed from between 0.07m to 1.70m, but stable from 1.70m onwards.

General Remarks:

No Groundwater. No odours.

Site: Coed Darcy	Start Date: 02/10/2008	Ground Level: -
Client: St Modwen Developments Ltd	End Date: 02/10/2008	Easting: -
Project No: 5041216	Logged By: Howel Morris	Northing: -
Site National Grid Reference:	Excavation Method:	
Site Level (mOD): 0.000	Plant: 7.5 Tonne Excavator	
	Shoring/Support:	
	Trial Pit Length: -	Trial Pit Width: -

Samples & Tests			Strata Details			
Depth (m)	Type	HSV (m-kPa)	Thk	Legend	Depth	Description
0.30 0.50	ES		0.05 0.05 0.20 1.10		0.05 0.10 0.30	MADE GROUND. Tarmac. MADE GROUND. Loose, red/orange, slightly gravelly sand. Sand is fine to coarse. Gravel is fine to medium, sub angular.
1.40 1.60	ES		0.40		1.40	MADE GROUND. Tarmac. MADE GROUND. Grey/brown, sandy gravel with occasional cobbles of brick. Gravel is fine to coarse, sub angular. Sand is fine to coarse.
1.80 2.00	ES		1.00		1.80	Orange/brown, slightly sandy, gravelly CLAY. Gravel is fine to coarse, sub rounded. Sand is fine to coarse.
					2.80	Grey/brown, slightly sandy, gravelly CLAY. Gravel is fine to coarse, sub rounded to rounded. Sand is fine to coarse.
						End of Trial Pit at 2.80 m

General Notes:

- All linear dimensions are in metres unless otherwise stated
- All relative density/shear strength descriptions are based only on field observations and available in-situ test data.

Groundwater Observations:

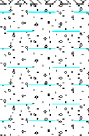
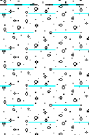
Stability:

Sides were unstable from 2.00m onwards.

General Remarks:

Groundwater seepage at 2.80m . Moderate odour at 1.80m. Pit terminated due to collapse from 2.0m

Site: Coed Darcy	Start Date: 02/10/2008	Ground Level: -
Client: St Modwen Developments Ltd	End Date: 02/10/2008	Easting: -
Project No: 5041216	Logged By: Howel Morris	Northing: -
Site National Grid Reference:	Excavation Method:	
Site Level (mOD): 0.000	Plant: 7.5 Tonne Excavator	
	Shoring/Support:	
	Trial Pit Length: -	Trial Pit Width: -

Samples & Tests			Strata Details			
Depth (m)	Type	HSV (m-kPa)	Thk	Legend	Depth	Description
0.20 0.40 0.30 0.50 0.50	BLK ES D		0.90		0.90	Grass and TOPSOIL with occasional brick and concrete cobbles.
1.00 1.20 1.20	BLK ES D		0.90		1.80	Compact, orange/brown, slightly gravelly, clayey SAND with occasional sub rounded cobbles. Sand is fine to coarse. Gravel is fine to coarse, sub rounded.
1.80 2.00	ES		1.00		2.80	Compact, brown/grey, slightly clayey, sandy GRAVEL (weathered sandstone). Gravel is fine to coarse, sub angular with flags of sandstone . Sand is fine to coarse.
2.40 2.60 2.60	BLK D		0.10		2.90	Grey, partially weathered SANDSTONE.
						End of Trial Pit at 2.90 m

General Notes:

- All linear dimensions are in metres unless otherwise stated
- All relative density/shear strength descriptions are based only on field observations and available in-situ test data.

Groundwater Observations:

Stability:

Sides were stable beyond 0.90m.

General Remarks:

No Groundwater. No odours. Pit terminated due to difficult dig.

Site: Coed Darcy	Start Date: 02/10/2008	Ground Level: -
Client: St Modwen Developments Ltd	End Date: 02/10/2008	Easting: -
Project No: 5041216	Logged By: Howel Morris	Northing: -
Site National Grid Reference:	Excavation Method:	
Site Level (mOD): 0.000	Plant: 7.5 Tonne Excavator	
	Shoring/Support:	
	Trial Pit Length: -	Trial Pit Width: -

Samples & Tests			Strata Details			
Depth (m)	Type	HSV (m-kPa)	Thk	Legend	Depth	Description
0.00 0.20	ES		0.20		0.20	Grass and TOPSOIL.
0.10 0.50	D		0.10		0.30	MADE GROUND. Concrete slab.
0.30	BLK		0.20		0.50	MADE GROUND. Loose, grey gravel. Gravel is coarse, sub angular (ballast).
0.80 1.20	BLK		0.10		0.60	MADE GROUND. Black, clayey sand. Sand is fine to medium.
1.00 1.00	ES					
	D					
1.40 1.60	ES		1.60			Orange/brown, very sandy CLAY with rare gravel. Sand is fine to coarse. Gravel is fine to medium, sub angular.
2.20 2.40	BLK				2.20	
2.40	ES		0.70			Grey, slightly sandy, clayey GRAVEL (weathered sandstone). Gravel is fine to coarse, sub angular with flags of sandstone.
	D				2.90	Sand is fine to coarse.
						End of Trial Pit at 2.90 m

General Notes:

- All linear dimensions are in metres unless otherwise stated
- All relative density/shear strength descriptions are based only on field observations and available in-situ test data.

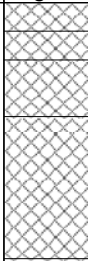
Groundwater Observations:

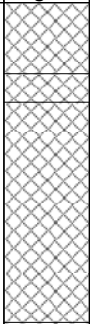
Stability:

Sides were fairly stable beyond 0.60m,

General Remarks:

No Groundwater. Moderate odour (3). Pit terminated due to difficult dig.

Site: Coed Darcy Urban Village Client: St. Modwen Developments Ltd Project No: CATP-1			Start Date: 24/03/2011 End Date: 24/03/2011		Site Level (mAOD): 46.826 Easting: 271652.40 Northing: 195858.20	
Trial Pit Length (m): -			Trial Pit Width (m): -		Excavation Method: Machine Excavation Plant: Volvo 210 Excavator Shoring/Support: None	
Logged By: A Mann			Checked By:			
Samples & Tests			Strata Details			
Depth (m)	Type	PID (ppm)	Thk	Legend	Depth	Description
0.30	ES		0.20		0.20	MADE GROUND, Brown slightly gravelly SAND. Medium to coarse gravel of sandstone and brick (0,0). MADE GROUND, light brown slightly gravelly SAND. Coarse gravel of brick and sandstone (0,0). MADE GROUND, Brown clayey gravelly SAND. Coarse gravel of brick, sandstone and quartz. Occasional boulders of concrete, brickwork. Occasional plastic (0,0). MADE GROUND. Locally stained grey sandy gravelly CLAY. Coarse gravel of sandstone and brick. Occasional cobbles and boulders of brick and concrete. Occasional wood, metal and solidified bitumen (2,1). End of Trial Pit at 1.80 m
			0.20		0.40	
0.70	ES		0.40		0.80	
1.30	ES		1.00		1.80	
General Notes: 1. All linear dimensions are in metres unless otherwise stated 2. All relative density/shear strength descriptions are based only on field observations and available in-situ test data.						
Groundwater Observations: No groundwater encountered			Stability: Trial Pit was stable.		General Remarks: Pit terminated at 1.8m on pipework.	

Site: Coed Darcy Urban Village			Start Date: 24/03/2011		Site Level (mAOD): 47.374	
Client: St. Modwen Developments Ltd			End Date: 24/03/2011		Easting: 271604.70	
Project No: CATP-1					Northing: 195860.30	
Trial Pit Length (m): -			Trial Pit Width (m): -		Excavation Method: Machine Excavation	
Logged By: A Mann			Checked By:		Plant: Volvo 210 Excavator	
Samples & Tests			Strata Details		Shoring/Support: None	
Depth (m)	Type	PID (ppm)	Thk	Legend	Depth	Description
0.40	ES		0.50		0.50	MADE GROUND. Coarse light brown gravelly SAND. Medium to coarse gravel of sandstone and brick. Rare brickwork (0,0).
0.80	ES		0.20		0.70	
1.50	ES		1.55			
			0.05		2.25	MADE GROUND as above but stained black, frequent pipework, brickwork and rubber hosing (4,2).
					2.30	Weathered SANDSTONE.
						End of Trial Pit at 2.30 m
General Notes: 1. All linear dimensions are in metres unless otherwise stated 2. All relative density/shear strength descriptions are based only on field observations and available in-situ test data.						
Groundwater Observations: Slight water ingress at 2.3m			Stability: Trial Pit was stable.		General Remarks: Pit terminated on bedrock	

Site: Coed Darcy Urban Village			Start Date: 29/03/2011		Site Level (mAOD): 44.662	
Client: St. Modwen Developments Ltd			End Date: 29/03/2011		Easting: 271678.60	
Project No: CATP-1					Northing: 195868.10	
Trial Pit Length (m): -			Trial Pit Width (m): -		Excavation Method: Machine Excavation	
Logged By: A Mann			Checked By:		Plant: Volvo 210 Excavator	
Samples & Tests			Strata Details		Shoring/Support: None	
Depth (m)	Type	PID (ppm)	Thk	Legend	Depth	Description
0.30	ES	120.00	0.10		0.10	MADE GROUND. Brown gravelly SAND. Coarse gravel of brick and sandstone (0,0).
			0.30		0.40	Brown gravelly SAND. Coarse gravel of Weathered sandstone (0,0).
			0.10		0.50	Weathered SANDSTONE.
						End of Trial Pit at 0.50 m
General Notes: 1. All linear dimensions are in metres unless otherwise stated 2. All relative density/shear strength descriptions are based only on field observations and available in-situ test data.						
Groundwater Observations: No groundwater encountered			Stability: Trial Pit was stable.		General Remarks: Pit terminated on bedrock	