



**South Wokingham Distributor Road - Spine
Road and Western Gateway Phase 1
Specification Appendices - Drainage
WMHP-TG-SRWG1-SP-HI-0501**

Revision: P03

Date: 25/03/2022



Balfour Beatty

South Wokingham Distributor Road - Spine Road and Western Gateway Phase 1 Specification Appendices - Drainage

Wokingham Borough Council

Document no: WMHP-TG-SRWG1-SP-HI-0501

Revision: P03

Date: 25/03/2022



This page is intentionally left blank

Document Issue Record

Project:	South Wokingham Distributor Road - Spine Road and Western Gateway Phase 1
Report Title:	Specification Appendices - Drainage
Client:	Wokingham Borough Council
Document No:	WMHP-TG-SRWG1-SP-HI-0501
Revision:	P03
Status	S2 - Suitable for information
Date:	25/03/2022
Filename:	WMHP-TG-SRWG1-SP-HI-0501-P03

Rev	Date	Description and Purpose of Issue	Prepared	Reviewed	Approved
P01	26/03/21	First Issue	DJF	MH	JC
P02	29/09/21	Section 4.1.2 updated for SCO comments, chamber details updated	MH	DJF	JC
P03	25/03/22	Updated for Internal Review	MH	ARL	JC

Issuing Office:	Tony Gee and Partners LLP, Hardy House, 140 High Street Esher, Surrey, KT10 9QJ
Tel:	+44 1372 461600
Email:	esher@tonygee.com

Contents

APPENDIX 5/1 DRAINAGE REQUIREMENTS	1
1 Pipe Networks	1
2 Road Gullies	4
3 Chambers	5
4 Water Attenuation Features	6
5 Other requirements	Error! Bookmark not defined.
APPENDIX 5/2 SERVICE DUCT REQUIREMENTS	9
1 Service Ducts for Statutory Undertakers Apparatus	9
APPENDIX 5/3: SURFACE WATER CHANNELS AND DRAINAGE CHANNEL BLOCKS	12
APPENDIX 5/4:– FIN DRAINS AND NARROW FILTER DRAINS	13
Appendix 5/5: Combined Kerb and Drainage Systems	14
1 General requirements	14
Appendix 5/6: Linear Drainage Channel Systems	15
Appendix 5/7 Thermoplastics Structural Wall Pipes And Fittings	16
1 Information to be Provided by the Contractor	16

APPENDIX 5/1 DRAINAGE REQUIREMENTS

1 Pipe Networks

1.1 Design Criteria

- 1.1.1 The drainage design is based on analysis using the Modified Rational Method described in the Wallingford procedure. The following design criteria shall apply:
- Nature of the Catchment – The catchment is the carriageway and verge/rain gardens together with the associated earthworks, side roads and junctions.
 - Time of entry shall be 6 minutes.
 - Storm Frequency – all new pipes in the drainage network shall be designed to meet the following parameters:
 - No surcharging during the 1 in 1 year return period storm;
 - No surface water flooding during all storm durations, up to and including the 1 in 30 year event;
 - Surface water flooding for 1 in 100 year return period is permitted, providing that overland flows may be directed along the highway corridor to Sustainable Drainage Systems without affecting property.
 - Rainfall intensities of the design storms with a 1 in 100 year return period have been increased by 40% to allow for climate change, as per the latest guidance from the Environment Agency document *Adapting to Climate Change : Advice for Flood and Coastal Erosion Risk Management Authorities*.
- 1.1.2 Rainfall Intensity – The design is based on FEH 2013 point data for the site electronically downloaded from the Centre of Hydrology and Hydrology website (<https://fehweb.ceh.ac.uk>)
- Pipe Flow Velocities – Minimum pipe velocity shall be 0.75 m/s
Maximum pipe velocity shall be 3.0 m/s
- 1.1.3 Drain Sizes:
- The minimum diameter for carrier pipes / filter drains shall be 150 mm
 - Gully connections shall be 150 mm or 225 mm diameter.

1.2 Permitted Pipe and Bedding Combinations

- 1.2.1 The following types of pipe from approved manufacturers may be used for highway surface water drains:
- Concrete pipes made with sulphate resisting cement to BS 5911-1: 2002 +A2:2010
 - Thermoplastic pipes, with current BBA Certification and in accordance with Appendix 5/7.

1. Pipe and Bedding Combinations shall be in accordance with drawing WMHP-TG-SRWG1-DR-DD-0521.
- 1.2.2 Cover to Drains – The preferred minimum cover to all drainage pipes is 1.2 m under carriageways and 0.9 m under footways and soft verges. Pipes with less cover shall be encased in concrete as drawing number WMHP-TG-SRWG1-DR-DD-0521 with type Z bedding, ST2 concrete with cement in accordance with SHW clause 2602, with flexible joints at every 6.0 m. For porous pipes crossing the carriageway the surround shall comprise of at least 200 mm of no fines concrete to SHW clause 2603.
- 1.2.3 Pipes for gully connections shall be 150 mm. The preferred minimum cover to the gully pipes is 1.2 m under carriageways and 0.9 m under footways and soft verges. Connections with less cover will have type Z concrete bed and surround, while gully connections with greater cover will have Type S full granular bed and surround. Concrete to gully connections shall be Mix ST2 with sulphate resistant cement in accordance with SHW clause 2603.

1.3 Pipe laying

1.3.1 Joints in surface water drains:

- i. All pipe joints shall be flexible.
- ii. All surface water pipes shall be laid to smooth flowing horizontal alignments conforming to the alignment of the carriageway, with a maximum deviation of 2 degrees at the joints.
- iii. Joints in surface water drains shall be watertight complying with Sub-Clause 3 of Clause 504 of the SHW.
- iv. Filter drains shall have joints in accordance with Sub-Clause 6 of Clause 504 of the SHW.
- v. Filler board for use at pipe joints to preserve the flexibility of concrete protected pipelines shall be 18 mm thick for pipes up to 450mm diameter and 36 mm pipes over 450 mm in diameter and shall comply with BS EN 322 / BS EN 323 and Clause 1015 of the SHW.

1.3.2 All branch connections to pipelines shall be made using:

- i. Formed junctions, or
- ii. Uni-junctions.

Saddles shall only be permitted for achieving connection to an existing drainage system such as repairs to existing gully connections and only with the Employer's approval, subject also to statutory undertaker's approval where applicable.

1.4 Filter drains

- 1.4.1 The location of filter drains is shown on drawing references WMHP-TG-SRWG1-DR-DD-0501 to 0507 and details are presented on drawing reference WMHP-TG-SRWG1-DR-DD-0521.
- 1.4.2 If Type C material is chosen to be incorporated in the works, the material shall comply with BS EN 13285.

1.4.3 Requirements for Geotextiles: Geotextiles used as a separation filters in drainage works shall be CE marked as complying with BS EN 13249, BS EN 13251 and BS EN 13252 and shall satisfy the following criteria:

- i. A maximum tensile load of not less than 7k N/m when tested in accordance with BS EN ISO 10319;
- ii. A minimum permeability of 75 l/m²/s when tested in accordance with BSEN ISO 11058, using a constant head of 100 mm;

The geotextile shall have a size distribution of pore openings such that the mean 090 is between 100 microns and 300 microns, when tested in accordance with BSENISO 12956.

The geosynthetics shall be manufactured under factory production control guidelines set out within EN 13249; Geotextiles and geotextile related products – Characteristics required for use in Roads and Paved Areas, or BS EN 13251 Earthworks or BS EN 15252 Drainage Systems.

The requirement for durability is that the geosynthetics shall be certified in accordance with Annex B3 for a Service Life of up to 25 years.

If the geosynthetics are CE marked and the CE Marking accompanying documents are provided with the delivered materials sampling and testing will not be required, providing the declared values meet with the requirements of the specification Table 6/5/1.

If the geosynthetic is not CE marked, the properties of the geosynthetic shall be determined at an approved laboratory using agreed test procedures before being used in the works.

1.5 Drainage Schedules

1.5.1 See document reference WMHP-TG-SRWG1-SH-HI-0501 for a list of drainage schedules.

2 Road Gullies

2.1 Design Criteria

- 2.1.1 The drainage design is based on analysis using the Modified Rational Method described in the Wallingford procedure. The following design criteria shall apply:
- i. Spacing of gullies in accordance with CD 526 (formerly HA102/17) based on a 1 in 1 year design storm event and a 1m flow width. Road assumed to be subject to ordinary maintenance ($m=1$).
 - ii. $2\text{min}M5 = 3.00\text{mm}$ (rainfall depth for 2 minutes of 5 year return period)
 - iii. The allowable surcharge flow width during a 1 in 5 years shall be 1 m.
 - iv. The maximum length for any gully connection shall be 20 m.

2.2 Gulley gratings

- 2.2.1 Gully gratings and frames shall be Kite-marked to BS EN 124:1994. Either Cast Steel or Ductile Iron may be used. The frame shall be bedded on a gauged Class 1 (3:1) sand/cement mortar and at least two but no more than three courses of Engineering Brickwork Class 'B' to BS EN 771-1:2003.
- 2.2.2 Units complying with BS EN 124 Class D400 shall be used. These shall be hinged and must be of the "captive" type and shall be installed on the side facing oncoming traffic. Minimum opening area 450 mm x 450 mm and minimum waterway area of 1200 cm² with frame at least 100 mm deep.
- 2.2.3 Gully covers and any other carriageway and footway or cycleway ironwork shall not be installed until the carriageway binder course layer is laid. During the construction process protection shall be given to all gullies and chambers from the ingress of debris.
- 2.2.4 Gully gratings and frames shall be so fixed as to be 5-10 mm below the surface of the road channels, carriageway or footway surface.

2.3 Gulley construction

- 2.3.1 WBC standard drawing no. WMHP_WSP_ZZ_SDR_DD_0501 shows details of gulley and gulley pot construction. Suitable provision shall be made to prevent the pots floating and distorting when the concrete surround is placed and compacted. The installations shall be entirely in accordance with the BBA approval certificate requirements. The BBA requirement shall be at least equivalent to a concrete base slab provided below the pot bed and surround and which may take the form of a paving slab set on 100 mm of ST2 concrete to SHW Clause 2602.

2.4 Drainage Schedules

- 2.4.1 See document reference WMHP-TG-SRWG1-SH-HI-0501 for gully schedules.

3 Chambers

3.1 Design criteria

- 3.1.1 Maximum spacing of chambers shall be 90 m.

3.2 Catchpit cover/frames

- 3.2.1 All manhole covers and frames shall be kite-marked products to BS EN 124:1994 and badged S.W (surface water) and F.W (foul water). In the carriageway covers shall be Heavy Duty: BS EN 124 reference D400 with a clear opening of 675mm unless noted otherwise and minimum frame depth of 100 mm and have a polished Skid Resistance Value (SRV) of >45. In the verge covers shall be Heavy Duty: BS EN 124 reference C250 with a clear opening of 675mm and minimum frame depth of 75 mm.
- 3.2.2 Manhole covers and any other carriageway and footway or cycleway ironwork shall not be installed until the binder course layer is laid. During the construction process protection should be given to all gullies and chambers from the ingress of debris.
- 3.2.3 The frames shall be bedded on a gauged Class 1 sand/cement mortar to SHW clause 2404 and BS EN 1996 above two to three courses of Engineering brickwork Class B to BS EN 771-1:2003. The use of accelerating admixtures to be agreed with the Designer prior to use.
- 3.2.4 Alternative bedding materials may be permitted but will require the approval of the Designer prior to commencement.

3.3 Catchpit construction

- 3.3.1 Catchpits shall be constructed to enable access to be provided to the surface water drainage network.
- 3.3.2 Catchpits with a depth of 1.2m or less shall be constructed in accordance with drawing WMHP-TG-SRWG1-DR-DD-0521. Catchpits with a depth between 1.2m and 3.0m to sump shall be constructed in accordance with WBC standard drawing WMHP_WSP_ZZ_SDR_DD_0507. Catchpits with a depth of 3.0m or more to sump shall be constructed in accordance with WBC standard drawing WMHP_WSP_ZZ_SDR_DD_0508. The diameter of the catchpits shall be as referenced in the chamber schedule ref WMHP-TG-SRWG1-SH-HI-0501.
- 3.3.3 Catchpits for flow control chambers shall be constructed in accordance with drawing WMHP-TG-SRWG1-DR-DD-0521.
- 3.3.4 Catchpits shall be constructed of precast concrete ring sections, to the requirements of BS5911. All catchpits must be watertight on completion.
- 3.3.5 All catchpits are deemed to be confined spaces and the Contractor is to fully comply with all relevant legislation regarding entry into the same and to give all notices applicable to this type of activity.
- 3.3.6 Prior to commencing a drainage run which connects to an existing manhole or ties into an existing system, the Contractor shall verify and record the route and invert levels of the existing pipe/chambers and identify any side connections along its length. Any discrepancies shall be immediately reported to the Designer.

- 3.3.7 The first pipe joint outside any chamber or new structure shall be as close as practicable to the face of the chamber to permit satisfactory jointing and subsequent movement.
- 3.3.8 If pipes are made of clay or concrete the first pipes beyond the chamber shall be a rocker pipe and a spigot/socket butt and be of the lengths:

Pipe Diameter (mm)	Short Length Pipe Length (m)	Rocker Pipe Length (m)
D≤600	0.6	0.6
D>600	1.0	1.0

- 3.3.9 If thermoplastic structured wall pipes or other flexible pipes are used a rocker pipe and stub pipes at the interface with manholes are not required.
- 3.3.10 In places where a high water table is encountered, the buoyancy forces acting on chambers shall be determined prior to the commencement of construction and any significant discrepancies reported to the Designer.

3.4 Drainage Schedules

- 3.4.1 See document reference WMHP-TG-SRWG1-SH-HI-0501 for chamber schedules.

4 Water Attenuation Features

4.1 Design Criteria

- 4.1.1 Proposed water attenuation features to be designed for 1 in 100 year return period + 40% for climate change, allowing 300 mm freeboard
- 4.1.2 An exceedance check will be made on the 1 in 100 year return period to assess the potential flood risk implications and determine the exceedance flow paths. To do this check, an allowance of 40% is made for the 1 in 100 return period.
- 4.1.3 The tanks shall be designed to take the load of vehicles up to 16000 kg and permanent earth pressure in both vertical and lateral direction as specified in CIRIA C737

4.2 Construction details

- 4.2.1 For attenuation pond and tank locations and details refer to drawings WMHP-TG-SRWG1-DR-DD-0501, 0502, 503, 507, 0571 and 0572.

5 Other requirements

5.1 Requirements for cleaning of existing drainage systems

- 5.1.1 All existing carrier pipe runs to be incorporated into the proposed works shall be cleaned using high pressure jetting apparatus in such a manner to remove any deposited solids from within the pipes upon completion of all new/replacement pipe work and remedial treatments.
- 5.1.2 The pipes, when jetted and cleaned, shall be checked by drawing through a mandrel as Clause 509.4 with the exception that the mandrel shall be 20 mm less than the diameter of the pipe.

5.2 Connection of new drains to existing drains

- 5.2.1 Connection to existing drains, chambers and channels shall be as per SHW Clause 506 and as indicated in the drainage drawings.
- 5.2.2 All relevant dimensions and levels of the existing pipes are to be verified prior to the commencement of construction and any significant discrepancies reported to the Designer.

5.3 Requirements for sealing, removal or grouting of existing drains

- 5.3.1 All existing gullies and chambers to be abandoned are shown on the drawings WMHP-TG-SRWG1-DR-HI-0201 to 0207.
- 5.3.2 If there is any additional existing pipework to be abandoned, this shall be confirmed with the Employer prior to commencing the works. All existing pipework to be abandoned that is under the carriageway shall be sealed and grouted or removed in accordance with SHW Clause 506.3.
- 5.3.3 All existing chambers and gullies to be abandoned shall be sealed with well compacted concrete ST4 and ST2 respectively.

5.4 Requirements for rapid setting bedding materials and the location where they will be required

- 5.4.1 Chamber tops and gully tops to be constructed on existing live roads shall be set in rapid setting bedding materials complying with the requirements of CD 534 – Chamber Tops and Gully Tops for Road Drainage and Services as follows:
 - i. Material is non-shrink
 - ii. Material to have a minimum working life of 15 minutes
 - iii. Minimum compressive strength of 30 N/mm² at 3 hours
 - iv. Minimum tensile strength of 5 n/mm² at 3 hours

5.5 As-built requirements

- 5.5.1 On completion of construction, internal surfaces of sewers, gullies and manholes shall be thoroughly cleansed to remove all deleterious matter, without such matter being passed

forward into existing public sewers or watercourses in accordance with Clause 509.5 of the SHW.

- 5.5.2 All drainage elements are to be left free from obstruction. On completion of the whole of the works the Contractor shall flush and CCTV survey all pipes (excluding narrow filter and fin drains) within the extents of the Site.

APPENDIX 5/2 SERVICE DUCT REQUIREMENTS

1 Service Ducts for Statutory Undertakers Apparatus

- 1.1.1 Details and layout of ducts construction are given in the special requirements of the various utilities as set down in Volume 1 of these Contract documents.
- 1.1.2 The system of ducting and materials shall comply with Clauses 501.7 and 501.8 of the Specification for Highway Works.
- 1.1.3 All ducts provided for utilities or other bodies are to be colour coded in accordance with sub-Clauses 501.7, 518.4 and the Health and Safety Executive booklet HS(G)47:
- Black - Electricity
 - Red - Electricity - some 11KV cables
 - Blue - Water
 - Yellow - Gas
 - Grey/White - Telecommunications
 - Green - Cable television
 - Orange - Street lighting and Traffic Signals
- 1.1.4 All service ducts and sleeves shall be constructed in accordance with the requirements of the Statutory Undertaker concerned.
- 1.1.5 All service ducts have a metal foil strip laid above them to aid their future location.
- 1.1.6 Inspection pits for Statutory Undertakers apparatus shall be consistent with those authorities' requirements. Covers for all pits, including draw pits, shall be capable of sustaining vehicle loading. The covers and frames shall be laid to suit the finished footway surface level and gradient.
- 1.1.7 Utility ducts that extend across the bridge shall be constructed using Polyethylene and they shall be encased in C28/35 fibre reinforced verge infill concrete. Ducts shall be sleeved where they pass through expansion joints.
- 1.1.8 Ducts that do not extend across the bridge shall be manufactured from thermoplastic material and shall be in accordance with Specification for Highway Works clause 501.7. The bore shall be smooth and even. The external surface shall be even or corrugated in the longitudinal section. The ducts shall be twin walled. Nonhomogeneous ducts with honeycomb or foam filled construction between the inner and outer surfaces are not permitted.

1.2 Service Duct Location and Installation

- 1.2.1 Longitudinally all ducts shall be laid in a trench to depth and position as indicated in the National Joint Utility Guidelines on the Positioning and Colour Coding of Underground Utilities Apparatus.
- 1.2.2 Service ducts are to be placed at standard depths below formation level, depending on the position of services, in accordance with National Joint Utility Guidelines. The minimum

clearance between ducts and drains and the mandrel detail shall be as set down in HCD Drawing No I2.

Pipe Bedding details for ducts that do not extend across the bridge shall be as detailed in Table 5/2.1 below.

Table 5/2.1: Permitted Alternative Pipe Bedding Combinations for Service Ducts

Pipe Type	Bedding
PVC SDR=41	STZ

- 1.2.3 Refer to HCD I1-I2 for construction details for transverse ducts.
- 1.2.4 Ducts under carriageways shall extend at least 500mm beyond the edge of the carriageway. 45 Degree bends and extensions shall be provided at each end to provide entry at a depth of 500mm below finished ground level. Where a footpath or track is adjacent to the carriageway ducts shall be continuous under both types of construction and terminate a minimum of 500 mm clear of the track and any edging.
- 1.2.5 Duct excavations shall be backfilled in accordance with the New Roads and Street Works Act 1991 – Specification for the reinstatement of openings in highways.
- 1.2.6 All trenches shall be properly reinstated before carriageway binder course is laid.
- 1.2.7 All duct trenches that run along footways/cycleways shall be properly backfilled and compacted before footway/cycleways construction commences.
- 1.2.8 If granular soils are exposed in the excavation, ground water may be expected to flow into the excavation and pumping may be required to keep the works dry.

1.3 Ducts for Electricity Supplies to Street Lighting and Illuminated Signs

- 1.3.1 Street lighting ducts and chambers are shown on Drawing Numbers WMHP-TG-SRWG1-DR-LI-1301 to 1308.
- 1.3.2 Details of street lighting ducts and chambers are shown on Drawing Number WMHP-TG-SRWG1-DR-LI-1321.
- 1.3.3 Ducts and cable draw pits for street lighting and illuminated traffic signs cables shall be used solely for that purpose and must not be shared with other utilities.
- 1.3.4 All ducts shall be thick walled low or medium density smooth bore polyethylene. Wall thickness shall not be less than 5 mm with a tolerance of +/- 0.1 mm.
- 1.3.5 Illuminated Traffic Signs ducts shall be coloured orange with the legend "Street Lighting" printed in white lettering 9 mm high along the length of the duct at intervals of not more than one metre. When laid the wording shall be upper - most. All lengths shall be properly jointed to give a smooth bore.
- 1.3.6 Ducts shall be impact resistant, impervious to water, capable of being laid at temperatures down to -10° C and sufficiently flexible to follow undulations in the trench bottom.

- 1.3.7 Drawpits shall be provided to enable street lighting cables to be installed within ducts. Drawpits shall be constructed in accordance with the detail presented on Drawing Reference WMHP-TG-SRWG1-DR-LI-1321.
- 1.3.8 Covers for drawpits shall have a D400 load classification and access chambers shall be encased in a 150 mm thick C40/50 concrete surround to ensure that the drawpit is capable of sustaining vehicle loading. The covers and frames shall be laid to suit the finished footway surface level and gradient.
- 1.3.9 For street lighting ducts, bedding and backfilling shall be in accordance with HCD Drawing I1 and I2. Minimum cover to be 750 mm where ducts extend below the carriageway or shared footway / cycleway and 450 mm where ducts extend below a verge.

1.4 General Requirements Street Lighting Ducts

- 1.4.1 Pipe Bedding details shall be as detailed in Table 5/2.1.
- 1.4.2 Ducts under carriageways shall extend at least 500 mm beyond the edge of the carriageway. 45 Degree bends and extensions shall be provided at each end to provide entry at a depth of 500 mm below finished ground level. Where a footpath or track is adjacent to the carriageway ducts shall be continuous under both types of construction and terminate a minimum of 500 mm clear of the track and any edging.
- 1.4.3 Duct excavations shall be backfilled in accordance with the New Roads and Street Works Act 1991 – Specification for the reinstatement of openings in highways.
- 1.4.4 All trenches shall be properly reinstated before carriageway binder course is laid.
- 1.4.5 All duct trenches that run along footways/cycleways shall be properly backfilled and compacted before footway/cycleways construction commences.
- 1.4.6 If granular soils are exposed in the excavation, ground water may be expected to flow into the excavation and pumping may be required to keep the works dry.

1.5 Markers

- 1.5.1 Utility and street lighting ducts which do not terminate in a drawpit chamber shall have 300 mm x 300 mm referenced concrete marker slabs placed directly over the duct ends, as indicated on HCD drawing I1.

1.6 Notifications

- 1.6.1 All Statutory Undertakers and the Highway Authority must be advised at least 7 days in advance of any proposed and approved works taking place. When excavating within an existing highway, drains, sewers or statutory undertakers apparatus must be located in advance of machine excavation. If any apparatus is encountered during excavation, the Highway Authority and other affected Statutory Undertaker must be notified immediately and no pipe or cable shall be disturbed without both their approvals.

APPENDIX 5/3: SURFACE WATER CHANNELS AND DRAINAGE CHANNEL BLOCKS

Not Used

APPENDIX 5/4:– FIN DRAINS AND NARROW FILTER DRAINS

Not used

APPENDIX 5/5: COMBINED KERB AND DRAINAGE SYSTEMS

1 General requirements

1.1 Introduction

1.1.1 Combined kerb drainage systems shall be designed to meet the following parameters:

- No surcharge for the 1 in 1 year storm event.
- Allowable surcharge flow width of 1m for the 1 in 5 year storm.

1.1.2 The location and details of combined kerb and drainage units are shown on drawings WMHP-TG-SRWG1-DR-DD-0501 to 0503. Details of the bedding to combined kerb and drainage units is shown on drawing WMHP-WSP-ZZ-SDR-DR-0505. Details of the outlets are shown on drawing WMHP-WSP-ZZ-SDR-DR-0505.

1.1.3 Limiting dimensions: 125 mm kerb upstand for half battered kerbs.

1.1.4 All combined kerb and drainage units shall be class D400 loading class to BS EN 124:1994 and conform to BS EN 1433. Evidence of compliance with the harmonised part of BSEN 1433 with respect to product performance shall be demonstrated by one of the following;

- CE marking in accordance with the Construction Products Directive and BS EN 1433.
- Demonstration through certification to at least the level of Attestation of Conformity given in BS EN 1433 that the product complies with the requirements given in Annex ZA of the standard.

1.1.5 They shall be suitable for their intended use and place of installation in the Works. See document WMHP-TG-SRWG1-SH-DD-0501 for schedule of location, sizes and type of combined kerb drainage unit.

1.1.6 Access covers for rodding shall be provided at the start and end of every run of combined kerb and drainage units and additionally at every 40 m along the run.

1.1.7 Joints between units comprising the system, and between the channel and units, shall be watertight.

1.1.8 Outlet units are to be provided where specified on drawings WMHP-TG-SRWG1-DR-DD-0501 to 0503.

APPENDIX 5/6: LINEAR DRAINAGE CHANNEL SYSTEMS

Not Used

APPENDIX 5/7 THERMOPLASTICS STRUCTURAL WALL PIPES AND FITTINGS

1 Information to be Provided by the Contractor

1.1.1 The Contractor shall provide the following information, in accordance with sub-Clause 518.2, for the range of pipes and fittings (to be verified by the Certification body - see sub-Clause 518.15):

- i. Technical drawings showing dimensions and tolerances including sealing rings and weight per metre, together with properties, as specified in sub-Clauses 518.3 and 518.5.
- ii. Material specification, as required in sub-clause 518.2:

Table 5/7.1: Unplasticised polyvinyl-chloride (PVC-U)

Property	Test Method Reference	Specification
Tensile Properties	BS EN ISO 6259, BS EN ISO 527-1	
Vicat	BS EN 727	
Longitudinal Reversion	BS EN 743	
K-value	BS EN 922	
PVC Content	EN 1905	
Density	BS EN ISO 1183-3, ISO 4451	
Heat Reversion	ISO 12091	
Effects Of Heating (injection moulded fittings only)	BS EN 763	

Table 5/7.2: Polyethylene (PE)

Property	Test Method Reference	Specification
Tensile Properties	BS EN ISO 6259, BS EN ISO 527-1	
Oxygen induction time	BS EN 728	
Melt Flow Rate	BS EN ISO 1133	
Density	BS EN ISO 1183-3, ISO 4451	
Melt Flow Rate	ISO 4440	
Heat Reversion	ISO 12091	
Effects of heating (injection moulded fittings only)	BS EN 763	

Table 5/7.3: Polypropylene (PP)

Property	Test Method Reference	Specification
Tensile Properties	BS EN ISO 6259, BS EN ISO 527-1	
Oxygen induction time	BS EN 728	
Melt Flow Rate	BS EN ISO 1133	
Density	BS EN ISO 1183-3, ISO 4451	
Melt Flow Rate	ISO 4440	
Heat Reversion	ISO 12091	
Effects of heating (injection moulded fittings only)	BS EN 763	

***Note:** The Contractor is to complete the column headed "Specification" in Tables 1, 2 and 3 above.*