Surface Water and SuDS Verification Report

Vistry Homes South East Ltd
Avisford Grange, Walberton, West Sussex

March 2023

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023

Quality Assurance

Site name:	Avisford Grange, Walberton, West Sussex
Client name:	Vistry Homes South East Ltd
Type of report:	Surface Water and SuDS Verification Report
Job Reference:	8804
Prepared by:	John Russell
Signed	[redacted]
Date	March 2023
Checked by:	Rob Brusselen
Signed	
Date	March 2023

Rev	November 2022	Details	Prepared by	Checked by
V.01	March 2023	Draft issue for external review	JR	RB
V.02	July 2024	Phase 1 completion	JR	AB
V.03	November 2024	As Constructed Survey completion	JR	AB
V.04	November 2024	Updated for consultation comments	JR	AB
V.05	March 2025	Updated for consultation comments	JR	AB
V.06	June 2025	Additional As-Built information	JR	AB
V.07	September 2025	Phase 2 detail information added	JR	AB
V.08	September 2025	Updated for consultation comments	JR	AB

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023

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barter hill

1 Introduction

1.1 Barter Hill Consulting Engineers have been commissioned by Vistry Homes Limited to prepare a Surface Water and Sustainable Urban Drainage Systems (SuDS) Verification Report. The aim of this report is to detail all the surface water drainage and surface water SuDS elements have been constructed in line with Ardent Consulting Engineers designs and specifications and the guidance set out within the CIRIA SuDS Manual 2015 and will inform those bodies responsible on how to manage and maintain these systems effectively in the future. This report will be submitted to Arun District Council's Planning Officer to enable discharge of condition 23b which states:

'

Immediately following implementation of the approved SuDS scheme for each design catchment agreed under (a) and prior to occupation of any part of the development which that catchment serves, the developer/applicant shall provide the Local Planning Authority with as-built drawings of the fully implemented scheme, together with a completion report prepared by an independent engineer that confirms that the scheme was built in accordance with the approved drawing/s and is fit for purpose.

1.2 This report will be a live document and as the works progress, the report will be updated in line with construction progress until such time as the development is complete and the finished submitted report agreed and accepted with the Local Authority. The Report is prepared in accordance with the Drainage Phasing Plan attached and seeks to address both Phases 1 and 2

1.3 The Author of the report, John Russell, has worked in the construction industry since 1979 for both Housing Developers and Consulting Engineers as a Civil Engineer and Company Director.

2 Site Location

2.1 The development is approximately 11.3 ha (28 acres) and was 100% Greenfield. It is located in Walberton, West Sussex (NGR 497286 106211) 500 m south from A27 (Arundel Road). The development site is currently bordered by the Avisford Park Golf course to the north, Tye Lane to the west and school and residential dwellings to the south and east.

2.2 The proposed development comprises the erection of 175 dwellings with access from B2132 Yapton Lane. Refer to Appendix A for a plan of the proposed development site consisting of residential dwellings and associated car parking, soft landscaping, private gardens and access roads.

3 Description of Works

3.1 The works comprise of a residential development consisting of 175 homes with associated infrastructure in the form of estate roads, traditional piped foul and surface water drainage, culverts and SuDS features out-falling to the proposed infiltration basins within the development boundaries. These basins which form the primary attenuation and water quality features for the overall development prior to final discharge at the prescribed greenfield run-off rate.

3.2 This report will focus on the construction and implementation of the on-site surface water drainage and SuDS features.

4 SuDS Features

4.1 Within the development SuDS features consist of a series of swales, under-drained swales and permeable paving all of which have been designed to convey and treat surface water run off together with providing some element of upstream attenuation and to eliminate the risk of flood to the development and the surrounding area. These features discharge surface water via infiltration both locally and to 2 larger basins These are located as follows and highlighted as constructed at time of latest inspection visit.

i	Soakaway Tank	ii	Swale C
iii	Swale D	iv	Headwall 1A
v	Headwall 1B	vi	Swale E
vii	Swale F	viii	Headwall 1C
ix	Headwall 1D	x	Headwall 1E
xi	Permeable Paving 1A	xii	Permeable paving 1B
xiii	Permeable Paving 1C	xiv	Swale G
xv	Swale H	xvi	Headwall 1F
xvii	Headwall 1G	xviii	Headwall 1H
xix	Headwall 1I	xx	Eastern Basin
xxi	Swale I	xxii	Swale J-M
xxiii	Swale N	xxiv	Swale 0
xxv	Swales P-R	xxvi	Headwalls 2C-2G
xxvii	Western Basin	xxviii	Eastern Basin

xxix	Swale A-B	xxx	Permeable Paving 4A
xxxi	Swale Z	xxxii	Permeable Paving 4B
xxxiii	Swale Y	xxxiv	Permeable Paving Stedman Ave
xxxv	Headwall 3E-F	xxxvi	Swales U-W
xxxvii	Swale X	xxxviii	Swale B spur
xxxix	Headwall 3C		

4.2 The above SuDS features are identified on the following drawings:

LHS240-1235 SuDS Key Plan
LHS240-1201_C7 Main Drainage Sheet 1
LHS240-1202_C6 Main Drainage Sheet 2
LHS240-1221_C1 Drainage Construction Details Sheet 1
LHS240-1222_C1 Drainage Construction Details Sheet 2
LHS240-1223_C1 Drainage Construction Details Sheet 3

These drawings are located in Appendix A and B of this report.

5 Construction Quality and Assurance

5.1 Barter Hill were instructed to carry out periodic site inspections which would consist of visually inspecting, monitoring and recording via photographic evidence the construction of drainage throughout the various stages of the construction process.

5.2 The author of this report John Russell is a director of Barter Hill Partnership Limited and as a Civil Engineer has over 40 years of experience in the construction industry

5.3 An initial site meeting was held between Vistry Homes, Barter Hill and the Groundworks Contractor (BARAM) to ensure the strategy and construction details were fully understood and to establish the requirement for accurate records to be taken during the construction process to allow this document to be populated accordingly and to inform a final set of As-Constructed details.

5.4 As instructed Barter Hill will undertake periodic site inspections and record keeping at each key stage of the drainage construction. Following this we conclude that the construction of the drainage has been built in

line with the Ardent approved design and specification and in line with the Water Authorities Association Sewer Sector Guidance

Evidence of the above inspections can be seen from the photos that were taken, and which can be located in Appendix C of this report.

5.5 As noted previously this report will be updated with the remainder of the drainage elements as and when they are constructed until such time as the development is complete. Once complete this report will be re-submitted to Arun District Council to allow full discharge of condition 23.

5.6 Following the most recent visit on 9 July 2024 it can be confirmed that phase 1 of the scheme has been constructed in accordance with the approved drawing/s and is fit for purpose.

5.7 Site Inspection Information

Site Inspections	Date	Barter Hill Employee Attended
Meeting with Contractor and review on design details	17 January 2022	John Russell
Eastern pond under construction, phase 1 eastern features complete and functioning	21 March 2022	John Russell
Site Inspection Eastern Pond complete, phase 1 features partially complete and functioning.	1 February 2023	John Russell
Phase 1 completion all features constructed and functioning.	9 July 2024	John Russell
Phase 2 completion all features constructed and functioning.	16 July 2025	John Russell

5.8 During the 4 site inspections listed in 5.7 above, all SUDS features were inspected and conditions recorded. A summary of these can be found at the foot of the photographic evidence found in Appendix C.

5.9 An As-Built Survey showing all SuDs features and finished levels has been compared with the design and other than the omission of Swale T all are in accordance with the proposals.

5.10 The omission of Swale T was referred to the designers (Ardent) they were able to remove the short section of swale due to the adjacent gully at the bottom of the ramp that the road can drain into. Design drawings in Appendix A updated accordingly.

5.11 Constructed site levels and Product information supplied by groundworks contractor shown in Appendix F.

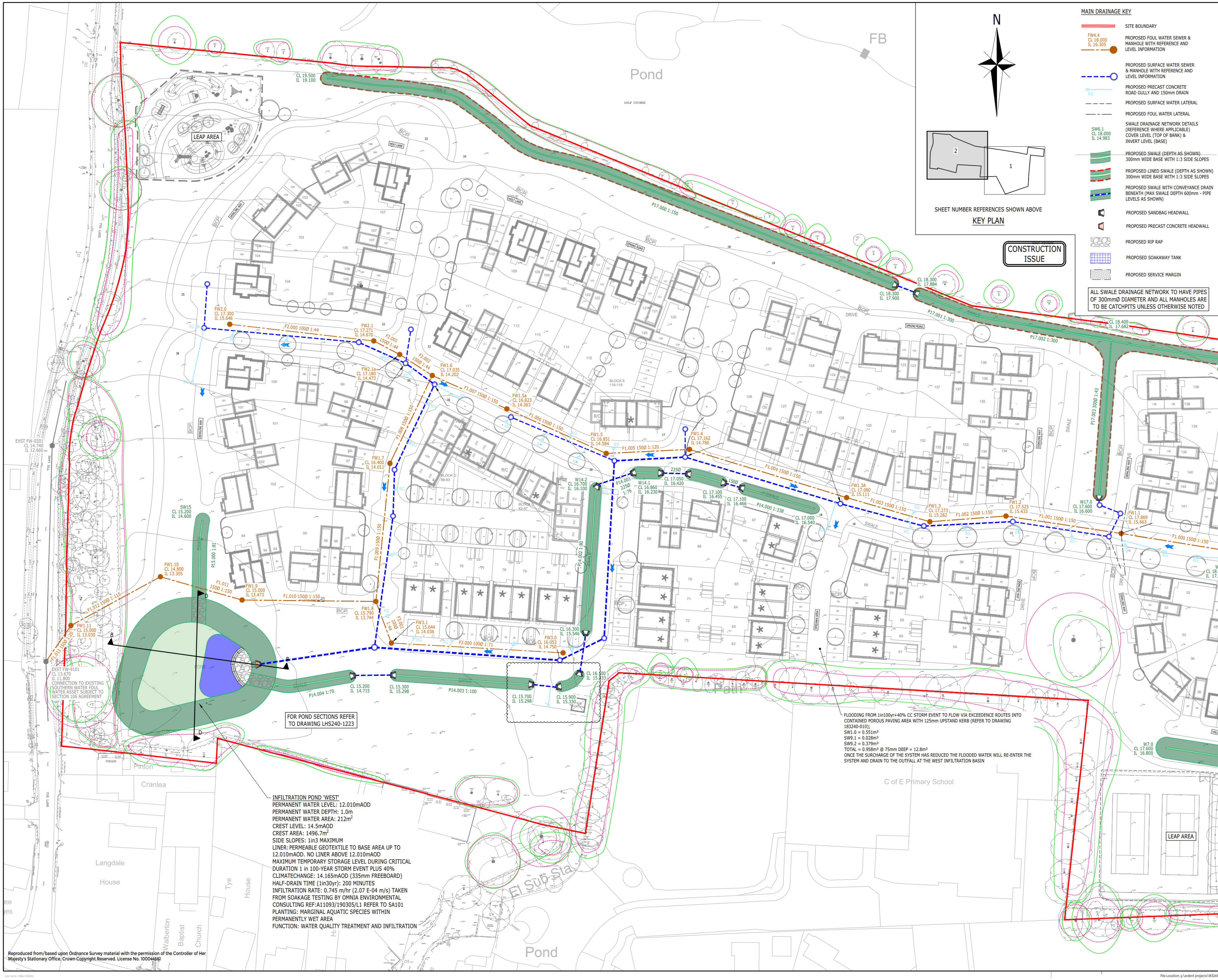
Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023

Appendices

Appendix A

Infrastructure Drainage Layouts with Asset Locations

- LHS240-1235 SuDS Key Plan
- LHS240-1201_C7 Main Drainage Sheet 1
- LHS240-1202_C6 Main Drainage Sheet 1



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NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT SPECIFICATION, INC. RISK ASSESSMENTS (SEE CDM NOTES) AND ALL OTHER RELATED DRAWINGS ISSUED BY THE ENGINEER.
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5. NO DEVIATION FROM THE DETAILS SHOWN ON THIS DRAWING IS PERMITTED WITHOUT PRIOR PERMISSION FROM THE ENGINEER.
6. ALL PRIVATE DRAINAGE IS TO COMPLY AND BE LAID IN ACCORDANCE WITH CURRENT PART H OF BUILDING REGULATIONS , BS 8301 AND BS 5955.
7. REFER TO ARCHITECT's HOUSE TYPE (WORKING) DRAWINGS FOR EXACT POSITION OF DRAINAGE POINTS.
8. POSITION & INVERT LEVELS OF ALL EXISTING MANHOLES, SEWERS AND LATERALS TO BE CONFIRMED PRIOR TO CONSTRUCTION & ANY DISCREPANCIES REPORTED TO THE ENGINEER.
9. ALL DRAIN AND SEWER PIPES ARE TO BE LAID SOFFIT TO SOFFIT, UNLESS SHOWN OTHERWISE (SEE ALSO MANHOLE SCHEDULE DRAWINGS).
10. ALL PLOT DRAINAGE TO BE 100mm Ø UNLESS SHOWN OTHERWISE, LAID IN ACCORDANCE WITH BS 8301.
11. ALL MATERIALS SHALL COMPLY TO THE BSI KITE MARK CERTIFICATION SCHEME AND MUST BE MARKED ACCORDINGLY.
12. COVER AND FRAMES TO MANHOLES/INSPECTION CHAMBERS TO COMPLY WITH BS EN124. REFER TO PRIVATE DRAINAGE CONSTRUCTION DETAILS DRAWING.
13. WHERE FINISHED GROUND LEVELS FALL TOWARDS BUILDING, AN OPEN GULLY IS TO BE PROVIDED AT THE FOOT OF ALL RAINWATER PIPES. ALL RAINWATER PIPES TO HAVE RODDING ACCESS.
14. FINAL POSITIONS OF INSPECTION CHAMBERS WITHIN PRIVATE AREAS ARE SUBJECT TO CONFIRMATION ON SITE TO SUIT PIPE CONFIGURATIONS AND CHAMBER INLET POSITIONS.
15. WHERE A DRAIN RUN PASSES THROUGH A WALL OR FOUNDATION IT IS NECESSARY TO:
   i) FORM AN OPENING USING A CONCRETE LINTEL WITH AT LEAST 50mm CLEARANCE AROUND THE PIPE AND THE OPENINGS MASKED WITH RIGID SHEET MATERIAL TO PREVENT ENTRY OF FILL OR VERMIN, OR:
   ii) BUILD IN A LENGTH OF PIPE WITH ITS JOINTS AS CLOSE AS POSSIBLE TO THE WALL FACES (150mm MAXIMUM) AND CONNECTED ON EACH SIDE TO 600mm LONG ROCKER PIPES WITH FLEXIBLE JOINTS.
16. PLOT DRAINAGE TO BE BEDDED ON GRANULAR MATERIAL AND BACKFILLED WITH SUITABLE CLEAN MATERIAL, AS DESCRIBED ON THE PRIVATE DRAINAGE CONSTRUCTION DETAILS DRAWINGS. SEE ALSO SHALLOW DRAINAGE TRENCH DETAIL AND PIPE RUNS NEAR BUILDINGS DETAIL FOR CONCRETE BED AND SURROUND PIPE PROTECTION MEASURES WHERE APPLICABLE.
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18. ALL DRAIN CONNECTIONS BENEATH THE HIGHWAY ARE TO HAVE MINIMUM 150mm CONCRETE BED AND SURROUND, WHERE COVER IS LESS THAN 1.2m.
19. REFER TO PRE-TENDER HEALTH & SAFETY PLAN & CONSTRUCTION PHASE HEALTH & SAFETY PLAN PRIOR TO THE COMMENCEMENT OF WORKS.

CDM NOTES:

1. THE ATTENTION OF THE CLIENT AND THE PRINCIPAL CONTRACTOR IS DRAWN TO THE FOLLOWING POTENTIAL RISKS IN CONJUNCTION WITH THE PROPOSED ON-SITE AND OFF-SITE WORKS AS DESIGNED FOR THIS PROJECT:
2. WORKS IN THE VICINITY OF LIVE SERVICES WILL BE NECESSARY AND THE ADVICE OF ALL STATUTORY SERVICE COMPANIES MUST BE SOUGHT BEFORE ANY WORKS COMMENCE.
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5. THE CONTRACTOR WILL BE RESPONSIBLE FOR LOCATING ALL EXISTING SERVICES WITHIN THE VICINITY OF THE WORKS AND ENSURE THESE ARE PROTECTED THROUGHOUT THE DURATION OF THE WORKS. ALL UTILITY PLANT SHOULD BE CLEARLY MARKED ON THE GROUND PRIOR TO COMMENCEMENT OF THE WORKS.
6. THE CONTRACTOR MUST ENSURE ALL WORKING AREAS ARE FULLY SECURE.

Rev	Description	Drn	Chk	App	Date
C8	SWALE BY PLOT 58 REMOVED FOLLOWING CLIENT COMMENT/REQUEST	MJR	MJR	JEC	02.09.25
C7	GULLY TO SUBSTATION ADDED	MJR	MJR	JEC	16.05.23
C6	GULLY POSITION UPDATED TO SUIT REVISED TURNING HEAD FOLLOWING CLIENT COMMENTS	UN	MJR	JEC	27.05.22
C5	W14.1 & P14.001 UPDATED TO SUIT RFI	JM	JM	GH	01.07.20
C4	UPDATED AS PER REV CLOUDS TO SUIT RFI's	JM	JM	GH	16.06.20
C3	SWALES UPDATED SEE REV CLOUD	UN	JM	GH	28.11.19
C2	REVISED TO SUIT COMBINED SERVICES LAYOUT	JM	JM	GH	22.08.19
C1	ISSUED FOR CONSTRUCTION	MJR	JM	GH	09.08.19

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Client: LINDEN HOMES SOUTH

Project Title: LAND EAST OF TYE LANE, WALBERTON

Drawing Title: MAIN DRAINAGE PLAN (SHEET 2 OF 2)

A1 Scale	Date	Designed by
1:500	18.04.2019	JM
Drawn by	Checked by	Approved by
JM	JM	GH

Drawing Number: LHS240-1202 Rev C8

SOAKAWAY TO BE COORDINATED WITH EXISTING FOUL DRAIN

GEOCELLULAR SOAKAWAY "A"
SPEC: WAVIN AQUACELL PLUS
GEOCELLULAR TANK DIMENSIONS (LxWxD): 10x10x0.8m
INVERT LEVEL: 15.200mAOD
COVER LEVEL: 20.000mAOD
INFILTRATION RATE: 0.4 m/hr (1.1 E-04 m/s)TAKEN FROM DESK STUDY & GROUND INVESTIGATION REPORT BY GEO-ENVIRONMENTAL REF:GE16861 REFER TO TP6

INFILTRATION POND 'EAST'
PERMANENT WATER LEVEL: 13.7mAOD
PERMANENT WATER DEPTH: 0.8m
PERMANENT WATER AREA: 246.4m²
CREST LEVEL: 16.7mAOD
CREST AREA: 2350m²
SIDE SLOPES: 1in3 MAXIMUM
LINER: IMPERMEABLE GEOMEMBRANE TO BASE AREA UP TO 13.700mAOD.
NO LINER ABOVE 13.700mAOD
MAXIMUM TEMPORARY STORAGE LEVEL DURING CRITICAL DURATION 1 in 100-YEAR STORM EVENT PLUS 40% CLIMATE CHANGE: 15.193mAOD (1.507m FREEBOARD)
HALF-DRAIN TIME (1in30yr): 228 MINUTES
INFILTRATION RATE: 1.134 m/hr (3.15 E-05 m/s)TAKEN FROM SOAKAGE TESTING BY OMNIA ENVIRONMENTAL CONSULTING REF:A11093/190305/L1 REFER TO SA102
PLANTING: MARGINAL AQUATIC SPECIES WITHIN PERMANENTLY WET AREA
FUNCTION: WATER QUALITY TREATMENT AND INFILTRATION

FOR POND SECTIONS REFER TO DRAWING LHS240-1223

LEAP AREA

DRAIN TO BE OFF-CENTRE OF SWALE TO SUIT MANHOLE CONNECTIONS

NEW MANHOLE ONLINE OF EXISTING SOUTHERN WATER SEWER
CL 16.700 (TBC)
IL 15.299 (1500)
IL 15.224 (2250)

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NOTES:

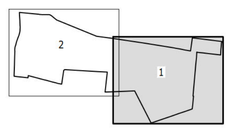
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CONSTRUCTION ISSUE

N



SHEET NUMBER REFERENCES SHOWN ABOVE

KEY PLAN

ALL SWALE DRAINAGE NETWORK TO HAVE PIPES OF 300mmØ DIAMETER AND ALL MANHOLES ARE TO BE CATCHPITS UNLESS NOTED OTHERWISE

MAIN DRAINAGE KEY

- SITE BOUNDARY
- FW4.4 CL 18.000 IL 16.305 — PROPOSED FOUL WATER SEWER & MANHOLE WITH REFERENCE AND LEVEL INFORMATION
- SW1.6 CL 18.000 IL 14.983 — PROPOSED SURFACE WATER SEWER & MANHOLE WITH REFERENCE AND LEVEL INFORMATION
- RG — PROPOSED PRECAST CONCRETE ROAD GULLY AND 150mm DRAIN
- PROPOSED SURFACE WATER LATERAL
- PROPOSED FOUL WATER LATERAL
- SW6.1 CL 18.000 IL 14.983 — SWALE DRAINAGE NETWORK DETAILS (REFERENCE WHERE APPLICABLE) COVER LEVEL (TOP OF BANK) & INVERT LEVEL (BASE)
- PROPOSED SWALE (DEPTH AS SHOWN) 300mm WIDE BASE WITH 1:3 SIDE SLOPES
- PROPOSED LINED SWALE (DEPTH AS SHOWN) 300mm WIDE BASE WITH 1:3 SIDE SLOPES
- PROPOSED SWALE WITH CONVEYANCE DRAIN BENEATH (MAX SWALE DEPTH 600mm - PIPE LEVELS AS SHOWN)
- PROPOSED SANDBAG HEADWALL
- PROPOSED PRECAST CONCRETE HEADWALL
- PROPOSED RIP RAP
- PROPOSED SOAKAWAY TANK
- PROPOSED SERVICE MARGIN

Rev	Description	Drn	Chk	App	Date
C7	DRAINAGE LATERAL UPDATED TO SUIT RFI	JM	JM	GH	01.07.20
C6	UPDATED AS PER REV CLOUDS TO SUIT RFI's	JM	JM	GH	16.06.20
C5	SWALES UPDATED SEE REV CLOUD	UN	JM	GH	28.11.19
C4	COVER LEVELS TO FW4.5, 4.6 & 5.4 UPDATED	JM	JM	GH	13.11.19
C3	MANHOLE ADDED TO EXISITING DRAINAGE SYSTEM	UN	JM	GH	21.10.19
C2	ROAD GULLY LOCATION REVISED AS CLOUDED	MJR	JM	GH	12.08.19
C1	ISSUED FOR CONSTRUCTION	MJR	JM	GH	09.08.19
T2	CATCHPIT ADDED. ROAD GULLY LATERAL REVISED.	JM	JM	GH	01.08.19

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Client: LINDEN HOMES SOUTH

Project Title: LAND EAST OF TYE LANE, WALBERTON

Drawing Title: MAIN DRAINAGE PLAN (SHEET 1 OF 2)

A1 Scale	Date	Designed by
1:500	18.04.2019	JM
Drawn by	Checked by	Approved by
JM	JM	GH

Drawing Number: LHS240-1201 Rev C7

NOTES:

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2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ARDENT CONSULTING ENGINEERS' DRAWING DRAWING NUMBER LHS240-1201, TITLED MAIN DRAINAGE PLAN DATED APRIL 2019.

LEGEND

- SITE BOUNDARY
- PERMEABLE PAVING
- PROPOSED SWALE
- PROPOSED LINED SWALE
- PROPOSED CONVEYANCE SWALE
- PROPOSED HEADWALLS
- CATCHPIT MANHOLE

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Rev	Description	Drn	Chk	App	Date

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Client

LINDEN HOMES SOUTH

Project Title:

LAND EAST OF TYE LANE, WALBERTON

Drawing Title:

SuDS KEY PLAN - OVERALL SITE

A1 Scale	Date	Designed by
1:1000	MARCH 23	MJR
Drawn by	**Checked by**	**Approved by**
MJR	MJR	JEC

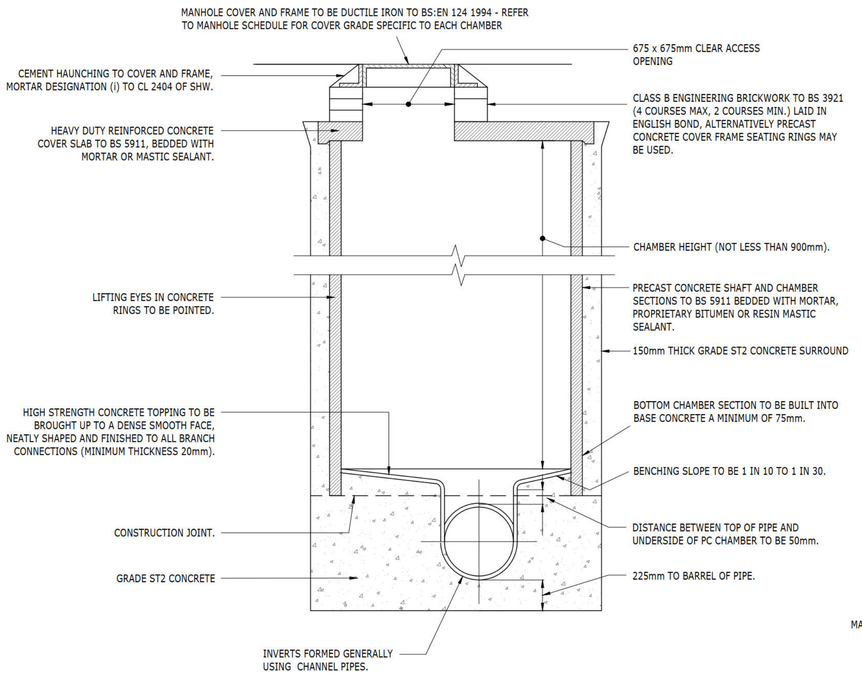
Drawing Number: LHS240-1235 | Rev: —

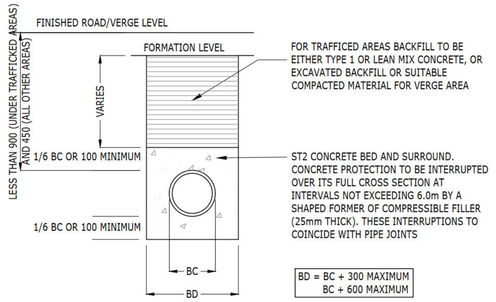
Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023

Appendix B

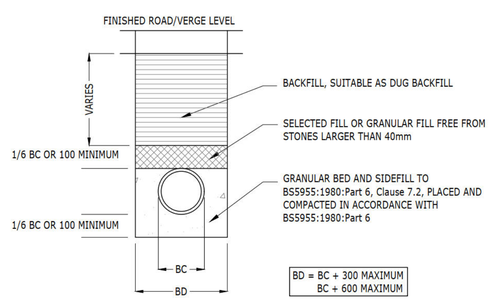
Infrastructure Construction Details

- LHS240-1221_C1 Drainage Construction Details Sheet 1
- LHS240-1222_C1 Drainage Construction Details Sheet 2
- LHS240-1223_C1 Drainage Construction Details Sheet 3





SHALLOW TRENCH DETAIL

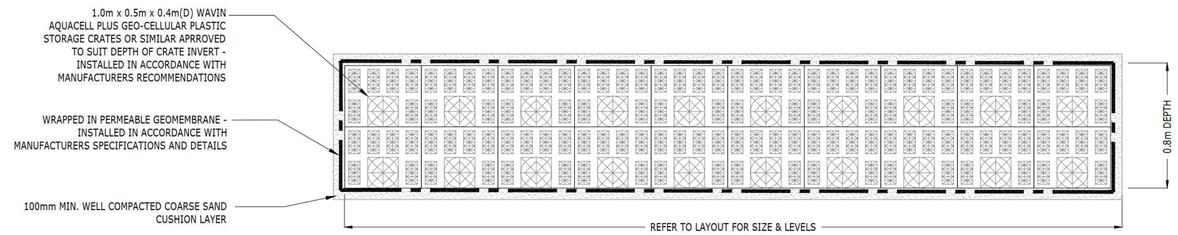


TYPICAL TRENCH DETAIL

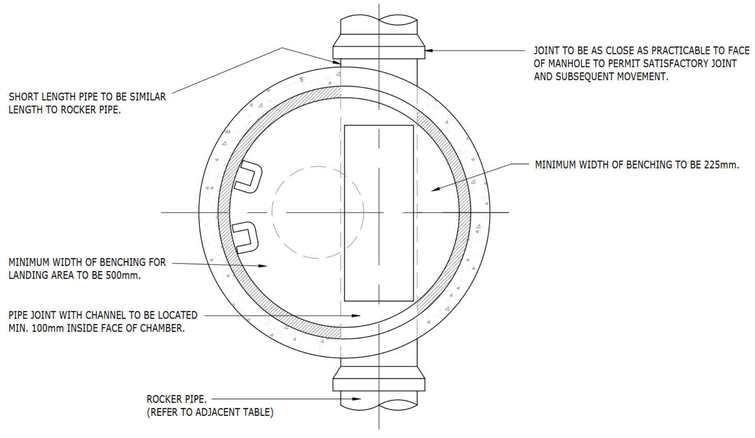
ALL PIPES ENTERING OR LEAVING MANHOLES SHALL HAVE A FLEXIBLE JOINT WITHIN 600mm OF THE INSIDE FACE OF THE MANHOLE. THE NEXT PIPE SHALL BE A SHORT "ROCKER PIPE" WITH LENGTH AS TABLE BELOW.

ROCKER PIPES	
SEWER DIAMETER (mm)	EFFECTIVE LENGTH (mm)
150 TO 600	600
675 TO 750	1000
825 AND OVER	1250

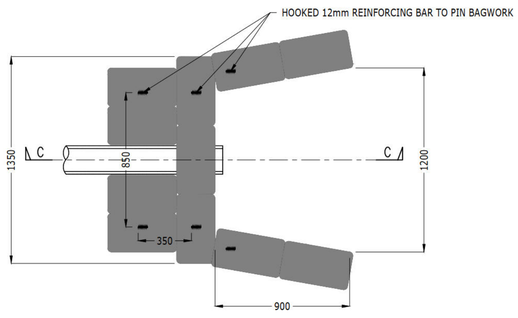
TABLE 1



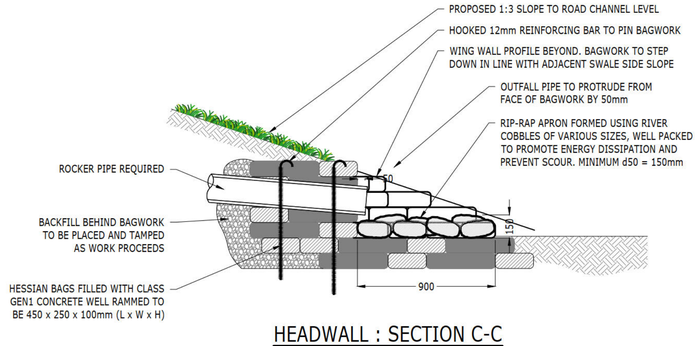
TYPICAL CELLULAR SOAKAWAY DETAIL
(1:20)



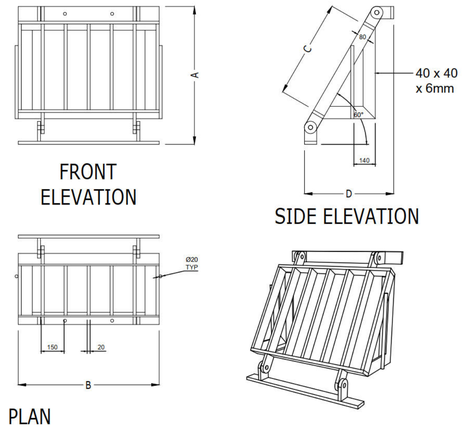
PRIVATE MANHOLE TYPE B
(MAX DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3.0m)



INLET/OUTLET SWALE HEADWALL PLAN



HEADWALL : SECTION C-C



DEBRIS SCREEN DIMENSIONS						
HEADWALL	PIPE Ø	DIMENSION 'A'	DIMENSION 'B'	DIMENSION 'C'	DIMENSION 'D'	ALTHON LTD PRODUCT NAME
SWALE	300	600	610	496	378	300mm SLOPED TRASH SCREEN & SIDES (60° RAKE)

NOTES:

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6. ALL PRIVATE DRAINAGE IS TO COMPLY AND BE LAID IN ACCORDANCE WITH CURRENT PART H OF BUILDING REGULATIONS , BS 8301 AND BS 5955.
7. REFER TO ARCHITECT'S HOUSE TYPE (WORKING) DRAWINGS FOR EXACT POSITION OF DRAINAGE POINTS.
8. POSITION & INVERT LEVELS OF ALL EXISTING MANHOLES, SEWERS AND LATERALS TO BE CONFIRMED PRIOR TO CONSTRUCTION & ANY DISCREPANCIES REPORTED TO THE ENGINEER.
9. ALL DRAIN AND SEWER PIPES ARE TO BE LAID SOFFIT TO SOFFIT, UNLESS SHOWN OTHERWISE (SEE ALSO MANHOLE SCHEDULE DRAWINGS).
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11. ALL MATERIALS SHALL COMPLY TO THE BSI KITE MARK CERTIFICATION SCHEME AND MUST BE MARKED ACCORDINGLY.
12. COVER AND FRAMES TO MANHOLES/INSPECTION CHAMBERS TO COMPLY WITH BS EN124. REFER TO PRIVATE DRAINAGE CONSTRUCTION DETAILS DRAWING.
13. WHERE FINISHED GROUND LEVELS FALL TOWARDS BUILDING, AN OPEN GULLY IS TO BE PROVIDED AT THE FOOT OF ALL RAINWATER PIPES. ALL RAINWATER PIPES TO HAVE RODDING ACCESS.
14. FINAL POSITIONS OF INSPECTION CHAMBERS WITHIN PRIVATE AREAS ARE SUBJECT TO CONFIRMATION ON SITE TO SUIT PIPE CONFIGURATIONS AND CHAMBER INLET POSITIONS.
15. WHERE A DRAIN RUN PASSES THROUGH A WALL OR FOUNDATION IT IS NECESSARY TO:
    i) FORM AN OPENING USING A CONCRETE LINTEL WITH AT LEAST 50mm CLEARANCE AROUND THE PIPE AND THE OPENINGS MASKED WITH RIGID SHEET MATERIAL TO PREVENT ENTRY OF FILL OR VERMIN, OR:
    ii) BUILD IN A LENGTH OF PIPE WITH ITS JOINTS AS CLOSE AS POSSIBLE TO THE WALL FACES (150mm MAXIMUM) AND CONNECTED ON EACH SIDE TO 600mm LONG ROCKER PIPES WITH FLEXIBLE JOINTS.
16. PLOT DRAINAGE TO BE BEDDED ON GRANULAR MATERIAL AND BACKFILLED WITH SUITABLE CLEAN MATERIAL, AS DESCRIBED ON THE PRIVATE DRAINAGE CONSTRUCTION DETAILS DRAWINGS. SEE ALSO SHALLOW DRAINAGE TRENCH DETAIL AND PIPE RUNS NEAR BUILDINGS DETAIL FOR CONCRETE BED AND SURROUND PIPE PROTECTION MEASURES WHERE APPLICABLE.
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18. ALL DRAIN CONNECTIONS BENEATH THE HIGHWAY ARE TO HAVE MINIMUM 150mm CONCRETE BED AND SURROUND, WHERE COVER IS LESS THAN 1.2m.
19. REFER TO PRE-TENDER HEALTH & SAFETY PLAN & CONSTRUCTION PHASE HEALTH & SAFETY PLAN PRIOR TO THE COMMENCEMENT OF WORKS.

CONSTRUCTION ISSUE

Rev	Description	Drn	Chk	App	Date
C1	ISSUED FOR CONSTRUCTION	MJR	JM	GH	09.08.19

ARDENT CONSULTING ENGINEERS
Third Floor
The Hallmark Building
52-56 Leadenhall Street
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EC3M 5JE
Tel: 020 7680 4088
Web: www.ardent-ce.co.uk
E-mail: enquiries@ardent-ce.co.uk

Client
LINDEN HOMES SOUTH

Project Title:
LAND EAST OF TYE LANE, WALBERTON

Drawing Title:
MAIN DRAINAGE CONSTRUCTION DETAILS (SHEET 1 OF 3)

A1 Scale	Date	Designed by
1:20	APRIL 2019	JM
Drawn by	Checked by	Approved by
JM	JM	GH

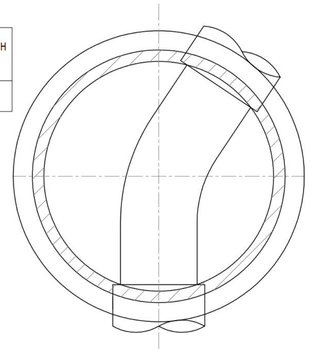
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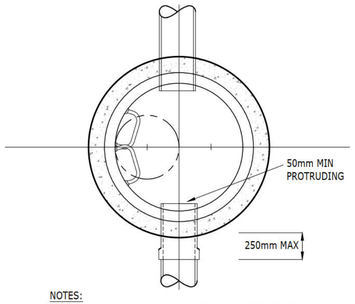
SHAFT DIAMETERS

DIA OF LARGEST PIPE IN MH (mm)	INTERNAL DIA. OF MH (mm)
LESS THAN 375	1200

NOTE:
IF PIPE DIAMETER IS 375mm OR ABOVE USE 1500mm DIAMETER TYPE B.

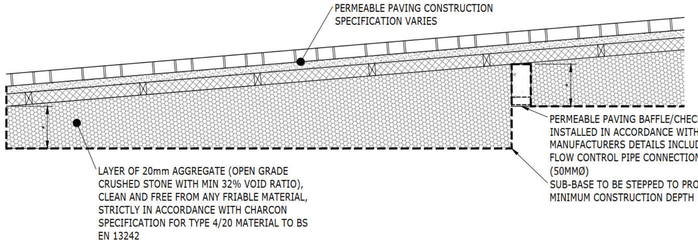


ALL PIPES ENTERING OR LEAVING MANHOLES SHALL HAVE A FLEXIBLE JOINT WITHIN 600mm OF THE INSIDE FACE OF THE MANHOLE. THE NEXT PIPE SHALL BE A SHORT "ROCKER PIPE" 600mm LONG.



NOTES:
1. MANHOLE RINGS, SLAB AND ST 1 CONCRETE TO BE MADE USING SULPHATE RESISTING CONCRETE.
2. EXCESS EXCAVATION CONCRETE BACKFILL TO BE ST 1 CONCRETE REFER TO MANHOLE SCHEDULES FOR RING DIAMETER

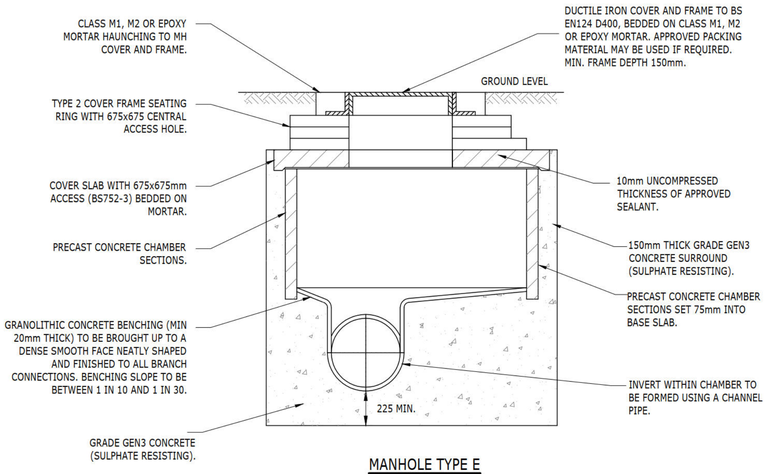
PLAN



TYPICAL PERMEABLE PAVING SUB-BASE FORMATION - STEP DETAIL

(APPLICABLE TO AREAS WITH GRADIENT IN EXCESS OF 1:40)

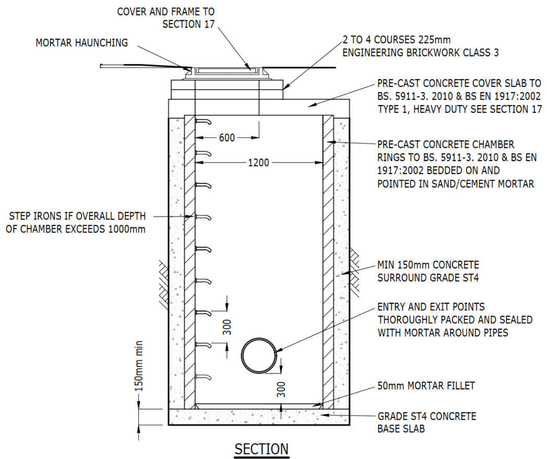
(1:20)



MANHOLE TYPE E

(DEPTH TO SOFFIT 1.00m TO 1.50m)

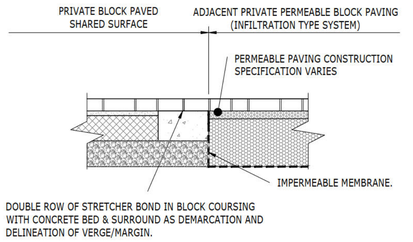
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SECTION

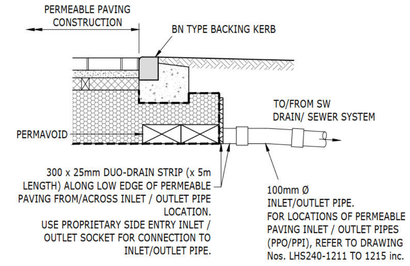
TYPICAL CATCHPIT DETAIL

(1:10)



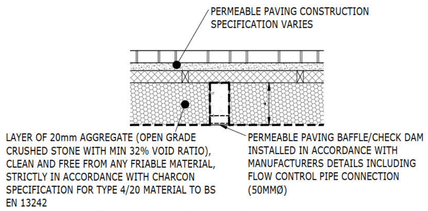
TYPICAL FLUSH INTERFACE BETWEEN PRIVATE BLOCK PAVED CARRIAGEWAY & PRIVATE PERMEABLE PAVED CONSTRUCTION

(1:20)



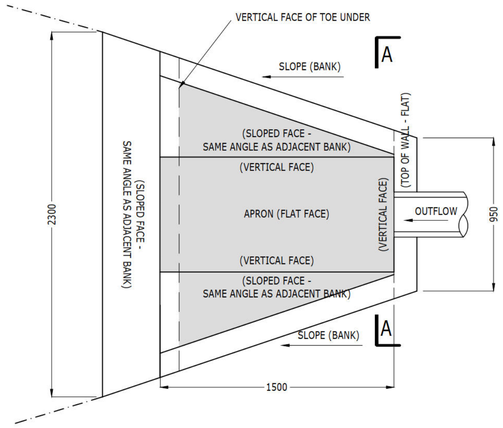
TYPICAL PERMEABLE PAVING INLET / OUTLET PIPE DETAIL

(1:20)

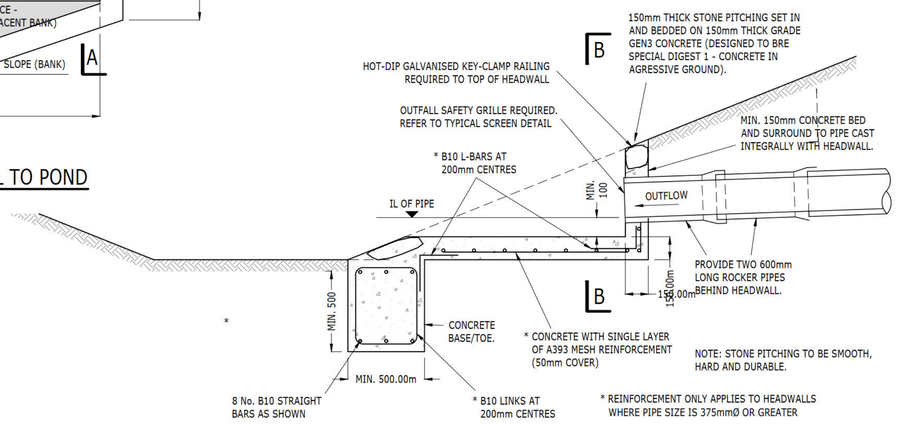


TYPICAL PERMEABLE PAVING BAFFLE / CHECK DAM DETAIL

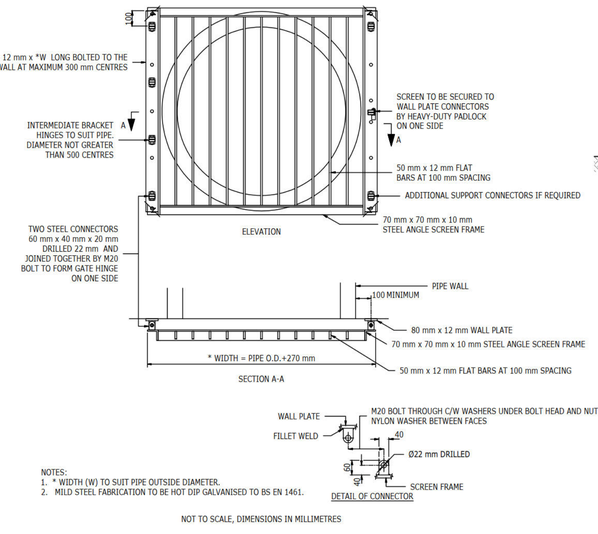
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HEADWALL / OUTFALL TO POND



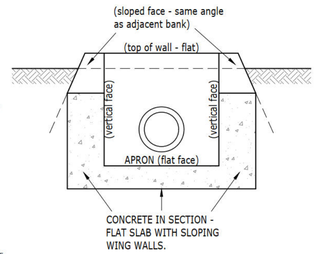
TYPICAL SECTION A-A THROUGH HEADWALL / PIPE OUTFALL TO POND



NOTES:
1. * WIDTH (W) TO SUIT PIPE OUTSIDE DIAMETER.
2. MILD STEEL FABRICATION TO BE HOT DIP GALVANISED TO BS EN 1461.

NOT TO SCALE, DIMENSIONS IN MILLIMETRES

TYPICAL OUTFALL SAFETY GRILLE



SECTION B-B

NOTES:

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CONSTRUCTION ISSUE

Rev	Description	Drn	Chk	App	Date
C1	ISSUED FOR CONSTRUCTION	MJR	JM	GH	09.08.19

ARDENT CONSULTING ENGINEERS
Third Floor
The Hallmark Building
52-56 Leadenhall Street
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Tel: 020 7680 4088
Web: www.ardent-ce.co.uk
E-mail: enquiries@ardent-ce.co.uk

Client

LINDEN HOMES SOUTH

Project Title:

LAND EAST OF TYE LANE, WALBERTON

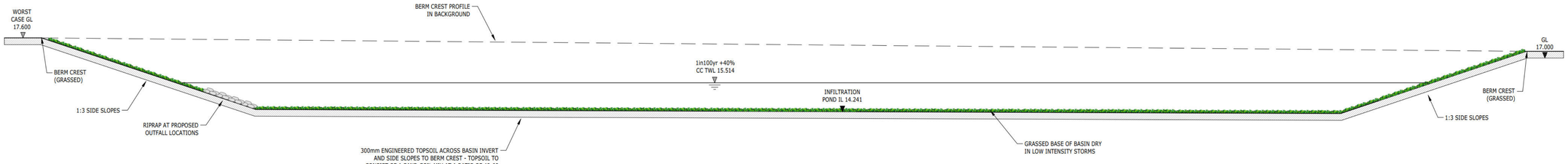
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MAIN DRAINAGE CONSTRUCTION DETAILS (SHEET 2 OF 3)

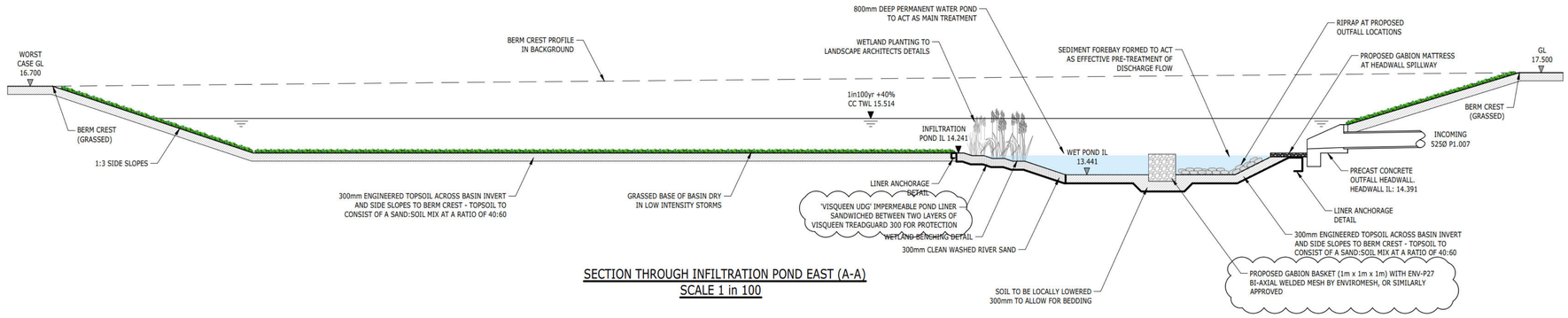
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1:20	APRIL 2019	JM
Drawn by	Checked by	Approved by
MJR	JM	GH

Drawing Number: LHS240-1222 Rev C1

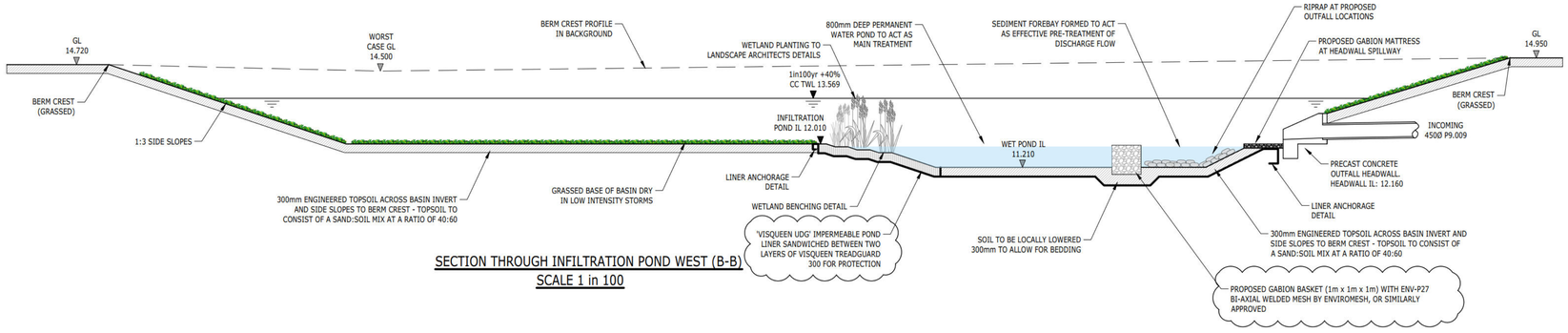
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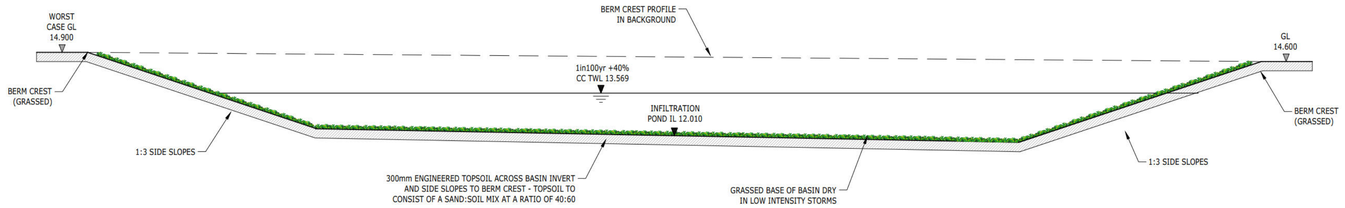
SECTION THROUGH INFILTRATION POND EAST (C-C)
SCALE 1 in 100



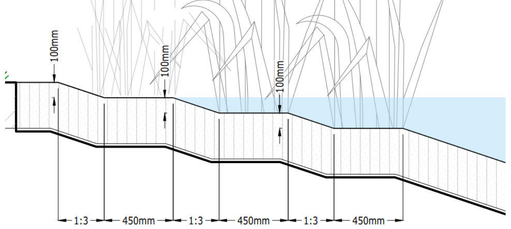
SECTION THROUGH INFILTRATION POND EAST (A-A)
SCALE 1 in 100



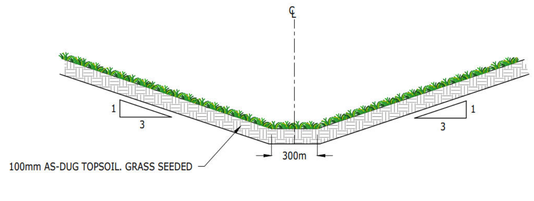
SECTION THROUGH INFILTRATION POND WEST (B-B)
SCALE 1 in 100



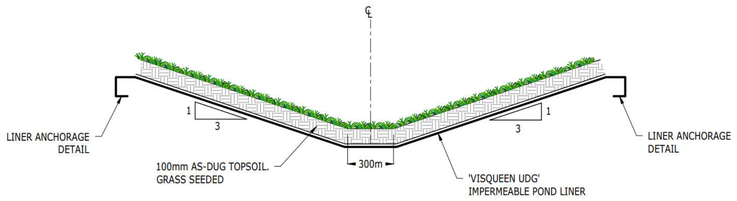
SECTION THROUGH INFILTRATION POND WEST (D-D)
SCALE 1 in 100



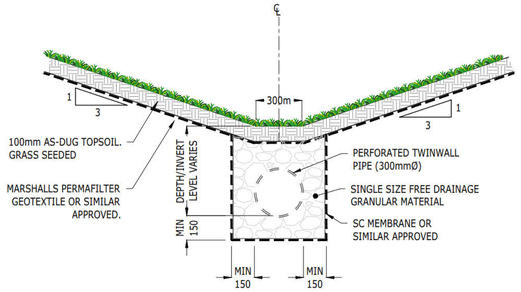
WETLAND BENCHING DETAIL
SCALE 1:20



TYPICAL SWALE CROSS-SECTION (NOT LINED)
(1:20)



LINED TYPICAL SWALE CROSS-SECTION
(1:20)



TYPICAL UNDER-DRAINED SWALE CROSS-SECTION
(1:20)

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10. ALL PLOT DRAINAGE TO BE 100mm Ø UNLESS SHOWN OTHERWISE, LAID IN ACCORDANCE WITH BS 8301.
11. ALL MATERIALS SHALL COMPLY TO THE BSI KITE MARK CERTIFICATION SCHEME AND MUST BE MARKED ACCORDINGLY.
12. COVER AND FRAMES TO MANHOLES/INSPECTION CHAMBERS TO COMPLY WITH BS EN124. REFER TO PRIVATE DRAINAGE CONSTRUCTION DETAILS DRAWING.
13. WHERE FINISHED GROUND LEVELS FALL TOWARDS BUILDING, AN OPEN GULLY IS TO BE PROVIDED AT THE FOOT OF ALL RAINWATER PIPES. ALL RAINWATER PIPES TO HAVE RODDING ACCESS.
14. FINAL POSITIONS OF INSPECTION CHAMBERS WITHIN PRIVATE AREAS ARE SUBJECT TO CONFIRMATION ON SITE TO SUIT PIPE CONFIGURATIONS AND CHAMBER INLET POSITIONS.
15. WHERE A DRAIN RUN PASSES THROUGH A WALL OR FOUNDATION IT IS NECESSARY TO:
    i) FORM AN OPENING USING A CONCRETE LINTEL WITH AT LEAST 50mm CLEARANCE AROUND THE PIPE AND THE OPENINGS MASKED WITH RIGID SHEET MATERIAL TO PREVENT ENTRY OF FILL OR VERMIN, OR:
    ii) BUILD IN A LENGTH OF PIPE WITH ITS JOINTS AS CLOSE AS POSSIBLE TO THE WALL FACES (150mm MAXIMUM) AND CONNECTED ON EACH SIDE TO 600mm LONG ROCKER PIPES WITH FLEXIBLE JOINTS.
16. PLOT DRAINAGE TO BE BEDDED ON GRANULAR MATERIAL AND BACKFILLED WITH SUITABLE CLEAN MATERIAL, AS DESCRIBED ON THE PRIVATE DRAINAGE CONSTRUCTION DETAILS DRAWINGS. SEE ALSO SHALLOW DRAINAGE TRENCH DETAIL AND PIPE RUNS NEAR BUILDINGS DETAIL FOR CONCRETE BED AND SURROUND PIPE PROTECTION MEASURES WHERE APPLICABLE.
17. BACKFILL SHOULD BE PLACED IN LAYERS NOT EXCEEDING 300mm (UNCOMPACTED THICKNESS), EACH LAYER BEING WELL COMPACTED. MECHANICAL COMPACTION EQUIPMENT SHOULD NOT BE USED UNTIL THERE IS A MINIMUM OF 450mm OF COMPACTED MATERIAL ABOVE THE CROWN OF THE PIPE.
18. ALL DRAIN CONNECTIONS BENEATH THE HIGHWAY ARE TO HAVE MINIMUM 150mm CONCRETE BED AND SURROUND, WHERE COVER IS LESS THAN 1.2m.
19. REFER TO PRE-TENDER HEALTH & SAFETY PLAN & CONSTRUCTION PHASE HEALTH & SAFETY PLAN PRIOR TO THE COMMENCEMENT OF WORKS.

CONSTRUCTION ISSUE

Rev	Description	Drn	Chk	App	Date
C2	POND LINER UPDATED AND LIMESTONE BOULDERS CHANGED TO GABIONS FOLLOWING COMMENTS	MJR	MJR	JEC	13.01.21
C1	ISSUED FOR CONSTRUCTION	MJR	JM	GH	09.08.19
T2	WETLAND BENCHES ADDED TO SECTIONS	JS	JM	GH	19.07.19

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52-56 Leadenhall Street
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E-mail: enquiries@ardent-ce.co.uk

Client: LINDEN HOMES SOUTH

Project Title: LAND EAST OF TYE LANE, WALBERTON

Drawing Title: MAIN DRAINAGE CONSTRUCTION DETAILS (SHEET 3 OF 3)

A1 Scale	Date	Designed by
1:20	APRIL 2019	JM
Drawn by	Checked by	Approved by
JS	JM	GH

Drawing Number: LHS240-1223 Rev C2

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023

Appendix C

QA Images

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale E - 17 January 2022 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Eastern Pond - 17 March 2022 – under construction, liner being istalled.

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale I - 01 February 2023 – complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Eastern Pond / Head Wall 1J - 01 February 2023 – stilling area complete an functioning.

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale K / L - 01 February 2023 Partially complete. 9 July 2024, complete & functioning.

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale M - - 01 February 2023 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale H - 01 February 2023 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Head Wall 1G - 01 February 2023 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Head Wall 1F - 01 February 2023 – Partially complete. 9 July 2024 - Complete & functioning.

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale 1H - 01 February 2023 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Permiable Paving -1B - 01 February 2023 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Permable Paving 1C - 01 February 2023 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Eastern Pond - 01 February 2023

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Eastern Pond A - 01 February 2023

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Eastern Pond A - 9 July 2024 - Complete & functioning.

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale C - 01 February 2023 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale D - 01 February 2023 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale C and Head Wall 1A - 01 February 2023 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale G and Head Wall 1I - 01 February 2023 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale G and Head Wall 1I - 01 February 2023 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Head Wall 1B - 01 February 2023 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Permeable Pavement 2A - 9 July 2024 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale B-HW2A - 9 July 2024 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale O-N - 9 July 2024 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale P-Q-HW2C-G - 9 July 2024 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale R-HW2G - 9 July 2024 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale S – 09 July 2024 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale H-HW1F - 9 July 2024 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale S-HW2F - 9 July 2024 - complete and functioning

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Avisford Grange, Walberton, West Sussex
March 2023



Headwall 3C – 16th July 2025 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Headwall 3G – 16th July 2025 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Headwall 3H – 16th July 2025 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Private parking 4A – 16th July 2025 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Private parking – 16th July 2025 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Private parking and Stedman Avenue – 16th July 2025 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale A (East) - 16th July 2025 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale A/B – 16th July 2025 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale B (Spur) – 16th July 2025 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale U – 16th July 2025 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale V – 16th July 2025 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale W – 16th July 2025 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale X – 16th July 2025 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale Y – 16th July 2025 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Swale Z – 16th July 2025 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023



Western Basin – 16th July 2025 - complete and functioning

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023

Appendix D

As Constructed Survey

497350 E
497400 E
497450 E
497500 E
106250 N
106200 N
106150 N

UTS DITCH FURTHER, AREA UNDER CONSTRUCTION
P/R FENCE Ht 1.2m
DITCH
CONCRETE
CONCRETE HEADWALL
IL 18.55
IL 18.63
TOW 19.15
TOW 19.22
225ø
TOP OF WALL 17.64
FAIRWAY CLOSE
ROSEMARY LANE
MONTAGUE PLACE
DOWLING WAY
VALLANCE MEAD
KNIGHT GARDENS
Tennis Courts
SWALE
BASE LEVEL 18.31
CONCRETE PARTIALLY BURIED
IL 16.93
100ø
IL 16.80
100ø
WT.1
IL 16.67
225ø
TOW 17.23
IL 17.75
IL 17.78
150ø
IL 17.79
IL 17.84
IL 17.73
225ø
TOW 18.35
TOW 18.45
TOW 18.58
TOW 18.32

7 5 3 1 5 3 1 34 32 30 2 5 28 26 24 1 3 8 5 6 4 1 33 31 29 27 25 23 21 19 35 16 14 12 10 17 2 4 6 8 15 11 2 1 3 22 2 20 18 16 14 12 1 3 5 7 9

Notes:

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3. BACKGROUND INFORMATION TAKEN FROM ORDNANCE SURVEY DIGITAL DATA.

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TOPOGRAPHICAL KEY

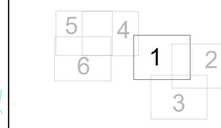
GENERAL ABBREVIATIONS

SURVEY STATION		AIR CONDITIONING UNIT	ACU
		AIR VALVE	AV
		AVERAGE	Av.
		BACK OF KERB	BK
BANKING		BASE LEVEL	BL
		BELISHA BEACON	BB
		BOLLARD	BO
		BOLLARD LIGHT	BOL
HEDGE SPREADS		BUS STOP	BS
		CABLE RISER	CR
WOODLAND CANOPY		CABLE TV COVER	CATV
		CABLES TO GROUND	CTG
ARROW ON STEPS / RAMPS INDICATES DIRECTION UP/KNRDS		CATCH PIT	CP
		CONTROL BOX	CB
		COVER LEVEL	CL
TREES	SPREAD & HEIGHT SHOWN TO SCALE	CROSSING CONTROL BUTTON	CCB
		DAMP PROOF COURSE	DPC
		DRAINAGE CHANNEL	DCH
		DROP KERB	DK
		ELECTRICITY POLE	EP
		EARTH ROD	ER
GATE		FIBRE HYDRANT	FH
		FLOOR LEVEL	FL
KERB CHANNEL		FOOTPATH	FP
		FOUL WATER	FW
ROAD LINE/KERBED		GAS RISER	GR
		GAS VALVE	GV
FOOTPATH		GULLY	GY
		HARD BED	HB
CHANGE IN SURFACE		INSPECTION COVER	IC
		INVERT LEVEL	IL
FENCE		KERB OUTLET	KO
		KIOSK	KI
WALL		MANHOLE	MH
		MARKER POST	MK
OVERHEAD ELECTRIC		METER	MT
		NO PIPES VISIBLE	NPV
OVERHEAD TELECOM		ORDNANCE SURVEY BENCH MARK	OSBM
		PUMP	PU
FOUL SEWER		POST	PO
		POST BOX	P.BOX
SURFACE SEWER		RODDING EYE	RE
		ROAD SIGN	RS
P-TRAP		RAIN WATER PIPE	RWP
BACK DROP (EXTERNAL)		RETAINING WALL	RW
BACK DROP (INTERNAL)		SEWER	SC
		STOP COCK	SC
BUILDING		STREET NAME PLATE	SNP
		STOP VALVE	SV
		SOIL PIPE	SP
OPEN SIDED BUILDING		SURFACE WATER PIPE	SWP
		SURFACE WATER	SW
OVERHANG / CANOPY		TACTILE PAVING	TAC
		TELECOM POLE	TP
GLASSHOUSE		TELECOM INSPECTION COVER	TEL
		TELEPHONE CALL BOX	TCB
CONTOUR	25.00	TICKET MACHINE	TM
		TOP OF WALL	TOW
SPOT LEVEL	+ 127.13	TRAFFIC LIGHT	TL
SONAR LEVEL	○ 127.13	TRAFFIC LIGHT COVER	TLC
		THRESHOLD LEVEL	THL
BORE HOLE	BH	UNABLE TO LOCATE	UTL
		UNABLE TO RAISE	UTR
TRIAL HOLE	TH	UNABLE TO SURVEY	UTS
		VENT PIPE	VP
		WATER LEVEL	WL
		WATER METER	WM
		WASH OUT	WO
		WATER RISER	WR
		WATER TAP	WT

FENCE ABBREVIATIONS

BARBED WIRE FENCE	BW	IRON RAILINGS	IR
CLOSE BOARDED FENCE	CB	LARCH LAP FENCE	LL
CORRUGATED IRON FENCE	CFL	POST AND RAIL FENCE	PR
CORRUGATED IRON FENCE	CI	POST AND WIRE FENCE	PW
CHAIN LINK FENCE	CL	WIRE MESH FENCE	WM
CHESTNUT PALING	CMP		

Sheet Layout: (Not to Scale)



Revision	Description	Drwn by	Check. by	Appr. by	Date
1	Added ditches and a balancing pond to west of site	DH	AG	NS	November 2024

0m 2 4 6 8 10 12 14 16 18 20 22

Topographical Survey

Client:

Vistry Group

Land East of Tye Lane
Walburton
Arundel
BN18 0AW

Scale:	Sheet Size:	Sheet Number:	Date:
1:200	A0	1	June 2024

Project Number:	Rev:	Surveyed by:	Checked by:	Approved by:
34231	1	JL	AG	NS

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Notes:

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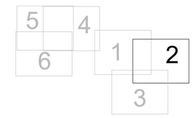
TOPOGRAPHICAL KEY

SURVEY STATION	5	GENERAL ABBREVIATIONS	
BANKING	TOP 307.00 BOT	AIR CONDITIONING UNIT	ACU
HEDGE SPREADS		AIR VALVE	AV
WOODLAND CANOPY		AVERAGE	Av.
ARROW ON STEPS / RAMPS INDICATES DIRECTION UPWARDS		BACK EDGE	BE
TREES	SPREAD & HEIGHT SHOWN TO SCALE	BASE LEVEL	BL
GATE		BELISHA BEACON	BB
KERB CHANNEL		BOLLARD	BO
ROAD U/KERBED		BOLLARD LIGHT	BOL
FOOTPATH		BUS STOP	BS
CHANGE IN SURFACE		CABLE RISER	CR
FENCE		CABLE TV COVER	CATV
WALL		CABLES TO GROUND	CTG
OVERHEAD ELECTRIC		CATCH PIT	CP
OVERHEAD TELECOM		CONTROL BOX	CB
FOUL SEWER		CONVEX MIRROR	CX
SURFACE SEWER		CROSSING CONTROL BUTTON	CCB
P-TRAP		DAMP PROOF COURSE	DPC
BACK DROP (EXTERNAL)		DRAINAGE CHANNEL	DCH
BACK DROP (INTERNAL)		DROP KERB	DK
BUILDING		ELECTRICITY POLE	EP
OPEN SIDED BUILDING		EARTH ROD	ER
OVERHANG / CANOPY		FIRE HYDRANT	FH
GLASSHOUSE		FLOOR LEVEL	FL
CONTOUR	25.00	FOOTPATH	FP
SPOT LEVEL	+ 127.13	FOUL WATER	FW
SONAR LEVEL	○ 127.13	GAS RISER	GR
BORE HOLE	BH	GAS VALVE	GV
TRIAL HOLE	TH	GULLY	GY
		HARD BED	HB
		INSPECTION COVER	IC
		INVERT LEVEL	IL
		KERB OUTLET	KO
		LAMP	LP
		MANHOLE	MH
		MARKER POST	MK
		METER	MT
		NO PIPES VISIBLE	NPV
		ORDNANCE SURVEY BENCH MARK	OSBM
		PARAPET	PP
		POST	PO
		POST BOX	P.BOX
		RODDING EYE	RE
		ROAD SIGN	RS
		RAIN WATER PIPE	RWP
		RETAINING WALL	RW
		SOIL VENT	SV
		STOP COCK	SC
		STREET NAME PLATE	SNP
		STOP VALVE	SV
		SOIL PIPE	SP
		SURFACE PIPE	SWP
		SURFACE WATER	SW
		TACTILE PAVING	TAC
		TELECOM POLE	TP
		TELECOM INSPECTION COVER	TEL
		TELEPHONE CALL BOX	TCB
		TICKET MACHINE	TM
		TOP OF WALL	TOW
		TRAFFIC LIGHT	TL
		TRAFFIC LIGHT COVER	TLC
		THRESHOLD LEVEL	THL
		UNABLE TO LOCATE	UTL
		UNABLE TO RAISE	UTR
		UNABLE TO SURVEY	UTS
		VENT PIPE	VP
		WATER LEVEL	WL
		WATER METER	WM
		WASH OUT	WO
		WATER RISER	WR
		WATER TAP	WT

FENCE ABBREVIATIONS

BARBED WIRE FENCE	BW	IRON RAILINGS	IR
CLOSE BOARDED FENCE	CB	LARCH LAP FENCE	LL
CORRUGATED IRON FENCE	CI	POST AND RAIL FENCE	PR
CORRUGATED IRON FENCE	CIL	POST AND WIRE FENCE	PW
CHAIN LINK FENCE	CL	WIRE MESH FENCE	WM
CHESTNUT PALING	CMP		

Sheet Layout: (Not to Scale)



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1	Added ditches and a balancing pond to west of site	TH	AG	NS	November 2024

0m 2 4 6 8 10 12 14 16 18 20 22

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Client:

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BN18 0AW

Scale:	Sheet Size:	Sheet Number:	Date:
1:200	A0	2	June 2024

Project Number:	Rev:	Surveyed by:	Checked by:	Approved by:
34231	1	JL	AG	NS

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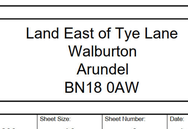
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		AIR VALVE	AV
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BANKING	TOP / BOTTOM	BACK OF KERB	BK
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		BOLLARD LIGHT	BOL
WOODLAND CANOPY		BUS STOP	BS
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		DROP KERB	DK
KERB CHANNEL		ELECTRICITY POLE	EP
		EARTH ROD	ER
ROAD U/KERBED		FIBRE HYDRANT	FH
		FLOOR LEVEL	FL
FOOTPATH		FOOTPATH	FP
		FOUL WATER	FW
CHANGE IN SURFACE		GAS RISER	GR
		GAS VALVE	GV
FENCE		GULLY	GY
		HARD BED	HB
WALL		INSPECTION COVER	IC
		INVERT LEVEL	IL
OVERHEAD ELECTRIC		KERB OUTLET	KO
		KIOSK	KI
OVERHEAD TELECOM		MANHOLE	MH
		MARKER POST	MK
FOUL SEWER		METER	MT
		NO PIPES VISIBLE	NPV
SURFACE SEWER		ORDNANCE SURVEY BENCH MARK	OSBM
		PUMP	PU
P-TRAP		POST	PO
		POST BOX	P.BOX
BACK DROP (EXTERNAL)		RODDING EYE	RE
		ROAD SIGN	RS
BACK DROP (INTERNAL)		RAIN WATER PIPE	RWP
		RETAINING WALL	RW
BUILDING		SEWER PIPE	SC
		STOP COCK	SC
OPEN SIDED BUILDING		STREET NAME PLATE	SNP
		STOP VALVE	SV
OVERHANG / CANOPY		SOIL PIPE	SP
		SURFACE PIPE	SWP
GLASSHOUSE		SURFACE WATER	SW
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BORE HOLE	BH	TRAFFIC LIGHT COVER	TLC
		THRESHOLD LEVEL	THL
TRIAL HOLE	TH	UNABLE TO LOCATE	UTL
		UNABLE TO RAISE	UTR
		UNABLE TO SURVEY	UTS
		VENT PIPE	VP
		WATER LEVEL	WL
		WATER METER	WM
		WASH OUT	WO
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CHESTNUT PALING	CMP		

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34231	1	JL	AG	NS

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Notes:

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2. SURVEY LIMITED TO POND / SWALES.
3. BACKGROUND INFORMATION TAKEN FROM ORDNANCE SURVEY DIGITAL DATA.

CROWN COPYRIGHT. ALL RIGHTS RESERVED. LICENCE No. 100022432).

TOPOGRAPHICAL KEY

GENERAL ABBREVIATIONS

SURVEY STATION	5	AIR CONDITIONING UNIT	ACU
		AIR VALVE	AV
	TOP	AVERAGE	AV.
BANKING	3631/104	BACK OF KERB	BK
		BASE LEVEL	BL
		BELISHA BEACON	BB
HEDGE SPREADS		BOLLARD	BO
	BUS STOP	BOLLARD LIGHT	BOL
		BRICK	BR
WOODLAND CANOPY		CABLE RISER	BS
		CABLE TV COVER	CAT\
ARROW ON STEPS / RAMPS INDICATES DIRECTION UPWARDS		CABLES TO GROUND	CTG
		CATCH PIT	CP
		CONTROL BOX	CB
TREES	SPREAD & GIRTH SHOWN TO SCALE	COVER	C
		CROSSING CONTROL BUTTON	CCB
		DAMP PROOF COURSE	DPC
		DRAINAGE CHANNEL	DCH
		DROP KERB	DK
		ELECTRICITY POLE	EP
GATE		FIRE HYDRANT	FH
		FLOOR LEVEL	FL
KERB CHANNEL		FOOTPATH	FP
		FOUL WATER	FW
ROAD UNKERBED		GAS RISER	GR
		GULLY GRATE	GV
FOOTPATH		GULLY	GY
		HARD BED	HB
CHANGE IN SURFACE		INSPECTION COVER	IC
		INVERT LEVEL	IL
FENCE		KERB OUTLET	KO
		LAMP POST	LP
WALL		MANHOLE	MH
		MARKER POST	MK
OVERHEAD ELECTRIC		METER	MT
		NO PIPES VISIBLE	NPV
OVERHEAD TELECOM		ORDNANCE SURVEY BENCH MARK	OSB
		PICKUP	PU
FOUL SEWER		POST	PO
		POST BOX	P.BC
SURFACE SEWER		RODDING EYE	RE
		ROAD SIGN	RS
P-TRAP		RAIN WATER PIPE	RWP
BACK DROP (EXTERNAL)		RETAINING WALL	RW
		SOIL VENT	SV
BACK DROP (INTERNAL)		STOP COCK	SC
		STREET NAME PLATE	SNP
BUILDING		STOP VALVE	SV
		SOIL PIPE	SP
OPEN SIDED BUILDING		SURFACE WATER PIPE	SWP
		SUB-SOIL WATER	SW
OVERHANG / CANOPY		TACTILE PAVING	TAC
		TELECOM POLE	TP
GLASSHOUSE		TELECOM INSPECTION COVER	TEL
		TELEPHONE CALL BOX	TCB
		TICKET MACHINE	TM
CONTOUR	25.00	TOP OF WALL	TOW
		TRAFFIC LIGHT	TL
SPOT LEVEL	+ 127.13	TRAFFIC LIGHT COVER	TLC
SIGNAL LEVEL	O 127.13	THRESHOLD LEVEL	THL
BORE HOLE	BH	UNABLE TO LOCATE	UTL
		UNABLE TO RAISE	UTR
TRIAL HOLE	TH	UNABLE TO SURVEY	UTS
		VENT PIPE	VP
		WATER LEVEL	WL
		WATER METER	WM
		WASH OUT	WO
		WATER RISER	WR
		WATER TAP	WT

FENCE ABBREVIATIONS

BARBED WIRE FENCE	BW	IRON RAILINGS	IR
CLOSE BOARDED FENCE	CB	LARCH LAP FENCE	LL
CONCRETE PANEL FENCE	CPL	POST AND RAIL FENCE	PAR
CORRUGATED IRON FENCE	CI	POST AND WIRE FENCE	PW
CHAIN LINK FENCE	CL	WIRE MESH FENCE	WM
CHESTNUT PALING	CNP		

Sheet Layout: (Not to Scale)



Revision	Description	Drwn. by	Check. by	Appr. by	Date
1	Added ditches and a balancing pond to west of site	TH	AG	NS	November 2(

0m 2 4 6 8 10 12 14 16 18 20 22

Topographical Survey

Client:

Vistry Group

Land East of Tye Lane
Walburton
Arundel
BN18 0AW

Scale:	Sheet Size:	Sheet Number:	Date:
1:200	A0	4	June 202
Project Number:	**Rev:**	**Surveyed by:**	**Checked by:**	**Approve**
34231	1	JL	AG	NS

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497050 E
497100 E
497150 E
497200 E
106350 N
106300 N
106250 N

58 60 56 62 64 66 68 70 72 76 2 54 52 50 48 46 55 53 44 57 17 51 15 59 49 1 47 2

P/R FENCE HT 1.2m
TOP OF WALL 14.89
IL 14.27 150ø
IC CONCRETE HEADWALL
CONCRETE HEADWALLS
IL 16.20 225ø
IL 16.09 225ø
IL 16.44 100ø
IL 16.21 150ø
IL 16.34 150ø
IL 16.40 150ø
TOP OF WALL 16.79
TOP OF WALL 16.69
TOP OF WALL 16.83
TOP OF WALL 16.78
TOP OF WALL 17.01
TOP OF WALL 16.92

Notes:

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TOPOGRAPHICAL KEY

SURVEY STATION 5
BANKING TOP 307.00 BOT 304.00
HEDGE SPREADS
WOODLAND CANOPY
ARROW ON STEPS / RAMPS INDICATES DIRECTION UP/KNRDS
TREES SPREAD & HEIGHT SHOWN TO SCALE
GATE
KERB CHANNEL
ROAD UNKERBED
FOOTPATH
CHANGE IN SURFACE
FENCE
WALL
OVERHEAD ELECTRIC
OVERHEAD TELECOM
FOUL SEWER
SURFACE SEWER
P-TRAP
BACK DROP (EXTERNAL)
BACK DROP (INTERNAL)
BUILDING
OPEN SIDED BUILDING
OVERHANG / CANOPY
GLASSHOUSE
CONTOUR 25.00
SPOT LEVEL + 127.13
SONAR LEVEL ○ 127.13
BORE HOLE BH
TRIAL HOLE TH

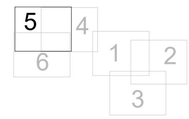
GENERAL ABBREVIATIONS

AIR CONDITIONING UNIT	ACU
AIR VALVE	AV
AVERAGE	Av.
BACK OF KERB	BK
BASE LEVEL	BL
BELISHA BEACON	BB
BOLLARD	BO
BOLLARD LIGHT	BOL
BUSH	BS
BUS STOP	BS
CABLE RISER	CR
CABLE TV COVER	CATV
CABLES TO GROUND	CTG
CATCH PIT	CP
CONTROL BOX	CB
CONTROL UNIT	CU
CROSSING CONTROL BUTTON	CCB
DAMP PROOF COURSE	DPC
DRAINAGE CHANNEL	DCH
DROP KERB	DK
ELECTRICITY POLE	EP
EARTH ROD	ER
FIRE HYDRANT	FH
FLOOR LEVEL	FL
FOOTPATH	FP
FOUL WATER	FW
GAS RISER	GR
GAS VALVE	GV
GULLY	GY
HARD BED	HB
INSPECTION COVER	IC
INVERT LEVEL	IL
KERB OUTLET	KO
LAMP POST	LP
MANHOLE	MH
MARKER POST	MK
METER	MT
NO PIPES VISIBLE	NPV
ORDNANCE SURVEY BENCH MARK	OSBM
PUMP	PU
POST	PO
POST BOX	P.BOX
RODDING EYE	RE
ROAD SIGN	RS
RAIN WATER PIPE	RWP
RETAINING WALL	RW
SOIL VENT	SV
STOP COCK	SC
STREET NAME PLATE	SNP
STOP VALVE	SV
SOIL PIPE	SP
SURFACE PIPE	SWP
SURFACE WATER	SW
TACTILE PAVING	TAC
TELECOM POLE	TP
TELECOM INSPECTION COVER	TEL
TELEPHONE CALL BOX	TCB
TICKET MACHINE	TM
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TRAFFIC LIGHT COVER	TLC
THRESHOLD LEVEL	THL
UNABLE TO LOCATE	UTL
UNABLE TO RAISE	UTR
UNABLE TO SURVEY	UTS
VENT PIPE	VP
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WATER METER	WM
WASH OUT	WO
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CHAIN LINK FENCE	CL	WIRE MESH FENCE	WM
CHESTNUT PALING	CMP		

Sheet Layout: (Not to Scale)



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0m 2 4 6 8 10 12 14 16 18 20 22

Topographical Survey

Client:

Vistry Group

Land East of Tye Lane
Walburton
Arundel
BN18 0AW

Scale:	Sheet Size:	Sheet Number:	Date:
1:200	A0	5	June 2024

Project Number:	Rev:	Surveyed by:	Checked by:	Approved by:
34231	1	JL	AG	NS

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ROAD U/KERBED
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CHANGE IN SURFACE
FENCE
WALL
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OVERHEAD TELECOM
FOUL SEWER
SURFACE SEWER
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BACK DROP (EXTERNAL)
BACK DROP (INTERNAL)
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OPEN SIDED BUILDING
OVERHANG / CANOPY
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CONTOUR 25.00
SPOT LEVEL + 127.13
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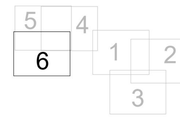
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HARD BED	HB
INSPECTION COVER	IC
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MARKER POST	MK
METER	MT
NO PIPES VISIBLE	NPV
ORDNANCE SURVEY BENCH MARK	OSBM
PUMP	PU
POST	PO
POST BOX	P.BOX
RODDING EYE	RE
ROAD SIGN	RS
RAIN WATER PIPE	RWP
RETAINING WALL	RW
SOIL PIPE	SP
STOP COCK	SC
STREET NAME PLATE	SNP
STOP VALVE	SV
SOIL PIPE	SP
STORM WATER PIPE	SWP
SURFACE WATER	SW
TACTILE PAVING	TAC
TELECOM POLE	TP
TELECOM INSPECTION COVER	TEL
TELEPHONE CALL BOX	TCB
TICKET MACHINE	TM
TRAFFIC SIGN	TSN
TRAFFIC LIGHT	TL
TRAFFIC LIGHT COVER	TLC
THRESHOLD LEVEL	THL
UNABLE TO LOCATE	UTL
UNABLE TO RAISE	UTR
UNABLE TO SURVEY	UTS
VENT	V
WATER LEVEL	WL
WATER METER	WM
WASH OUT	WO
WATER RISER	WR
WATER TAP	WT

FENCE ABBREVIATIONS

BARBED WIRE FENCE	B/W	IRON RAILINGS	I/R
CLOSE BOARDED FENCE	C/B	LARCH LAP FENCE	L/L
CORRUGATED IRON FENCE	C/I	POST AND RAIL FENCE	P/R
CORRUGATED IRON FENCE	C/I	POST AND WIRE FENCE	P/W
CHAIN LINK FENCE	C/L	WIRE MESH FENCE	W/M
CHESTNUT PALING	CMP		

Sheet Layout: (Not to Scale)



497050 E
497100 E
497150 E
497200 E
106250 N
106200 N
106150 N
72
55
57
59
61
63
53
17
15
11
51
50
48
46
44
49
1
47
2
4
3
5
16
14
12
10
8
6
7
9
AYLING CRESCENT
Pinlon
Cranlea
P/R FENCE HT 1.2m
TOP OF WALL 14.89
IL 14.27 150ø
CONCRETE HEADWALL
IL 14.58 100ø
BALANCING POND
TOP OF WALL 11.77
GABION WALL
MUD
GRASS
UNABLE TO OBTAIN BED LEVELS IN POND DUE TO HIGH WATER LEVEL. Av. WATER LEVEL 11.45
CONCRETE HEADWALL
IL 12.29 525ø
TOP OF WALL 13.08
TOP OF WALL 12.07
TOP OF WALL 15.20
IL 14.59 300ø
IL 14.90 300ø
TOP OF WALL 15.44
IL 15.42 300ø
TOP OF WALL 15.90
IL 15.35 300ø
TOP OF WALL 16.00
IL 15.43 300ø
TOP OF WALL 15.98
IL 15.57 300ø
TOP OF WALL 16.16
CONCRETE HEADWALLS
IL 16.20 225ø
TOP OF WALL 16.79
IL 16.09 225ø
TOP OF WALL 16.69
IL 16.44 100ø
TOP OF WALL 16.83
IL 16.21 150ø
TOP OF WALL 16.78
IL 16.34 150ø
IL 16.40 150ø
TOP OF WALL 16.92
TOP OF WALL 17.01
TOP OF WALL 17.19

Revision	Description	Surv. by	Check. by	Appr. by	Date
1	Added ditches and a balancing pond to west of site	TH	AG	NS	November 2024

0m 2 4 6 8 10 12 14 16 18 20 22

Topographical Survey

Client:

Vistry Group

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BN18 0AW

Scale:	Sheet Size:	Sheet Number:	Date:
1:200	A0	6	June 2024

Project Number:	Rev:	Surveyed by:	Checked by:	Approved by:
34231	1	JL	AG	NS

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Head Office: Milton Keynes t: 01908 565561 e: mail@mksurveys.co.uk

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023

Appendix E

Professional Indemnity Insurance

PROFESSIONAL INDEMNITY INSURANCE

We confirm the following details relating to our client's Professional Indemnity Insurance:

Insured:	**Barter Hill Partnership Ltd**
Address:	**Unit 40 Stansted Business Hub** **Parsonage Road** **Takeley** **Essex** **CM22 6PU**
Lead Insurer(s):	**Axis Specialty Europe SE and a panel of co-insurers**
Period of Insurance:	**31 January 2025 to 30 January 2026**
Policy Number:	**24/1/01643**
Limit of Indemnity:	**A sum not less than £5,000,000 any one claim and unlimited in the period of insurance**

Signed: .....[redacted].....

Carl Evans
Partner
Group Chief Executive - Professional Risks

Date: **15 January 2025**

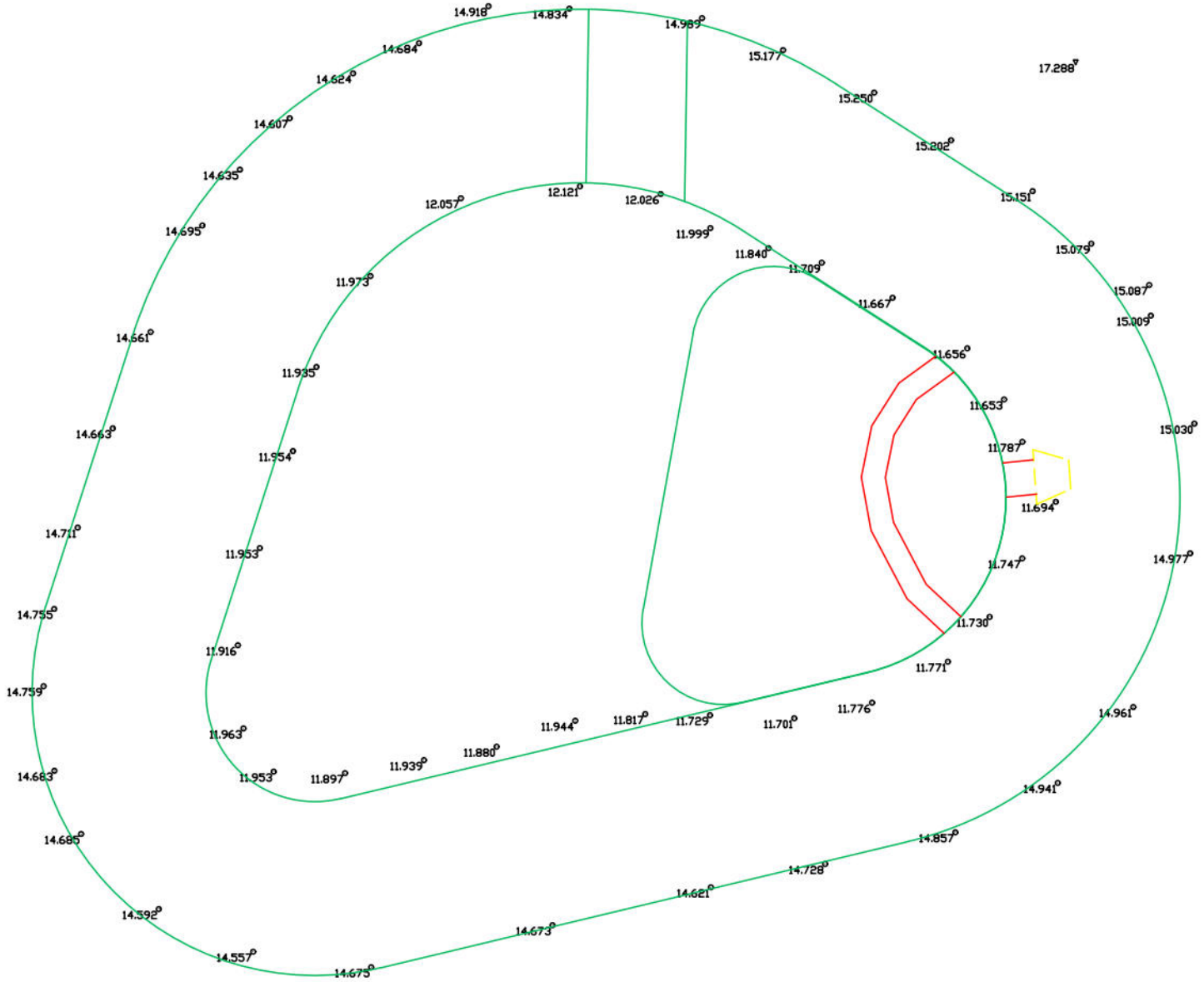
The policy is subject to the insuring agreements, exceptions, exclusions, limitations, conditions and declarations contained therein. The above is accurate at the date of signature. No obligation is imposed herein on the signatory to advise of any alteration.

Professional Risks is a division of Griffiths & Armour, a partnership which is authorised and regulated by the Financial Conduct Authority

Vistry South East Ltd
Avisford Grange, Walberton, West Sussex
March 2023

Appendix F

FFL Survey & Supplier Material Details


14.918
14.834
14.989
15.177
17.288
15.250
15.202
15.151
15.079
15.087
15.009
15.030
14.977
14.961
14.941
14.857
14.728
14.621
14.673
14.675
14.557
14.592
14.685
14.683
14.759
14.755
14.711
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14.661
14.695
14.635
14.607
14.624
14.684
12.057
12.121
12.026
11.999
11.840
11.709
11.667
11.656
11.653
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11.694
11.747
11.730
11.771
11.776
11.701
11.729
11.817
11.944
11.880
11.939
11.897
11.953
11.963
11.916
11.953
11.954
11.935
11.973



Notes :

1. As-built survey carried out using national ordance datum
2. survey infomation has been carried out without entering manholes.
   Although every effort has been made to accurately survey
   To correctly identify this infomation, it should always
   checked in areas thst are critical to the future proposal
3. Road levels recoreded using GPS

KEY

15.79 SURVEYED ROAD LEVELS
15.79 SURVEYED FINISHED FLOOR LEVELS

BARAM
YELFS YARD, BOTLEY ROAD
SOUTHAMPTON
SO32 1DR
:

LINDEN HOMES
AVISFORD GRANGE
WALBERTON

Road and Plots As-Built Survey

Scale	Sheet Size:	Sheet Number:	Date:
1:1000	A1	2	Dec 2024
Drawing number: 051224-2	Rev: -	Surveyed By: ET	Approved By: BS

Aggregate Industries Technical Department
Aggregate Specification Datasheet

Material:	2/6 Conc. SS Limestone
Product Code:	EN4233702
Aggregate Petrographic Group:	Limestone
Supply Plant:	Torr

GRADING AND SPECIFICATION

SIEVE SIZE	TYPICAL GRADING	SPECIFICATION LIMITS
14mm	100	100 – 100
10mm	100	98 – 100
8mm	100	-
6,3mm	93	80 – 100
4mm	31	-
2,8mm	11	-
2mm	9	0 – 20
1mm	4	0 – 5
63µm	2.9	0.0 – 4.0

MATERIAL PROPERTIES

Aggregate	Carboniferous Limestone
Water Absorption	1.0%
Oven Dried Relative Density	2.64 Mg/m^3
Saturated Surface Dried Relative Density	2.67 Mg/m^3
Apparent Relative Density	2.71 Mg/m^3
Polished Stone Value	41
Aggregate Abrasion Value	6.2
Los Angeles	21
Micro Deval	17
Magnesium Sulfate Soundness Value	5
pH Value	8.5
Total Sulphur Content	0.10%

Issued by: Chloe Gullock
Technical Sales Support Manager

Date: 19th June 2024

It is the sole responsibility of the certificate holder to ensure the validity and current status of all information herein

Aggregate Industries Technical Department
Aggregate Specification Datasheet

Material:	4/20 Conc. Graded Limestone
Product Code:	EN4173102
Specification:	BS EN 12620:2002+A1 / PD6682-1:2009+A1:2013
Grading Category:	Gc90/15
Grading Tolerance:	$G_T17.5$
Supply Plant:	Torr Quarry
Customer:	Not specified
Site:	Not specified

GRADING AND SPECIFICATION

SIEVE SIZE	TYPICAL GRADING	SPECIFICATION LIMITS
40mm	100	100
31,5mm	100	98 - 100
20mm	97	90 - 100
16mm	84	
14mm	74	
10mm	44	25 - 60
6,3mm	12	
4mm	3	0 - 15
2mm	2	0 - 5
1mm	1	
63µm	1.1	0,0 - 4,0

MATERIAL PROPERTIES

Aggregate	Carboniferous Limestone
Flakiness Index	11
Oven Dried Relative Density	2.63 Mg/m³
Saturated Surface Dried Relative Density	2.67 Mg/m³
Apparent Relative Density	2.73 Mg/m³
Water Absorption	1.3%
Polished Stone Value	43
Aggregate Abrasion Value	6.2
Los Angeles	21
Micro Deval	17
Magnesium Sulfate Soundness Value	5
pH Value	8.8

Issued by: Tim Cooke
Area Technical Manager

Issue Date: 8th August 2024

It is the sole responsibility of the certificate holder to ensure the validity and current status of all information herein

Permavoid Modular Cell 85

Data Sheet

PRODUCT INFORMATION

ISSUE 7 - November 2023

Product code: PVPP85

Permavoid is a geocellular interlocking system designed for shallow ground water storage or infiltration, to be used in place of traditional aggregate sub-base or can provide source control at both roof and podium level, removing the need for heavier and less efficient systems. The system has an exceptionally high compressive and tensile strength and bending resistance with a proprietary jointing mechanism to create a horizontal structural 'raft' within the pavement that is ideal for the shallow attenuation of surface water. The system can also be combined in layers using interlocking shear connectors to increase depth in 85mm and 150mm increments. This is particularly useful in designing infiltration systems, allowing flexibility in balancing the soil permeability/infiltration area of the Permavoid storage units and residual temporary attenuation.

Key Benefits

High strength, high capacity, shallow, sub-base replacement system

- Stormwater attenuation and/or infiltration system
- Used as part of a sustainable drainage system (SuDS) scheme

to offer stormwater storage at shallow construction depths

- 100% recyclable
- Units are manufactured from 100% recycled polypropylene (PP)

Applications

The Permavoid units are suitable for use as a stormwater attenuation and/or infiltration system. The system comprises of single, interconnected cells which can be installed in the ground as part of sub-base formation, or above ground as part of roof or podium attenuation systems for source control. Permavoid is suitable for use in a range of applications including, sports pitches, roofs, basements, pedestrian areas and rainwater harvesting.

Performance

The structural load bearing capacity of the Permavoid units have been tested in accordance with the following European Standard: BS 7533-13:2009. The system's structural design life expectancy, based upon creep test data (tested in accordance with CIRIA guidelines) is as follows; for lightly loaded areas such as car parks a design life of 50 years is achievable. For areas with prolonged HGV loading a typical design life may only be 25 years, depending on the design of the pavement surfacing and structural layers over the tank.

Installation

All calculations for Permavoid units are based upon site-specific load cases, pavement construction types and thicknesses, soil cover and ground conditions and the suitability must therefore be approved for each project.



Element	Value
PHYSICAL PROPERTIES	
Weight Per Unit	2.25KG
Weight Per Sqaure Metre	9KG
Length	708mm
Width	354mm
Depth	85mm
SHORT TERM COMPRESSIVE STRENGTH	
Vertical	715KN/m²
Lateral	156KN/m²
SHORT TERM DEFLECTION	
Vertical	1mm Per 126KN/m²
Lateral	1mm Per 15KN/m²
TENSILE STRENGTH	
Of a Single Joint	42.4KN/m²
Of a Single Joint at (1% Secant Modulus)	18.8KN/m²
Bending Resistance Of Unit	0.71KN/m²
Bending Resistance of Single Joint	0.16KN/m²
OTHER PROPERTIES	
Volumetric Void Ratio	92%
Average Effective Perforated Suraface Area	52%
Intrinsic Permeability	Minimum 1.0 x10⁵
Ancillary	Permavoid Permatie Permavoid Shear Connector
Material	Polypropylene

Permavoid Modular Cell 85

PRODUCT INFORMATION | ISSUE 7 - November 2023

Hydrualic Performance

3 units wide, 1 unit deep (1.06m x 0.15m)

FREE DISCHARGE

Gradient (%)	0	1	2
Flow Rate (l/m/s)	4	6	7

Permavoid Modular Cell 85 can be utilised in these SuDS techniques

Techniques												
Blue-Green Roofs	Podium Decks	Trees	Sports Pitches	Cycle Paths	Permeable Paving	Bioretention & Rain Gardens	Attenuation Storage Tanks	In filtration	Filter Drains	Detention Basins	Ponds & Wet-lands	Filter Strips
✓	✓	✓	✓			✓	✓	✓	✓			

Visit www.polypipe.com/greeninfrastructure

Technical Support

For further information, please contact our Technical Team on [redacted]

or email: [redacted]

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Ridgidrain

Data Sheet

PRODUCT INFORMATION **P1** **ISSUE 6 - OCT 2018**

The very first twinwall surface drainage system in the UK with Highways Authority Product Approval Scheme (HAPAS) status, Ridgidrain has a high strength to weight ratio and flexibility to resist high traffic loads. Available in sizes 100-900mm it has a low friction inner wall for improved hydraulics and comes in 6m lengths (3m lengths as standard for 750-900mm) to significantly reduce the number of joints and risk of leakage. Made from 100% recycled, high strength HDPE using a structured wall design to produce a robust, yet flexible pipe, Ridgidrain has a high resistance to the most common chemicals. It offers excellent performance, meaning you get all the benefits of sustainability, strength and lower weight without compromising on long term effectiveness.



Applications

Ridgidrain is a versatile non-pressure surface water and subsurface water drainage system that can be used as a carrier drain or used for attenuation or infiltration. Ridgidrain is used in many applications including:

- Residential
- Commercial
- Highways
- Rail
- Retail
- Leisure
- Education
- Airports
- Industrial
- Agricultural

Performance

Ridgidrain is manufactured to SN6 with a predicted design life in excess of 50 years. The system is resistant to most common chemicals and is ideal for stormwater applications. Where applications permit for the use of lower stiffness classes, Ridgidrain in sizes 750mm and 900mm can be manufactured to SN4.

Technical Support

Detailed guidance and assistance is available.
For further information, please contact our Technical Team on **+44 (0) 1509 615 100** or email **civils@polypipe.com** or visit **www.polypipe.com/civils-technical-hub**

Key benefits

- Full range of SN6 pipes and fittings from 100mm to 900mm
- BBA and BBA HAPAS approved
- Network Rail Parts and Drawing Systems (PADS) approved*
- Structured wall design for high ring stiffness and strength
- Smooth bore giving excellent hydraulic properties
- Longer lengths so fewer joints for improved resilience to leakage
- 100-600mm Ridgidrain comes in 6m lengths as standard, sizes 750-900mm comes in 3m lengths as standard
- Light in weight for reduced transport /installation costs and improved Health & Safety benefits
- Unperforated, half perforated and full perforated options available
- Ridgitrack is available for higher loading applications
- Up to 94% lighter than concrete means fewer deliveries to site
- Reduces CO_2 consumed in production, transportation and on-site handling
- Incorporates recycled plastic, manufactured from 100% recycled material
- Resistant to ground movement and differential settlement
- Integrally socketed in diameters 400mm to 600mm for ease of installation

(Network Rail Parts and Drawing Systems (PADS) Approved)
Certificate Number: PA05/05460

* For sizes 100-600mm.
Pending for sizes 750-900mm.

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Ridgidrain

Data Sheet

PRODUCT INFORMATION **P2** **ISSUE 6 - OCT 2018**

RIDGIDRAIN PLAIN ENDED PIPES

NOMINAL SIZE MM	CODE	ID MM	OD MM	LENGTH M	OPTION	WEIGHT KGM^{-1}	PACK QTY
100	RD100X6PE *	100	118	6	U	0.75	85
100	RD100X6PEHP *	100	118	6	HP	0.75	85
100	RD100X6PEP *	100	118	6	P	0.75	85
150	RD150X6PE/1	150	178	6	U	1.2	36
150	RD150X6PEHP/1	150	178	6	HP	1.2	36
150	RD150X6PEP/1	150	178	6	P	1.2	36
225	RD225X6PE/1	225	267	6	U	2.45	14
225	RD225X6PEHP/1	225	267	6	HP	2.45	14
225	RD225X6PEP/1	225	267	6	P	2.45	14
300	RD300X6PE/1	300	355	6	U	4.18	9
300	RD300X6PEHP/1	300	355	6	HP	4.18	9
300	RD300X6PEP/1	300	355	6	P	4.18	9
375	RD375X6PE/1	375	435	6	U	7.5	5
375	RD375X6PEHP/1	375	435	6	HP	7.5	5
375	RD375X6PEP/1	375	435	6	P	7.5	5
400	RD400X6PE/1▲	400	458	6	U	8.13	5
400	RD400X6PEHP/1▲	400	458	6	HP	8.13	5
400	RD400X6PEP/1▲	400	458	6	P	8.13	5
450	RD450X6PE/1▲	450	523	6	U	9.3	1
450	RD450X6PEHP/1▲	450	523	6	HP	9.3	1
450	RD450X6PEP/1▲	450	523	6	P	9.3	1
500	RD500X6PE/1▲	500	576	6	U	12.25	1
500	RD500X6PEHP/1▲	500	576	6	HP	12.25	1
500	RD500X6PEP/1▲	500	576	6	P	12.25	1
600	RD600X6PE/1▲	600	700	6	U	17.5	1
600	RD600X6PEHP/1▲	600	700	6	HP	17.5	1
600	RD600X6PEP/1▲	600	700	6	P	17.5	1

RIDGIDRAIN INTEGRALLY SOCKETED PIPES

NOMINAL SIZE MM	CODE	ID MM	OD MM	LENGTH M	OPTION	WEIGHT KGM^{-1}	PACK QTY
400	RD400X6/1**	400	458	6	U	8.0	5
400	RD400X6HP/1**	400	458	6	HP	8.0	5
400	RD400X6P/1**	400	458	6	P	8.0	5
450	RD450X6/1**	450	523	6	U	9.0	1
450	RD450X6HP/1**	450	523	6	HP	9.0	1
450	RD450X6P/1**	450	523	6	P	9.0	1
500	RD500X6/1**	500	576	6	U	12.0	1
500	RD500X6HP/1**	500	576	6	HP	12.0	1
500	RD500X6P/1**	500	576	6	P	12.0	1
600	RD600X6/1**	600	700	6	U	14.0	1
600	RD600X6HP/1**	600	700	6	HP	14.0	1
600	RD600X6P/1**	600	700	6	P	14.0	1
750	RD7506X3/1 **	750	852	3	U	30	2
750	RD7506X3HP/1▲**	750	852	3	HP	30	2
750	RD7506X3P/1▲**	750	852	3	P	30	2
900	RD9006X3/1**	900	1022	3	U	39	2
900	RD9006X3HP/1▲**	900	1022	3	HP	39	2
900	RD9006X3P/1▲**	900	1022	3	P	39	2

Sizes 1050 – 3000mm are available as Ridgistorm-XL. * Black inner wall. ▲ Made to order and subject to lead times. U = Unperforated, HP = Half perforated, P = Fully perforated Weights are nominal.

** Integral sockets are manufactured from non recycled material. Sizes 750 – 900mm are also available in SN4 and lengths of 1.5m and 6m.

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Polypipe

H3C Headwall Range

Up to 300mm Pipework
Approximate weight 530kg

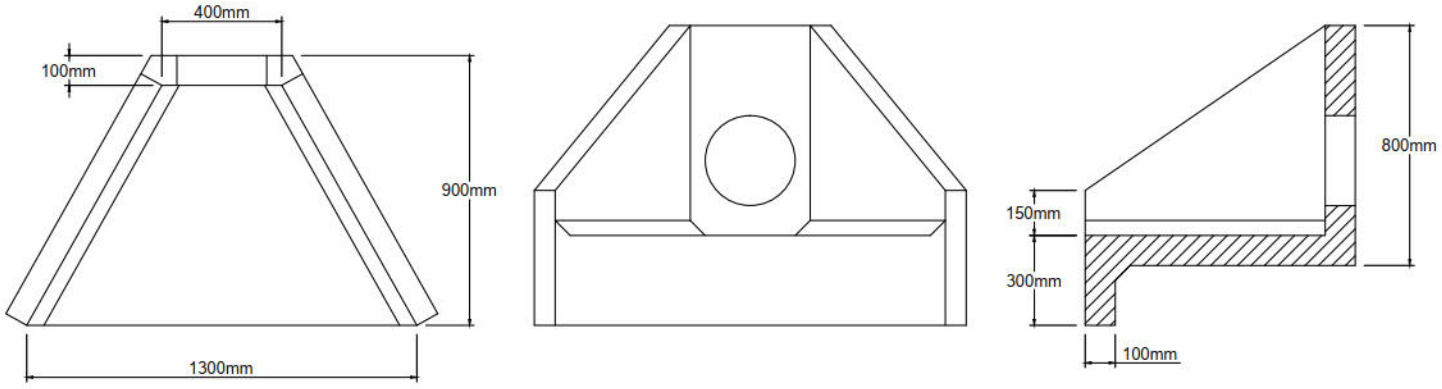


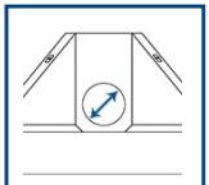
Optional Kee Klamp handrail

Our H3C Headwall is a precast concrete headwall to suit plastic or clay pipes up to 300mm and concrete pipes up to 225mm. Stainless steel sockets can be cast into the headwall for the attachment of gratings and other factory fitted accessories.

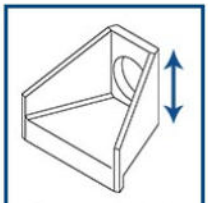
The H3C headwall weighs 530kg

We cast the opening in the back wall of our precast concrete headwalls to suit the pipe diameter and material of the pipe being used. We can cast multiple pipe openings, elliptical, square or rectangular culvert openings into any of our headwalls. We can also cast pipe openings into the wing walls of our headwalls

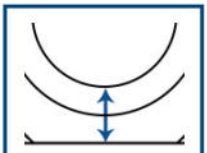




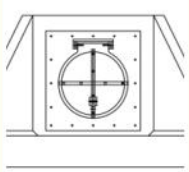
Maximum pipe size 300mm



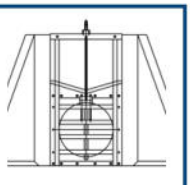
Backwall height 800mm



Specifiable pipe invert levels



Optional pre-fitted flap valve



Optional pre-fitted penstock



Optional pre-fitted Grating

January 2020

Installation Guide

Once installed correctly the ground pressure of a headwall is low (approximately 7kn/m2) Althon suggest a minimum sub base of 100mm dry mix concrete to give a foundation to sit the headwall onto

1. Ensure that the pipe is fully fitted leaving either the first (or last) section of pipe free from backfill in order to attach to the headwall

2. Dig out the bank of the watercourse to take the size of the headwall making sure that the headwall will not protrude into the path of the water flow

3. Dig out sufficient size trench to take the toe along the front of foundation allowing for sufficient room to manoeuvre the headwall over the end of the pipe

• If an extended toe is to be fitted then increase the depth of the excavation as required

• If very large pipes are being used, it is recommended that a 500mm wide x 500mm deep trench filled with mass concrete is constructed under the back edge of the headwall to cover the possibility of the heavy pipe resting upon the opening within the back wall of the headwall.

4. Lay a minimum (varies with ground conditions) of 100mm thick bed of dry mix concrete as a foundation to rest the headwall on. Althon recommend creating a slight fall of 1:50 from pipe to spill mouth

5. Prior to lifting and positioning the headwall all attachments such as gratings and water control gear should be removed

• If there is a bolt on extended toe fully thread the M16 stainless steel studding into the fixing sockets of the toe and lift this into position first. Once the headwall is installed on top of the toe use washers and nuts to fix the headwall and toe together. Once the nuts have been sufficiently tightened fill the holes with mortar

• Do not exceed a torque setting of 40Nmm² when tightening bolts.

6. Lift the headwall into position using 3no RD20 threaded lifting eyes, long adjustable chains and suitable machinery. Before carrying out the lifting operation all relevant personnel involved should read the installation and lifting guide in this document and a detailed lift plan and risk assessment should be completed by a competent person

• The 3no RD20 threaded lifting sockets are all located in the base of the headwall

• Placing a shim at the bottom of the pipe will assist with centring it in position

• If attachments such as water control gear or gratings are to be fitted to the headwall – the pipe must be fitted flush with the inside of the back wall

• If there are no attachments to be fitted Althon recommend fitting the headwall so that the pipe protrudes 50mm through the back wall

7. When satisfied with positioning backfill in front and under the headwall toe with mass concrete

8. Backfill around the pipe with either mass concrete or well-compacted impervious clay. If concrete has been used around the pipe then proceed with soil backfilling to the top level of the structure ensuring good compaction as you go

9. Depending on soil conditions and specific site requirements Althon recommend backfilling around wing walls with well compacted impervious clay

10. Using an appropriate mortar or resin fill in the gap between the pipe and headwall around the opening in the back wall of the headwall

11. For fitting gratings and other fabricated metal components

• Position the grating using appropriate lifting equipment

• Use the correct size and length of stainless steel bolts with washers to fix

• Gratings to the threaded fixing sockets cast into headwalls

• To prevent bolts binding in threaded fixing sockets copper slip must be applied to the thread of all bolts

• Do not exceed a torque setting of 40Nmm² when tightening bolts.

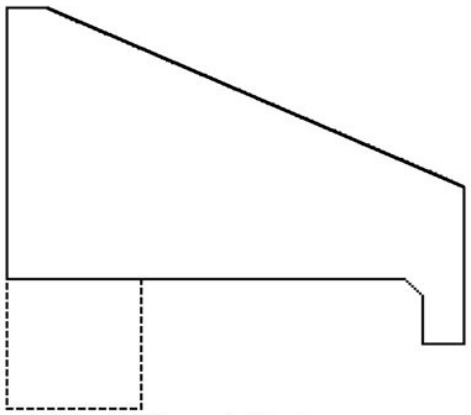
12. For fitting water control gear (i.e. Flap Vales & Penstocks)

• Apply foam seal or mastic sealant to the back plate of the water control gear to ensure a watertight seal between the headwall

• Position the water control gear using appropriate lifting equipment

• Use the correct size and length of stainless steel bolts with washers to fix control gear to the threaded fixing sockets cast into headwalls

• To prevent bolts binding in threaded fixing sockets copper slip must be applied to the thread of all bolts. Do not exceed a torque setting of 40Nmm² when tightening bolts. Overtightening bolts may distort the back-plate thus preventing the valve from sealing correctly



Due to the wide variety of site conditions this is only intended to be a guide, it is inappropriate to give specific information regarding details such as the depth of foundations to support the headwall or a detailed lift plan & risk assessment.

MULTITRACK 1000

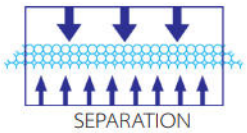
Thermally bonded non-woven geotextile

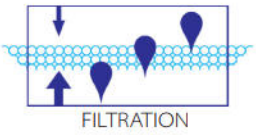
MULTITRACK 1000 is one of the most commonly specified general purpose nonwoven geotextiles and is our alternative to Terram® T1000 GT. MULTITRACK 1000 is one of the MULTITRACK thermally bonded nonwoven range of geotextiles, providing excellent separation & filtration properties, making them ideal for use in a variety of construction applications.

Applications for Multitrack 1000:

- Separating/Strengthening layer under access roads and areas of hard standing
- Filter surround for trench drains
- Separation to stop the intermixing of dissimilar soil layers
- Filtration - allowing the flow of water whilst preventing the passage of soil
- Horse arenas - separation of infill materials
- Filter surround for infiltration tanks

Mechanical properties	Test	Units	MULTITRACK 1000
Tensile strength - MD	EN ISO 10319	kN/m	8.5
Tensile strength - XD	EN ISO 10319	kN/m	8.5
Elongation at break - MD	EN ISO 10319	%	45
Elongation at break - XD	EN ISO 10319	%	55
CBR puncture resistance	EN ISO 12236	N	1500
Hydraulic properties			
Water flow normal to the plane	EN ISO 11058	$l/m^2/s$	110
Characteristic opening (pore) size	EN ISO 12956	µm	120
Physical properties			
Thickness under 2 kPa	EN ISO 9863-1	mm	1
Roll width		cm	450
Roll length		m	100





1. Wrekin Products Ltd reserves the right to alter product specifications without prior notice.
2. It is the responsibility of all users to satisfy themselves that the above data is current.
3. The above figures are average values obtained in testing to current EN geotextiles test standards. Although not guaranteed these results do, to the best of our knowledge, offer a true and accurate record of the product's performance.
4. Polypropylene is the constituent polymer used in the production of the Multitrack NW range.
5. Wrekin cannot be held responsible for the performance of these products as conditions of use are beyond our control.
6. Installation details are available on request.

Other grades of geotextiles within the Wrekin range include:
Standard Grade, High Flow and High Strength woven fabrics and Needle Punched non-wovens.

50-1312A

Technical Datasheet

Visqueen Urban Drainage Geomembrane

Features & benefits

- Used in stormwater attenuation systems and as an impermeable membrane in permeable paving systems
-
-

Product description

Visqueen Urban Drainage Geomembrane is a 100% recycled polyethylene geomembrane, black in colour, 0.5mm thick and supplied in multi folded rolls 4m x 12.5m.

Approvals and standards

- Suitable for use as an impermeable membrane in a permeable paving systems to BS 7533-13:2009 (System C - no infiltration)
- Visqueen certified with Quality Management System ISO 9001:2015
- Visqueen certified with Occupational Health and Safety System ISO 45001:2018
- Visqueen certified with Environmental Management System ISO 14001:2015

Usage

Visqueen Urban Drainage Geomembrane is a flexible membrane suitable for wrapping of underground stormwater attenuation crates in light duty situations (maximum 2 units deep), and as an impermeable membrane placed on top of the subgrade formation level and to the sides of the sub-base within a permeable paving system.

System components

- VisqueenPro Detailing Strip, 300mm x 10m, 500mm x 10m
- Visqueen Top Hat Units
- Visqueen TreadGUARD 300, 2m x 75m
- Visqueen Medium Duty Protection Board
- Visqueen GR Lap Tape, 150mm x 10m
- Visqueen 100mm Double Sided Butyl Tape, 100mm x 15m

Storage and handling

Visqueen Urban Drainage Geomembrane should be stored horizontally, under cover in its original packaging.

Care should be taken when handling the product in line with current manual handling regulations.

Preparation

Visqueen Urban Drainage Geomembrane can be cut with a sharp retractable safety knife or robust scissors.

For small scale works, Visqueen Medium Duty Protection Board is available as an alternative to Visqueen Treadguard 300 protection layer.

Installation

Visqueen Urban Drainage Geomembrane should be clean and dry at the time of jointing. It should be overlapped by at least 150mm and the lap bonded with Visqueen 100mm Double Sided Butyl Tape. In demanding site conditions also seal lap joints with Visqueen GR Lap Tape. All lap joints should be pressed and rollered to ensure a completely sealed joint is achieved.

Alternatively lap joints can be heat welded to achieve an effective seal. Welded lap joints can be less than 150mm provided the joint integrity is not compromised.

Visqueen Preformed Top Hat Units should be used for sealing pipe penetrations. The base of the top hat and the upstand should be bonded using Visqueen 100mm Double Sided Butyl Tape. The upstand should be secured with the supplied jubilee clip. Alternatively Visqueen Pro Detailing Strip can be used to seal pipe penetrations.

If the geomembrane is punctured or perforated a patch of the same material should be lapped at least 150mm beyond the limits of the puncture and bonded with Visqueen 100mm Double Sided Butyl Tape. Alternatively a patch can be formed using Visqueen Pro Detailing Strip and lapped at least 150mm beyond the extents of the puncture.

When used as a liner for stormwater attenuation crates, ensure that the base of the trench is level and free from voids or protrusions. Blind the substrate with minimum 100mm sand blinding, level and compact. When installing the geomembrane, it should be protected on both faces with Visqueen TreadGuard 300 protection layer. Visqueen UDG Corner Units (unit dimension 150mm x 150mm x 150mm) should be positioned at the external corners of the crate system.

When used in a System C permeable paving application, the geomembrane should be laid on a smooth continuous

Heanor Gate Road, Heanor, Derbyshire, DE75 7RG
[redacted] I www.visqueen.com

Visqueen Urban Drainage Geomembrane

blinded subgrade free from irregularities such as voids or protrusions, or alternatively the blinding can be replaced with a layer of Visqueen TreadGuard 300 protection. The upper face of the geomembrane should be protected with Visqueen TreadGuard 300 protection layer prior to laying the sub-base coarse graded aggregate.

Usable temperature range

It is recommended that Visqueen Urban Drainage Geomembrane and all associated system components should not be installed below 5°C.

Additional information

For additional detailing information, contact Visqueen Technical Services +44 (0) 333 202 6800.

The product is recyclable and categorised under LDPE recycling code 4.

Visqueen is part of Berry bpi, the largest European recycler of polyethylene. This product is recyclable and should be segregated on site in accordance with site management procedures for plastic waste. We have 4 recycling sites in the UK where the plastic waste could be recycled and converted back into a second life product. Please contact us to find out more.

The information in this datasheet was correct at the time of publication. It is the user's responsibility to obtain the latest version of the datasheet as it is updated on a regular basis. The information contained in the latest datasheet supersedes all previously published editions.

Property	Test method	Units	Compliance criteria	Result
Colour				Black
Length	BS EN 1848-2	m	-10/ 10%	12.5
Width	BS EN 1848-2	m	-2.5%/ 2.5%	4
Puncture	ASTM D4883	N	MDV	135
Impact resistance	BS EN 12691	mm	MLV	200
Jointed membrane watertightness to 60kPa for 24 hours	BS EN 1928	-	Pass/Fail	Pass
Jointed membrane watertightness to 250kPa	MOAT 27 5.1.4		Pass/Fail	Pass
Tensiles strength MD	BS EN 12311	N/mm2	MLV	15
Tensiles strength CD	BS EN 12311	N/mm2	MLV	15
Elongation @ break MD	BS EN 12311	%	MLV	400
Elongation @ break CD	BS EN 12311	%	MLV	400
Thickness	BS EN 1849-2	mm	/- 12%	0.5

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Technical support: [redacted]

Date Published: 20-May-2024

Visqueen Urban Drainage Geomembrane

Health and safety information

Refer to the Visqueen Urban Drainage Geomembrane safety datasheet (SDS).

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Visqueen Urban Drainage Geomembrane

About Visqueen

Visqueen is a leading provider of construction membrane technologies and design-based solutions for ground gas, structural waterproofing, damp proofing and fire protection.

We offer complete support at every stage of the specification, including the supply chain process. As the UK's principal technical authority, we are best placed to ensure that the principal designer and contractor specify the most technically suited, durable, and competitive solution to guarantee their project is protected for the lifetime of the building.

Visqueen is at the forefront of advanced membrane technology and innovation in the construction industry, earning the trust and loyalty of specifiers throughout the UK and Europe.

For more information, visit visqueen.com or contact our sales office at +44 (0) 333 202 6800 or enquiries@visqueen.com

Complete Range, Complete Solution



Passive Fire Protection | Gas Protection | Damp Proof Membrane | Air and Vapor Control | Stormwater | Damp Proof Course | Temporary Protection

Visqueen Technical Support

Visqueen offer a comprehensive full nationwide technical support. Our team of CSSW qualified technical support managers provide on site design-based solutions for specifiers, contractors and builders merchants, and will ensure that from design stage to installation the project is fully risk assessed and the specification is approved by all stakeholders.

Our Technical Office, can design, prepare and manage CAD detailing, together with assisting in quantity take offs, while offering advice on technical installations and product selection.

Competency & Design

Visqueen promotes competency in building design by ensuring that its technical team possesses the necessary skills, knowledge, experience, and ethical practices. The company adopts the "golden thread of information," ensuring all project data is digitally secure and accessible throughout a building's lifecycle. This approach aligns with the Building Safety Act and aims to foster accountability and compliance with evolving regulations, providing clients with confidence in the safety and reliability of their projects.

Visqueen CPD Seminars

Visqueen's CPD Seminars offer insights into Building Regulations, Standards, and industry guidance related to damp proofing, hazardous ground gas protection, and structural waterproofing. These one-hour seminars are tailored for construction design professionals and delivered by our Technical Support Managers. Visit our website to book a free CPD.

Visqueen Contract Design Services

Visqueen Contract Design Services offers a bespoke design service led by our team of Certified Surveyors in Structural Waterproofing (CSSW), providing experienced and specialised waterproofing design expertise for complex projects. We provide comprehensive support throughout the entire project, ensuring that all work meets the requirements of warranty providers and adheres to the highest standards of quality, reliability and current legislation.

Visqueen Training Academy

Based at our Derbyshire facility, the Visqueen Training Academy offers a variety of training programs across the UK. These include one-day product awareness sessions for distributors and builders' merchants, and intensive two-day courses for hands-on product installation training. Contact us for more information.

LM Geomembrane

Product Data Sheet

LLDPE Smooth Geomembrane

LLDPE Smooth Geomembrane is a black, high quality, linear density polyethylene (LLDPE) geomembrane produced from specially formulated polyethylene resin with outstanding flexibility. The polyethylene resin is designed specifically for flexible geomembrane applications. Its high uniaxial and multiaxial elongation characteristics make it very suitable for applications where differential or localised subgrade settlements are expected such as landfill closure cappings, leach pads, or any application where elongation or puncture resistance is critical. LLDPE contains approximately 97.5% polyethylene, 2.5% carbon black, trace amounts of antioxidants and heat stabilisers, and is suitable for exposed applications. These product specifications meet or exceed TRI-GM 17.

This product is double sided smooth.

Tested Property	Unit	Test Method	Values
Thickness Lowest individual reading	mm	ASTM D 5199	1 -10%
Density	g/cm³	ASTM D-792	≤ 0.939
Strength at Break (Both directions)	N/mm	ASTM D-638/6693 Type IV	27
Elongation at Break (Both directions)	%	50mm/min lo = 50mm For Break	800
Tear Resistance	N	ASTM D-1004	100
Puncture Resistance	N	ASTM D-4833	250
Carbon Black Content	%	ASTM D-1603	2 - 3
Carbon Black Dispersion (2)	Category	ASTM D-5596	Note 2
Oxidation Induction Time (OIT)	min.	ASTM D-3895	≥ 100
High Pressure Oxidative Induction Time (HPOIT)	min	ASTM D-5885	≥ 400
Oven Aging Standard OIT % retained after 90 days	%	ASTM D-5721/D3895 @ 85°C	≥ 35
UV Resistance HPOIT (3) % retained after 1,600 hours	%	ASTM D 7238 ASTM D 5885	≥ 35
Roll Width (approx.) (4)	m	----	2.9 - 5.8
Roll Length (approx.) (4)	m	----	100
Surface	----	----	Double Sided Smooth

NOTES:
(*) - All values unless stated otherwise are nominal values
(1) - Tolerance ±10% of the lowest individual reading
(2) - Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be category 1 or 2. No more than 1 view from category 3
(3) - Test conditions: 20 hours UV cycle at 75oC followed by 4 hours condensation at 60°C
(4) - Roll width and lengths have a tolerance of ±1%

This information corresponds to our current knowledge on the subject. It is offered solely to provide possible suggestions for your own experimentation. It is not intended, however, to substitute for any testing you may need to conduct to determine for yourself the suitability of our products for your particular purposes. This information may be subject to revision as new knowledge becomes available. Since we cannot anticipate all variations in actual end use conditions, Stormwater Management Limited makes no warranties and assumes no liabilities in connection with this information. Nothing in this publication is to be considered as a licence to operate under or a recommendation to infringe any patent right.

DR: 267/V1/06.11.2019

stormwater MANAGEMENT

Bentotex® 50

Product Data Sheet

Product Description

Bentotex is a high specification geosynthetic clay liner, comprising of high quality natural sodium bentonite encapsulated between two woven and non-woven needlepunched polypropylene geotextiles.

Bentotex adopts unique self-seeming overlaps technology which doesn't require any additional treatment of its longitudinal edges.

Material properties	Test method	Typical value
Physical properties		
Total mass per unit area[1]	EN 14196	5500 g/m^2
Bentonite mass per unit area[1]	EN 14196	5200 g/m^2
Bentonite mass per unit area[3]	EN 14196	4640 g/m^2
Thickness [6, 7]	EN 9863-1	7.5 mm
Hydraulic properties		
Flux index[2]	EN 16416	3*10^{-9} m^3/m^2/s
Permability[9]	DIN 18130 / ASTM 5887	1*10^{-11}
Water Absorption		600 %
Montmorillonite content[8]	XRD	80%
Mechanical properties		
Peel Strength	ASTM D6496	1000 N/m
Tensile strength[4]	EN ISO 10319	11 kN/m
Static puncture resistance (CBR)[5]	EN ISO 12236	2.0 kN
Textiles (PP)		
Non woven mass / unit area[8]	EN ISO 9864	200 g/m^2
Woven mass / unit area[8]	EN ISO 9864	100 g/m^2

1 - Average, at 12% moisture content, tolerance 4%
2 - Average, tolerance 0,5x10^{-9} m^3/m^2/s
3 - Average, at 0% moisture content, tolerance 4%
4 - Average, tolerance 2,0 kN
5 - Puncture resistance (CBR) with tolerance – 0.2 kN
6 - Material is fully saturated and it is this measured at 2kPa pressure
7 - Average, tolerance 10 %
8 - Certified by supplier
9 - Average tolerance 0,5*10^{-11} m/s

This information corresponds to our current knowledge on the subject. It is offered solely to provide possible suggestions for your own experimentation. It is not intended, however, to substitute for any testing you may need to conduct to determine for yourself the suitability of our products for your particular purposes. This information may be subject to revision as new knowledge becomes available. Since we cannot anticipate all variations in actual end use conditions, Stormwater Management Limited makes no warranties and assumes no liabilities in connection with this information. Nothing in this publication is to be considered as a licence to operate under or a recommendation to infringe any patent right.

212/V1/06.03.2018

stormwater MANAGEMENT

Bentotex® 50

Product Data Sheet

Application:

- Water reservoirs, dams and river embankments
- Liquid waste disposals sites, transfer stations, secondary containment
- Transport infrastructure
- Canals
- Solid waste storage and disposal sites

Advantages:

- Self-healing
- Robust construction
- Limited preparation work
- Easy and quick installation
- Long performance
- All weather installation, including wet and frozen subgrades

Installation:

- Unrolled on smooth and compacted subgrade
- Subsequent panels lapped 300mm at leading edges

Packaging:

Bentotex is produced in 5m wide x 40m long panels, rolled onto a 100mm internal diameter central core, and protected with a plastic sleeve. Other panel sizes are available on request.

Storage:

Provided the rolls are kept inside their protective plastic sleeves, further on-site protection is not required.

Safety Instruction

There are no special safety measures required for the handling and installation of Bentotex, other than those normally implemented on construction sites.

This information corresponds to our current knowledge on the subject. It is offered solely to provide possible suggestions for your own experimentation. It is not intended, however, to substitute for any testing you may need to conduct to determine for yourself the suitability of our products for your particular purposes. This information may be subject to revision as new knowledge becomes available. Since we cannot anticipate all variations in actual end use conditions, Stormwater Management Limited makes no warranties and assumes no liabilities in connection with this information. Nothing in this publication is to be considered as a licence to operate under or a recommendation to infringe any patent right.

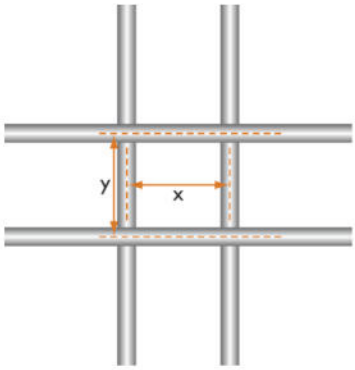
stormwater MANAGEMENT

ENVIROMESH®

Unit 4 Cartwright Industrial Estate • Spring Garden Road • Longton • Staffordshire ST3 2TE • United Kingdom

Gabion Design Specification : Bi-Axial Welded Mesh

GABION ENV-P27 (Polymer Powder Coated Grey)



SPECIFIED MESH BI-AXIAL WELDED

Nominal dimensions (x) and (y) : Gabions, 75mm Mattresses, 75mm

Gabions are to be manufactured and / or supplied by:

Enviromesh, Unit 4 Cartwright Industrial Estate, Spring Garden Road, Longton, Staffordshire, ST3 2TE.

Online: www.enviromeshgabions.co.uk

The certification, materials, manufacture, assembly and installation of the above-mentioned product shall comply with all of the following criteria:

Certification

1. All gabion materials and accessories must be certified in accordance with **British Board of Agrément (BBA)** certificate no. 05/4215. This is for current General Building Regulations.
2. All gabion products are manufactured in accordance with the requirements of BS EN 10223-8:2013 where the gabions are considered to have a life expectancy of **120 years.**
3. Evidence of current BBA certification and relevant certificates of conformity with respect to wire strength, weld strength and coating weights used in the manufacture of the mesh fabric and wire products are to be issued upon request.

Materials

The wire used in the manufacture of the gabions and installation accessories shall comply with the following:

Mesh Fabric

The mesh fabric shall be formed by electrically welding at each and every intersection, hard drawn steel line and cross wires into a dimensionally stable bi-axial square metric mesh of size **75mm x 75mm.**

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The weld strength shall be **75%** of the minimum ultimate tensile strength of the wire.

The nominal wire diameter for the mesh fabric shall be **2.70mm** for the base, front, rear, end, diaphragm panels and lid, all within the tolerances specified in BS EN 10218-2:2012 and shall have a tensile strength that falls within a range of **540-770 N/mm²**.

Lacing Wire

The lacing wire used for site assembly shall be of a nominal **2.2mm** wire diameter in accordance with BS EN 10218-2:2012 and shall have a tensile strength that falls within a range **of 350 to 550 N/mm².**

Corrosion Resistance

All wire used in the mesh fabric or accessories shall be Galfan coated (95% Zn/5% Al) in accordance with BS EN 10244-2:2009 (Class A). An additional nominal thickness is applied of **0.25mm** organic polymer powder coating (grey) for the mesh fabric and a nominal **0.5mm** organic polymer powder coating (grey) for the lacing wire. This coating being in accordance with BS EN 10245-1:2011 and BS EN 10245-2:2011

Manufacture

Unit Formation

The gabion is to be formed from mesh panels such that the front, rear, ends and diaphragm panels are connected to the base panel with **either Stainless Steel CL35 clips** or **Stainless Steel CL50 'C' rings** at a maximum spacing of 225mm for all joints. This process must be undertaken in a factory-controlled environment. The lid may be supplied loose or fixed in the same manner to the rear or face panel. Diaphragm (partitioning panels) spacings should not exceed 1.050m on units oriented as stretchers and 1.65m oriented as headers.

Should units be required to be prefilled and lifted as opposed to filling in situ, additional clips, rings and mesh panels may be required. In such circumstances the manufacturer must be consulted prior to supply to ensure product is suitable for application.

Gabion Sizes

It should be noted that it is industry standard for gabions to be quoted as overall nominal sizes. The actual gabion sizing is dependant upon the physical mesh configuration.

Clarification should always be sought from the manufacturer in relation to gabion sizing.

Designation of sizes **length x width x height**

Gabion standard unit lengths: 975mm or 2025mm
Gabion standard unit widths: 450mm, 675mm, 975mm, 1350mm, 1500mm or 1650mm
Gabion standard unit heights: 300mm, 450mm or 975mm
Non-standard sizes available in multiples of 75mm on request.

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Assembly and Installation

Note Please also refer to manufacturer's installation instructions, which are available upon request in either electronic or hard copy format.

Jointing

Gabions are supplied with lacing wire as standard for horizontal and vertical jointing of adjacent units whilst empty. Lacing is to be continuous along all joints using alternate single and double loops at a maximum spacing of 100mm ensuring that it forms a tight joint. Start or termination of lacing is formed by three turns ensuring the free end is turned into the unit.

If CL50 'C' rings are to be used for final jointing as an alternative to lacing then these must be installed at every other mesh opening to achieve the required joint strength.

Internal Bracing

Internal bracing is formed by creating a continuous windlass tie between the face and rear of the exposed cells within the structure.

For 1m high units, two internal windlass bracings are required at third widths and at each third height of the gabion.

In all cases the windlass tie is to span two or three mesh openings on the front and rear cells to spread the load. The exposed end gabions to the wall should also be braced in both directions to prevent end face deformation.

The same is required to the rear cell of each course (rear panel to side panels).

Geotextile Separators

Where a geotextile separator between the rear of the gabion and backfill is to be used, refer to the engineer's design proposal and specification.

Foundations

Reference to the engineer's design proposal must be made with respect to foundation requirement, wall inclination, face configuration (stepped, flush or combination thereof), drainage and backfilling requirements. Any soft areas in the sub grade should be excavated and replaced with a granular material to the engineer's requirements.

Filling

Units are to be filled with a hard, durable, non-frost susceptible rock, stone or clean crushed concrete as specified by design. The grading of the fill is to be 100 to 150mm or 100 to 200mm (6G). Where dual fills of the same grading are specified a separation panel is optional. Where the secondary fill grading is less than the mesh aperture size, it is necessary for the fills to be separated using pre-cut correx panels or geo-textile that is inserted into the gabion on site. If this is the case then this will require the fitting of an

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additional longitudinal diaphragm set back from the face. In such instances it is important to refer to the engineer's design proposal with respect to additional drainage that may be required. It is also important to note that cohesive fills are not to be used as a secondary fill within gabions.

The units shall be filled in layers not exceeding 340mm, if large voids are present then the stone must be re-orientated to minimise voids. Where specified the gabions are to have a hand placed front face.

The units shall be filled such that the mesh lid bears down onto the gabion filling material. It may be beneficial to blind the top of the filled unit with a 20 to 50mm aggregate.

Filling should be staged so that no adjacent cells have more than a half difference in the level of filling for units of greater height than 500mm.

To assist in maintaining face alignment and reduce deformation, the use of external formwork i.e. timber or scaffold tubes can be tied onto the external face of the structure at third heights and then removed upon completion.

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Marshalls
Creating Better Spaces

Landscape House, Premier Way,
Lowfields Business Park,
Elland HX5 9HT
[redacted]

[redacted]
W: www.marshalls.co.uk/commercial

Priora 200 x 100 x 80

Date Created: 03/08/22




Priora - Charcoal


Priora - Buff


Priora - Brindle


Priora - Burnt Ochre


Priora - Bracken


Priora - Natural


Priora - Colourtop Yellow


Priora - Colourtop White

Priora is Marshalls original Concrete Block Permeable Paving (CBPP) system, and the best-selling system of its type in the UK. Combining the ever-popular aesthetics of Keyblok block paving with a source-control SuDS solution, Priora paving not only looks great but also mitigates flood risk, removes surface water, and improves water quality without the need for additional linear drainage systems.

Manufactured in Mainland Britain, the Priora system from Marshalls has been proven for over 15 years of successfully installed projects. The innovative nib on the edge of the Priora blocks creates voids for the water to fall into a specially prepared sub-base. The block design also provides 40% more interlock than standard block paving, helping to enhance surface stability. A variety of laying patterns can be achieved using the 200x100 blocks, and as long as the sub-base is installed to Marshalls specification, Priora is suitable for all loading requirements.

There are different surface profiles available, each with their own properties to suit your requirements; these include Standard, Pencil Edge, and Colourtop. Standard Priora has chamfered edges to minimise spalling and create a classical aesthetic. Pencil Edge Priora minimises the chamfer to provide a smoother, flatter surface, which helps to minimise vibration and surface noise from the wheeled traffic that uses it, making

DESCRIPTION	
Appearance	Solid unit with integral spacers intended to create 6mm drainage apertures
Governing Manufacturing Standards	All data where relevant to be established in accordance with BS EN 1338 : 2003
Type	Solid permeable unit with integral spacers
UKCA Marking/DOP	https://www.marshalls.co.uk/declarations
NBS Specification	Q24 115

Marshalls
Creating Better Spaces

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Lowfields Business Park,
Elland HX5 9HT
[redacted]
[redacted]

Priora 200 x 100 x 80

Date Created: 03/08/22

it an ideal paving product for car parks and cycleways. Colourtop Priora is perfect for delineation between parking bays and road lanes, as well as for permanent floor signage.

- Manufactured in Mainland Britain.
- Part of UK's best-selling permeable block paving range.
- 40% more interlock than standard blocks.
- Also available in a non-permeable option.

PHYSICAL PROPERTIES	
Work Dimensions (mm)	199 x 99 x 80
Nominal Dimensions (mm)	200 x 100 x 80
Tolerances on Work Dimensions (mm)	Length ±2mm, width ±2mm, thickness ±3mm
Abrasion Resistance (mm)	≤ 23mm (Wide Wheel Abrasion Test)
Durability (Freeze-thaw)	≤ 1.0 kg/m² as a mean with no individual value > 1.5 kg/m²
Slip/Skid Resistance (polished)	PSRV > 45
Slip/Skid Resistance (unpolished)	USRV > 45.
Thermal Conductivity (K value)	Design data as defined to BS EN 13369
Tensile Splitting Strength	Characteristic tensile splitting strength not less than 3.6 MPa. None of the individual results shall be less than 2.9 MPa, nor have a failure load less than 250N/mm of splitting length

SPECIFICATION	
Approx unit weight (kg)	3.5
External Fire Performance	Deemed to satisfy when used for roofing
Reaction to fire	Class A1 when used for internal flooring

SUPPLY	
Pack size (m^2)	6.2
Av. pack weight (kg)	1040
Packaging	All packs are shrinkwrapped onto pallets for fork off-load or crane off-load if necessary

FURTHER INFORMATION	
Efflorescence	Any product containing cement during its early life may exhibit a temporary white discolouration known as efflorescence. This is not a product fault and will gradually disappear with exposure to natural weathering and trafficking
Contact Us	For technical information on the design, specification and construction when utilising the product, contact Group Technical Services on 0370 411 2233

Marshalls
Creating Better Spaces

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Lowfields Business Park,
Elland HX5 9HT
[redacted]
[redacted]

Priora 200 x 100 x 80

Date Created: 03/08/22

SUSTAINABILITY	
Breeam	These units can achieve an "A" rated system when used in conjunction with the correct sub-base components
Carbon Footprint	
Priora 200 x 100 x 80 Charcoal	20 kg CO2 m²
Priora 200 x 100 x 80 Buff	20 kg CO2 m²
Priora 200 x 100 x 80 Brindle	20 kg CO2 m²
Priora 200 x 100 x 80 Burnt Ochre	20 kg CO2 m²
Priora 200 x 100 x 80 Bracken	20 kg CO2 m²
Priora 200 x 100 x 80 Natural	kg CO2
Priora Colourtop 200 x 100 x 80 Yellow	24 kg CO2 m²
Priora Colourtop 200 x 100 x 80 White	24 kg CO2 m²

APPLICATION	
Loading Classification	Marshalls Priora Design Category 10: 1000 HGVs per week or 15 msa. This is subject to using the appropiate installation method, bond pattern and sub base design.


HY06 UUN








SARAM







16 SEP 2022

Invoice

Althon Limited
Vulcan Road South
Norwich
Norfolk
NR6 6AF

Telephone [redacted]
Fax
Email

Baram Ltd
Yelf's Yard
Botley Road
Bishop's Waltham, Southampton
Hampshire
SO32 1DR

Invoice Number	91199
Invoice Date	08/09/2022
Customer Account	3BAR004

Customer Order: LH286/1177

Quantity	Details	Unit Price	Disc Amount	Net Amount	VAT
1.00	Althon Headwall H6C A 1100mm back wall height opening for 450mm PCC Pipework, fitted with GMS Close Coupled Grating	[redacted]	[redacted]	[redacted]	[redacted]

Delivery Details
Baram C/O Linden Homes
Yapton Lane
Walberton
Arundle
BN18 0AW

Net Amount £	[redacted]
Carriage Net £	[redacted]
Total Net Amount £	[redacted]
Total VAT Amount £	[redacted]
Total Invoice Value £	[redacted]

TERMS: 30 DAYS FROM DATE OF INVOICE

Please note all values shown are in GBP (£) Sterling unless stated otherwise

Bank Details: National Westminster Bank Plc
69 Bridge Street, Worksop, Notts. S80 1DG UK
IBAN GB79NWBK60243081946856 **BIC:** NWBKGB2L

CPD

Delivery Note

Althon Limited
Vulcan Road South
Norwich
Norfolk
NR6 6AF

Telephone [redacted]
Fax
Email

Delivery Address
Baram C/O Linden Homes
Yapton Lane
Walberton
Arundle
BN18 0AW

Order Number 23551
Customer Order Number LH286/1177
Page 1

Qty Ordered	Unit	Product Code	Product Description
1.00	each	ALTHWH6CA	Althon Headwall H6C A 1100mm back wall height opening for 450mm PCC pipework
1.00	each	ALTHWH6CCCG	GMS Close Coupled Grating Bars 75mm crs to fit H6C HW

Notes:
Temporary site entrance is
Via Avisford Park Golf Course
Delivery w/c 5th sept

Goods received in good condition by:

Signature: _____

Print: _____

Date: _____

VAT Reg. Number: 525 3975 28

DELIVERY STATUS

ORDER NUMBER: 23551

SCHEDULED : 2022-09-08

SUPPLIER : Althon LTD

TELEPHONE : [redacted]

EMAIL : [redacted]

START DATE : 2022-09-08

ATTACHMENT : N/A

STATUS : DELIVERED

REASON : N/A

SERIAL NO. : 34111

DELIVER TO / COLLECT FROM : N/A

PO NUMBER : LH286/1177

DELIVER TO :

Baram C/O Linden Homes
Baram C/O Linden Homes
Yapton Lane
Walberton
Arundle
BN18 0AW

INSTRUCTIONS :

Temporary Site Entrance Is Via Avisford Park Golf Course

NO.	PRODUCT CODE	DESCRIPTION	QTY	REJECT	REASON
1	ALTHWH6CA	Althon Headwall H6C A 1100mm back wall height opening for	1	0	
2	ALTHWH6CCCG	GMS Close Coupled Grating Bars 75mm crs to fit H6C HW	1	0	

NOTE : N/A

REMARKS : N/A

PROOF OF DELIVERY

SUBMITTED AT : 2022-09-08 03:48 PM

RECEIVED BY : M Fall

GOODS/SERVICES RECEIVED IN GOOD ORDER

SIGNATURE/PHOTOS :

[redacted]

TERMS AND CONDITIONS

Please ensure you have checked your delivery for damage or missing items BEFORE signing for delivery. Any damage / missing items must be noted on the delivery drivers' paperwork. Concealed damage and missing item claims must be submitted with photographic evidence within 48hrs of delivery. Failure to inspect and/or notify us within the time period will result in a forfeit of claim.

Invoice

22 SEP 2020

Althon Limited
Vulcan Road South
Norwich
Norfolk
NR6 6AF

Telephone [redacted]
Fax
Email

Baram Ltd
Yelfs Yard
Botley Road
Bishop's Waltham, Southampton
Hampshire
SO32 1DR

Invoice Number 17786
Invoice Date 01/09/2020
Customer Account 3BAR004

Customer Order: LH286/255

Quantity	Details	Unit Price	Disc Amount	Net Amount	VAT
1.00	Althon SFA10C Headwall 500 x 500mm Toe 1230mm back wall height, opening for 525mm PCC Pipe (670mm OD) c/w 8no 180mm lengths M16 studding cmw nuts & washers and 965 x 765mm GMS	[redacted]	[redacted]	[redacted]	[redacted]
0.00	Hinged SFA1525 Outfall Grille UTI 525mm		0.00	0.00	0.00

Delivery Details

Baram
c/o Linden Homes
Yapton Lane
Walberton
Arundle, BN18 0AW
Martin [redacted]

Net Amount £	[redacted]
Carriage Net £	[redacted]
Total Net Amount £	[redacted]
Total VAT Amount £	[redacted]
Total Invoice Value £	[redacted]

TERMS: 30 DAYS FROM DATE OF INVOICE

Please note all values shown are in GBP (£) Sterling unless stated otherwise

Bank Details: National Westminster Bank Plc
69 Bridge Street, Worksop, Notts. S80 1DG UK

IBAN GB79NWBK60243081946856 **BIC:** NWBKGB2L
ACCOUNT No: 81946856 **SORT CODE:** 60-24-30

CPD MEMBER
Construction CPD Certification Service

VAT Reg. Number 525 3975 28

Delivery Note

Althon Limited
Vulcan Road South
Norwich
Norfolk
NR6 6AF

[redacted]

Delivery Address
Baram
c/o Linden Homes
Yapton Lane
Walberton
Arundle, BN18 0AW
Martin [redacted]

Order Number	17065
Customer Order Number	LH286/255
Page	1

Qty Ordered	Unit	Product Code	Product Description
1.00	each	SFA10C505	Althon SFA10C Headwall 500 x 500mm Toe 1230mm back wall height, opening for 525mm PCC Pipe (670mm OD)
1.00	set	TOESFA10	8no 180mm lengths M16 studding c/w nuts & washers
1.00	each	SFA1525	965 x 765mm GMS Hinged SFA1525 Outfall Grille UTI 525mm

Notes:
Temporary site entrance is via
Avisford Park Golf Course

Goods received in good condition by:

Signature: _____

Print: [redacted]

Date: 1-9-20

VAT Reg. Number: 525 3975 28

