

L- 00149 - 001

27th October 2023

Mr Chris Mills
Via email (chris@alderwood.co.uk)

Dear Chris,

Re: Land Adj. Knott Inn, Station Lane, Rushton Spencer

Further to your instructions we have reviewed the UU comments on your planning application and provide the following response regarding the drainage specifications. For Clarity the UU comments we are referring to are below.

'United Utilities will require the use of the highest specification pipework and designs for schemes involving new sewerage systems in SPZ1, to minimise leakage. As the ground investigation available suggests an absence of a suitable thickness of impermeable deposits forming a confining layer to the underlying aquifer, additional protection is required to minimise the risk wastewater pipework poses to the quality of the groundwater. The site lies within SPZ1 and across SPZ2, and therefore a completely sealed sewer network is required to minimise leaks from polluting the aquifer. The sealed network may be achieved by installation of a clay liner to the foul network and sealing of manhole chambers, or another impermeable material, such as Geosynthetic Clay Liners (GCLs), may be selected for lining.'

The following general pipeline and inspection chamber specification shall be used for all drainage installed at the site.

PRODUCTS

PIPES, BENDS AND JUNCTIONS - SUPPLY:

Pipes and fittings: From same manufacturer for each pipeline.

PIPE, BENDS AND JUNCTIONS – CLAY – FLEXIBLE JOINTS EXTERNAL DRAINAGE

Material and standard: Vitrified clay to BS EN 295-1, Kitemark certified.

Manufacturer: Wavin Hepworth. –

Product reference: SuperSleve.

Sizes: DN 100, DN 150, DN 225; and DN 300. Crushing strength (minimum): FN 40.

Joining type: Plain ended pipes with flexible couplings

FLEXIBLE COUPLINGS:

Standard: To BS EN 295-1, BS EN 1401-1 or WIS 4-41-01 and Kitemark certified, or Agrément certified.

Manufacturer: Wavin Hepworth

- Product reference: SuperSleve

INSPECTION CHAMBERS - PLASTICS - PPIC

Standard: To BS 7158, BS EN 13598-1, BS EN 13598-2 or Agrément certified.

- Diameter: 450mm
- Manufacturer: Polypipe
- Bases: - Product reference: UG440, UG670, ICDB3 (Non Man Entry), ICDB1 (Non Man Entry),
- Shaft units: - Product reference: UG431, UG488.
- Access covers and frames: - Product reference: UCD750, UG511, UG512 (square), UG513.
- Loading grades to BS EN 124: A15 for pedestrian use, B125 for light traffic.

EXECUTION

LAYING PIPELINES: Laying pipes: To true line and regular gradient on even bed for full length of barrel with sockets (if any) facing up the gradient.

Ingress of debris: Seal exposed ends during construction.

Timing: Minimize time between laying and testing.

JOINTING PIPELINES:

Connections: Durable, effective and free from leakage.

Junctions, including to differing pipework systems: With adaptors intended for the purpose.

Cut ends of pipes: Clean and square. Remove burrs and swarf. Chamfer pipe ends before inserting into ring seal sockets.

Jointing or mating surfaces: Clean and, where necessary, lubricate immediately before assembly

Allowance for movement: Provide and maintain appropriate clearance at ends of spigots as fixing and jointing proceeds. Jointing material: Do not allow to project into bore of pipes and fittings.

INSTALLING FLEXIBLE COUPLINGS:

Ends of pipes to be joined: Cut cleanly and square.

Outer surfaces of pipes to be joined: Clean and smooth. Where necessary, e.g. on concrete or iron pipes, smooth out mould lines and/ or apply a cement grout over the sealing area.

Clamping bands: Tighten carefully to make gastight and watertight seals.

COMPLETION

REMOVAL OF DEBRIS AND CLEANING

- Preparation: lift covers to manholes, inspection chambers and access points. Remove wrappings, mortar droppings and any other debris.
- Timing: Before cleaning, final testing, CCTV inspection if specified and immediately before handover
- Cleaning: Thoroughly flush with water to remove silt and check for blockages. Rod pipelines between access points if there is any indication that they may be obstructed.
- Washings and detritus: Do not discharge into sewers or watercourses.
- Covers: Securely replace after cleaning and testing.

TESTING/ INSPECTION

- Dates for inspection: Give notice.
- Period of notice: as agreed with contractor
- Attendance: Provide water, assistance and apparatus as required.
- Remedial work: Repair leaks.

WATER/ AIR TESTING OF GRAVITY DRAINS AND PRIVATE SEWERS UP TO DN 300

- before testing - cement mortar jointing: leave 24h - solvent welded pipelines: leave 1h
- Initial testing: To ensure that pipelines are sound and properly installed, air test short lengths to BS 8301, clause 25.6.3 immediately after completion of bedding/ surround.
- Final testing: For final checking and statutory authority approval, water test to BS 8301, clause 25.6.2 all lengths of pipeline from terminals and connections to manholes/ chambers and between manholes/ chambers.

WATER TESTING OF MANHOLES/ INSPECTION CHAMBERS –

Timing: Before backfilling.

- Standard: - Exfiltration: To BS EN 1610, clause 13.3.
- Method: Testing with water (method W)
- Infiltration: No identifiable flow of water penetrating the chamber.

CCTV INSPECTION OF PRIVATE PIPELINES

- General: Carry out and record internal inspection using CCTV equipment.
- Locations to be inspected: All.
- Illumination: Of adequate intensity.
- Recording: Provide continuous position recording, still photographs and stopping of the camera at any point.
- Copy of videotape recording: Submit.

To ensure that a fully sealed sewerage system is provided it is proposed to use a HDPE impermeable geomembrane to line the excavations of the pipelines, inspection chambers and treatment plant. The product to be use is '0.6 HDPE Geomembrane' by Wrekin. A Product data sheet is included in appendix A.

The attenuation basin shall be lined using a Geosynthetic Clay liner. The Product to be use is 'Geosynthetic Clay Liner 4500' by Wrekin. A product data sheet is included in appendix B.

Appendix c presents a copy of some typical details showing the drainage components with the impermeable liner placement for clarity.

We trust this report is of assistance however should you have any points requiring clarification please do not hesitate to contact our office.

Yours sincerely,



W R ALLSOPPP. B.Eng (Hons),
for SEA Consulting Engineers Ltd

Appendix A – HDPE Geomembrane product sheet

Appendix B – Geosynthetic Clay Liner product Sheet

Appendix C – SEA Drawing 00149/E10 – Contruction Details

Appendix A

HDPE Geomembrane product sheet



Protection



Reinforcement



Drainage

0.6MM HIGH DENSITY POLYETHYLENE IMPERMEABLE GEOMEMBRANE

HDPE 0.6 mm - is a mono layer, high-density polyethylene membrane specifically designed and manufactured to perform as a robust waterproofing barrier protection system, which is suitable for use in various demanding geomembrane applications such as SUDS, root barrier, waterproofing and radon protection and permeable paving. HDPE 0.6 mm is a fully weldable, category 2 attenuation grade liner fully conformant to C753 and BS7533-13 and is CE marked for use in the following application areas: EN13967 (A/T) HDPE 0.6 mm provides resistance to root penetration from invasive species, including (but not limited to): Japanese Knotweed, Bamboo, Mustard Seed, meadow Grass, Ivy, Hybrid poplars, Willow, Elm, Maple, Mare's Tail, ground creeping plants, edible plants and aquatic plants.

KEY ATTRIBUTES

- ✓ Protection - Stress reduction layer to prevent or reduce damage.
- ✓ Reinforcement - Resists stresses or reduces deformations.
- ✓ Drainage - Collects and transports fluids within its thickness.
- ✓ Conforms to BS 7533-13 and "Code for sustainable homes 2006"

APPLICATIONS

- ▶ Ponds
- ▶ Lagoons
- ▶ Anaerobic digestion ponds
- ▶ Gas barrier
- ▶ Hydrocarbon barrier
- ▶ Swales
- ▶ Attenuation tanks
- ▶ Root protection barrier

FUNCTIONS

- ▶ Protection
- ▶ Reinforcement
- ▶ Drainage



APPLICATION

HDPE 0.6 mm is a robust weldable geomembrane suitable for attenuation tank encapsulations, porous sub-base installations, containment and cut-off trenches, structural waterproofing. HDPE 0.6 mm is a chemically inert membrane offering designers and specifiers a range of critical properties that meet the needs of today's demanding geomembrane applications including high water table sites. HDPE 0.6 mm can be fully welded where required.

SUDS

Every potential major development in the UK is examined for the risk of flooding following (1:100) storm events. Sustainable drainage systems (known as SUDS) offer an alternative approach to traditional drainage. SUDS effectively manage drainage at source and aim to detain runoff and release it slowly into water courses. The 'Code for Sustainable Homes 2006' uses a sustainable rating system

that helps designers' and builders' choice of development and also aids home buyers' selection of home. Category 4 'Surface water run off' mentions that the added points will be scored if an attenuation system is used. HDPE 0.6mm, used in conjunction with an underground storm water system, increases the development's sustainable rating.

ADDITIONAL SYSTEM COMPONENTS

SNW40 - non-woven geotextile protector of use following HDPE 0.6 mm installation to protect the membrane from damage against backfilling. Typically used in attenuation tank encapsulation, SNW40 geotextile is a CE marked BS7533-13 and C753 conformant protection grade textile.

HDPE 0.6mm Top Hat Unit - preformed pipe sleeve unit for sealing around pipe penetrations MultiTrack SNW40 non-woven geotextile protector for use following HDPE 0.6mm installation to protect the membrane from damage against backfilling. Typically used in attenuation tank encapsulation.

INSTALLATION

HDPE 0.6mm should be installed on a blinded or smooth surface, free from sharp protrusions (typically maximum permissible particle size in direct contact with the membrane should be <10mm). Avoid areas of unsupported membrane. Where required, adequate protection should be applied over the membrane to prevent damage after installation. HDPE 0.6mm exhibits superior welding properties making it ideal for on-site welding of joints.

STORAGE

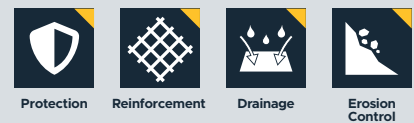
Store in a clean and dry environment, with rolls stacked no more than 5 units high. HDPE 0.6mm is classified as non-hazardous. It is chemically inert and is not affected by acids and alkalis that may be present in the subsoils. The material is not recommended for uses where it will be exposed to long periods of outdoor weathering such as exposure to ultraviolet light that will embrittle the product. Care should be taken to avoid accidental damage when handling the membrane on site



PROPERTIES	TEST METHOD	UNIT	VALUE
Thickness	BS EN 1849-2	mm	0.6
Width	BS EN 1849-2	m	2.5 or 5.1
Length	BS EN 1849-2	m	50 or 100
Density	Length	g/cm ²	0.939
Resistance to roots	Length	-	Impenetrable
HYDRAULIC PROPERTIES			
Permeability to liquids	EN 14150	m ³ / (m ² .d)	10 x 10 ⁻⁶
Water tightness (60 kPa)	EN 1928	-	Pass
MECHANICAL PROPERTIES			
Resistance to static load	EN 12730-B	Kg	>20
Tensile Strength (MD)	EN 12311-2(A)	N/50mm	500
Tensile Strength (CMD)	EN 12311-2(A)	N/50mm	500
Tear Strength (MD)	EN 12310-1	N	450
Tear Strength (CMD)	EN 12310-1	N	500
Resistance to impact	EN 12691 (A)	mm	>2000
Shear resistance of joint	EN 12317-2	N/50mm	Tape 400 / Welded 400
DURABILITY AND CHEMICAL RESISTANCE			
Resistance to elevated temperature	EN 1296	-	Conforming
Resistance to chemicals	EN 1847	-	Conforming
GAS PERMEABILITY			
Radon permeability	K124/02/95	m ² /s	2.0 x 10 ⁻¹²
COMPLIANCE AND CERTIFICATION			
CE Mark - EN13967:2012 (A/T)			
BS7533-13 and 'Code for Sustainable Homes 2006' Conformant			
Conforms to CIRIA C697 and C753 as an Attenuation Membrane			

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Appendix B
Geosynthetic Clay Liner product Sheet



GEOSYNTHETIC CLAY LINER 4500

GCL 4500 is a woven fabric-like material, primarily used as a fluid barrier for use in construction of liquid waste disposal sites. The granular bentonite clay is sandwiched between a woven and nonwoven geotextile, resulting in a very strong robust product.

AREAS OF USE

- Solid waste and hazardous waste landfill areas
- Ponds and pools
- Dams
- Irrigation channels and water transfer lines
- Landslide repairs and similar ground reinforcement applications
- Base insulations in flood controls

GEOTEXTILE LAYER (NON-WOVEN) SPECIFICATIONS

TEST METHOD		UNIT	VALUES	TOLERANCE
Mass per unit area	EN ISO9864 (EN965)	g/m²	200	-10%

GEOTEXTILE LAYER (WOVEN) SPECIFICATIONS

TEST METHOD		UNIT	VALUES	TOLERANCE
Mass per unit area	EN ISO9864 (EN965)	g/m ²	100	-10%

SODIUM BENTONITE SPECIFICATIONS

TEST METHOD		UNIT	VALUES	TOLERANCE
Raw material			Sodium Bentonite	
Mass per unit area	EN 14196	g/m²	3200, 4200, 5200	-10%
Expansion index	ASTM-D-5890	ml/2g	24	-10%
Loss of fluid	ASTM-D-5891	ml	18	+10%
Water content	DIN18121/I SO 11465 (5saat, 1050C)	%	10	-



SPECIFICATION

GEOSYNTHETIC CLAY LINER SPECIFICATIONS

TEST METHOD		UNIT	VALUES	TOLERANCE
Raw material			Sodium Bentonite / Nonwoven / Woven geotextile	
Mass per unit area		g/m ²	4500	-10%
Thickness	EN 14196 EN ISO9863-1	mm	4.0, 5.0, 6.0	-10%
Tensile strength (iD/iDD)**	(EN964-1) ENISO10319	kN/m	11/11	-10%
Puncture strength	EN ISO12236	N	>1800	-10%
Flux index	ASTM-D-5887 / DIN18130	(m ³ /m ²)/s	9x10 ⁻⁹ , 9x10 ⁻⁹ , 5x10 ⁻⁹	+10%
Permeability /K - value	ASTM-D-5887	m/s	3x10 ⁻¹¹ , 2.5x10 ⁻¹¹ , 2x10 ⁻¹¹	+10%
Peel strength	ASTM D6496	N/m	360	-10%
Roll sizes (min)		m	5x40	-10%



FM32898 EMS 758038

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Appendix C
SEA Drawing 00149/E10 – Construction Details



- RIGID CARRIER DRAIN - CLASS S,
BEDDING, SIDEFILL AND BACKFILL
WITH IMPERMEABLE MEMBRANE

NOTES AND SPECIFICATION

1. Processed granular bedding and side fill materials shall include aggregates to BS EN 12620 + A1 and lightweight aggregates to BS EN 13055-1 and shall be graded as defined in the following tables

TABLE 1

Pipe Nominal Size (mm)	Maximum Partical Size (mm)	Class of Bedding	Maximum CF Value	Material
100	10	S B	0.15 0.30	10mm nominal single size
over 100 to 150	15	S B	0.15 0.30	10 or 14mm nominal single size or 14 to 5mm graded.
over 150 to 300	20	S B	0.15 0.30	10, 14 or 20mm nominal single size or 14 to 5mm graded or 20mm to 5mm graded.
over 300 to 550	20	S B	0.15 0.30	14 or 20mm nominal single size or 14 to 5mm graded or 20mm to 5mm graded.
over 550	40	S B	0.15 0.30	14, 20 or 40mm nominal single sized crushed rock or 14 to 5mm graded or 20mm to 5mm graded or 40 to 5mm graded.

2. The sulphate content of bedding and side fill materials shall not be greater than 0.3% as sulphur trioxide.
3. The above specification has been produced based on the Water Industry specification publication No. 4-08-01 (issue 4) February 1994.
4. Compaction factor (CF) shall be determined in accordance with water industry publication No 4-08-02 (issue 1) February 1994 - appendix B.

RIGID CARRIER DRAIN - SPECIFICATION OF BEDDING AND SIDEFILL MATERIALS (CLASS S BEDDING)



Rev.	Date	By	Description
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<u>PROJECT</u>			
LAND ADJ. KNOTT IN STATION LANE RUSHTON SPENCER			
<u>DRAWING</u>			
CONSTRUCTION DETAILS			
SCALE: NTS		DATE: 27.10.2023	
DRAWN BY: WRA		REV: -	