

L- 00149 - 002

12th January 2024

Mr Chris Mills

Dear Chris,

Re: Land Adj. Knott Inn, Station Lane, Rushton Spencer – Planning Conditions Submission

Further to your instructions we have carried out our storm and foul drainage designs for the project and the following letter presents our work.

In accordance with the planning decision notice there are three conditions relevant to the drainage which require our input, these are condition 10, 12 and 19. Each condition is replicated below along with our response to each.

10.No development shall commence until details of the design of the Wastewater Drainage for the site have been submitted to and approved in writing by the Local Planning Authority. The scheme shall be implemented in full in accordance with the approved details prior to first occupation of the dwelling, or completion of the development, whichever is sooner. Before the dwelling is occupied, a validation report that demonstrates the drainage scheme and associated groundwater mitigation measures have been completed in accordance with the approved details and the Environmental permit shall be submitted to and approved in writing by the Local Planning Authority. The approved drainage system shall be retained, managed and maintained in accordance with the approved details at all times for the duration of the development.

The sites foul water drainage is presented on SEA drawings 00149/E01 and 00149/E10A, both of these drawings are shown in appendix A. These drawings along with the pipework specification presented in appendix B show how the foul water from the site will be managed and ensure the higher specification and groundwater mitigation required due to the sites location in ground water source protection zone 1.

12. Prior to being discharged into any watercourse, surface water sewer or soakaway system, all surface water drainage from parking areas and hardstandings shall be passed through an oil interceptor designed and constructed to have a capacity and details compatible with the site being drained. Roof water shall not pass through the interceptor.

In accordance with the drainage strategy submitted as part of the planning application by RAB the sites surface water is split into two. The new dwelling and patio is drained via a new detention basin (please see below for full details as per condition 19) and the gravel driveway and garage to be drained via a bioretention areas with surface water diffused overland , via an overflow weir to the water course. The use of an oil interceptor is not viable due to the shallow drainage and the treatment of the surface water from the drive and garage is provided by the gravel surfacing and bioretention areas as per the RAB strategy provide at planning stage.

19. No development approved by this permission shall be commenced until a detailed scheme for the provision and implementation of a surface water regulation system, in accordance with drawing no. RAB3128FRD/001, 002 & 003 and the Drainage Strategy report by RAB (3128) Version 1 dated 16th May 2023 has been submitted to and approved in writing by the Local Planning authority. The scheme shall include detailed design drawings including:

- *proposed pipework specification*
- *geotechnical membrane (liner) specification and construction details/ cross section of the attenuation basins/ bioretention areas and swales*
- *all other pollution prevention measures.*
- *maintenance and management regime.*

The scheme shall be implemented in accordance with the approved details, unless otherwise agreed in writing by the LPA.

The site surface water drainage is presented in SEA drawing 00149/E01 (appendix A) which is in line with the RAB details provide at planning stage. Calculations are presented in appendix C which shows that the pipework and detention basin provide protection for the up to and including the 1 in 100 year storm event plus a 45% allowance for climate change.

A pipework specification is presented in appendix B and cross sections and details are presented on SEA drawing 00149/E10A (appendix A).

Below presents the maintenance requirement for the site drainage which will remain private and the responsibility will be with the landowner.

Pipe systems, Inspection chambers and manholes.

Maintenance Schedule		
Maintenance Category	Required Action	Frequency
Regular Maintenance	Inspect and identify area that are not operating correctly, if required, take remedial action	Monthly (for the first 3 months) then six monthly
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
Remedial Actions	Remove Blockages	As required
	Cleaning/Jetting	As required
	Repair/rehabilitation of system	As required
Monitoring	Inspect/check all parts of the piped system and inspection chambers to ensure that they are in good condition and operating as required.	Annually and after large storm

Detention Basin and Bioretention Area

Maintenance Schedule		
Maintenance Category	Required Action	Frequency
Regular Maintenance	Remove litter and debris	Monthly
	Cut Grass – for access routes	Monthly (during growing season) or as required
	Cut Grass – Meadow grass and around basin	Half yearly (spring – before nesting season and autumn
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages and clear if required	Monthly
	Inspect inlets and facility surface for slit accumulation. Establish appropriate slit removal frequencies	Monthly (for first year, then as required)
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually, or as required
	Manage wetland plants in outlet pool – where provided	Annually
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 year, or as required
Remedial Actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

Yours sincerely,

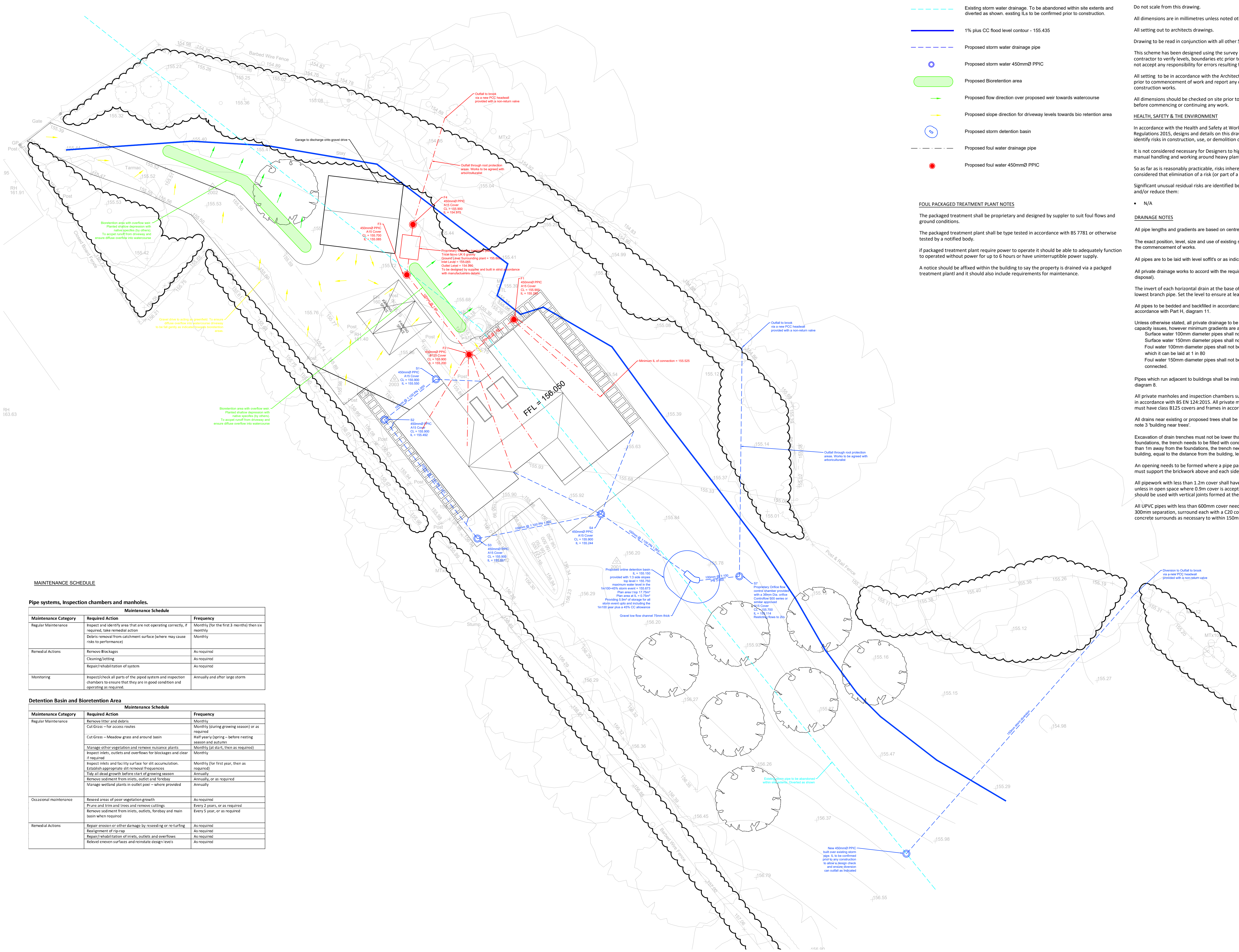
W R ALLSOPPP. B.Eng (Hons),
for SEA Consulting Engineers Ltd

Appendix A – SEA drawing 00149/E01 and E10A

Appendix B – Pipework Specification

Appendix C – Storm water Calculations

Appendix A
SEA Drawing 00149/E01 and E10



MAINTENANCE SCHEDULE

Pipe systems, Inspection chambers and manholes.

Maintenance Schedule		
Maintenance Category	Required Action	Frequency
Regular Maintenance	Inspect and identify area that are not operating correctly, if required, take remedial action	Monthly (for the first 3 months) then six months
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
Remedial Actions	Remove Blockages	As required
	Cleaning/jetting	As required
	Repair/rehabilitation of system	As required
Monitoring	Inspect/check all parts of the piped system and inspection chambers to ensure that they are in good condition and operating as required.	Annually and after large storm

Detention Basin and Bioretention Area

Maintenance Schedule		
Maintenance Category	Required Action	Frequency
Regular Maintenance	Remove litter and debris	Monthly
	Cut Grass – for access routes	Monthly (during growing season) or as required
	Cut Grass – Meadow grass and around basin	Half yearly (spring – before nesting season and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages and clear if required	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies	Monthly (for first year, then as required)
	Take all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually, or as required
	Manage wetland plants in outlet pool – where provided	Annually
	Re-seed areas of poor vegetation growth	As required
Occasional maintenance	Prune and trim trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 year, or as required
Remedial Actions	Repair erosion or other damage by re-seeding or re-turfing	As required
	Re-alignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relieve uneven surfaces and reinstate design levels	As required

- Existing storm water drainage. To be abandoned within site extents and diverted as shown. existing ILS to be confirmed prior to construction.
- 1% plus CC flood level contour - 155.435
- Proposed storm water drainage pipe
- Proposed storm water 450mmØ PPIC
- Proposed Bioretention area
- Proposed flow direction over proposed weir towards watercourse
- Proposed slope direction for driveway levels towards bio retention area
- Proposed storm detention basin
- Proposed foul water drainage pipe
- Proposed foul water 450mmØ PPIC

FOUL PACKAGED TREATMENT PLANT NOTES

The packaged treatment shall be proprietary and designed by supplier to suit foul flows and ground conditions.

The packaged treatment plant shall be type tested in accordance with BS 7781 or otherwise tested by a notified body.

If packaged treatment plant require power to operate it should be able to adequately function to operated without power for up to 6 hours or have uninterrupted power supply.

A notice should be affixed within the building to say the property is drained via a packaged treatment plant and it should also include requirements for maintenance.

Do not scale from this drawing.

All dimensions are in millimetres unless noted otherwise.

All setting out to architects drawings.

Drawing to be read in conjunction with all other SEA drawings and architects drawings.

This scheme has been designed using the survey information provided by others. It shall be the responsibility of the contractor to verify levels, boundaries etc prior to commencing any works on site. SEA Structural Engineers Ltd. shall not accept any responsibility for errors resulting from the survey.

All setting to be in accordance with the Architect's drawings, the Contractor is to check all dimensions and levels prior to commencement of work and report any discrepancies to the Engineer, including any encountered during construction works.

All dimensions should be checked on site prior to construction. Please notify the Engineer of any discrepancies before commencing or continuing any work.

HEALTH, SAFETY & THE ENVIRONMENT

In accordance with the Health and Safety at Work etc Act 1973 and the Construction (Design and Management) Regulations 2015, designs and details on this drawing have been the subject of a Designers Risk Assessment, to identify risks in construction, use, or demolition of the scheme.

It is not considered necessary for Designers to highlight obvious and/or common risks (such as deep excavations, manual handling and working around heavy plant) which Contractors should be familiar with.

So as far as is reasonably practicable, risks inherent in the design have been eliminated. Where it has been considered that elimination of a risk (or part of a risk) is not reasonably practicable, it has been reduced.

Significant unusual residual risks are identified below, beside the measures which have been adopted to eliminate and/or reduce them:

- N/A

DRAINAGE NOTES

All pipe lengths and gradients are based on centre of manhole to centre of manhole.

The exact position, level, size and use of existing sewers to be confirmed on site and reported to the Engineer prior to the commencement of works.

All pipes are to be laid with level soffits or as indicated.

All private drainage works to accord with the requirements of Building Regulations 2000, Part H (drainage and waste disposal).

The invert of each horizontal drain at the base of a stack shall be at least 450mm below the center line of the lowest branch pipe. Set the level to ensure at least 50mm clearance to footings.

All pipes to be bedded and backfilled in accordance with Part H, diagram 10. Shallow pipes shall be protected in accordance with Part H, diagram 11.

Unless otherwise stated, all private drainage to be 100mm diameter. Gradients have been shown where there are pipe capacity issues, however minimum gradients are as below:

- Surface water 100mm diameter pipes shall not be laid flatter than 1 in 100
- Surface water 150mm diameter pipes shall not be laid flatter than 1 in 150
- Foul water 100mm diameter pipes shall not be laid flatter than 1 in 40 unless there is a WC connected upstream at which it can be laid at 1 in 80
- Foul water 150mm diameter pipes shall not be laid flatter than 1 in 150 providing there are minimum of 5 WCs connected.

Pipes which run adjacent to buildings shall be installed in strict accordance with Part H, clauses 2.23 to 2.25 and diagram 8.

All private manholes and inspection chambers subject to vehicular loading must have class D400 covers and frames in accordance with BS EN 124:2015. All private manholes and inspection chambers not subject to vehicular loading must have class B125 covers and frames in accordance with BS EN 124:2015.

All drains near existing or proposed trees shall be constructed in accordance with the requirements of NHBC's practice note 3 'building near trees'.

Excavation of drain trenches must not be lower than the foundation of any nearby buildings. If the trench is within 1m of foundations, the trench needs to be filled with concrete up to the lowest level of the foundation. If the trench is further than 1m away from the foundations, the trench needs to be filled with concrete to a level below the lowest level for the building, equal to the distance from the building, less than 150mm.

An opening needs to be formed where a pipe passes through a wall, with a minimum 50mm clearance. A lintel must support the brickwork above and each side of the opening masked with rigid sheet material.

All pipework with less than 1.2m cover shall have a concrete slab to adopting water company's requirements unless in open space where 0.9m cover is acceptable. Where a pipe requires a concrete surround C20 concrete mix should be used with vertical joints formed at the face of each flexible joint using 18mm thick compressible board.

All UPVC pipes with less than 600mm cover need concrete protection. Where two pipes cross with less than 300mm separation, surround each with a C20 concrete mix. Where centered on the crossing point, extend the concrete surrounds as necessary to within 150mm of the next nearest flexible joint.

Rev. Date By Description

SEA
CONSULTING ENGINEERS
[CONSULTING CIVIL & STRUCTURAL ENGINEERS]
E: warren@seaco.uk
T: 07976310054

PROJECT

LAND ADJ. KNOTT IN STATION LANE RUSHTON SPENCER

DRAWING

PROPOSED DRAINAGE LAYOUT

SCALE: 1:150@A1

DATE: 12.01.2024

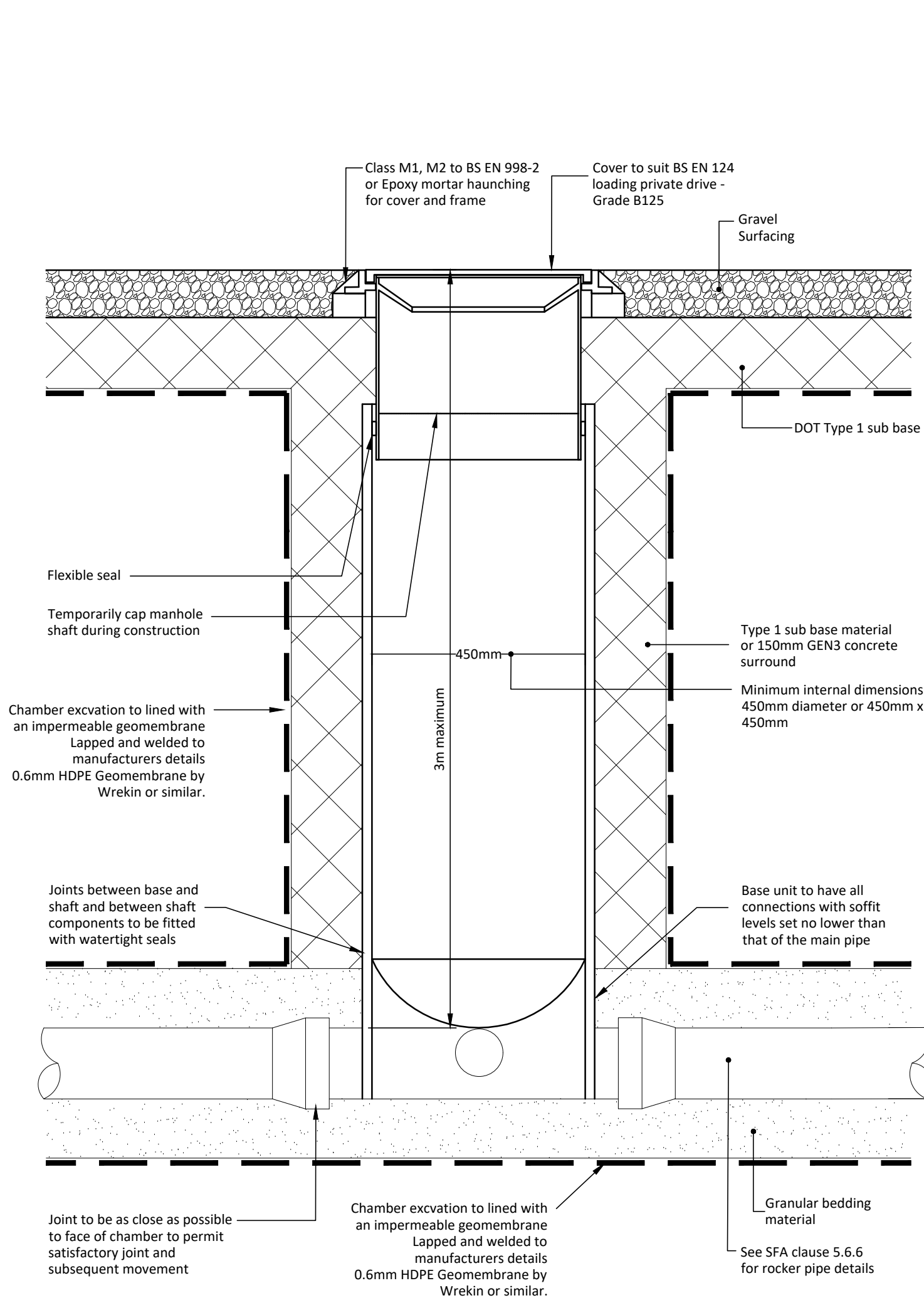
DRAWN BY: WRA

REV: A

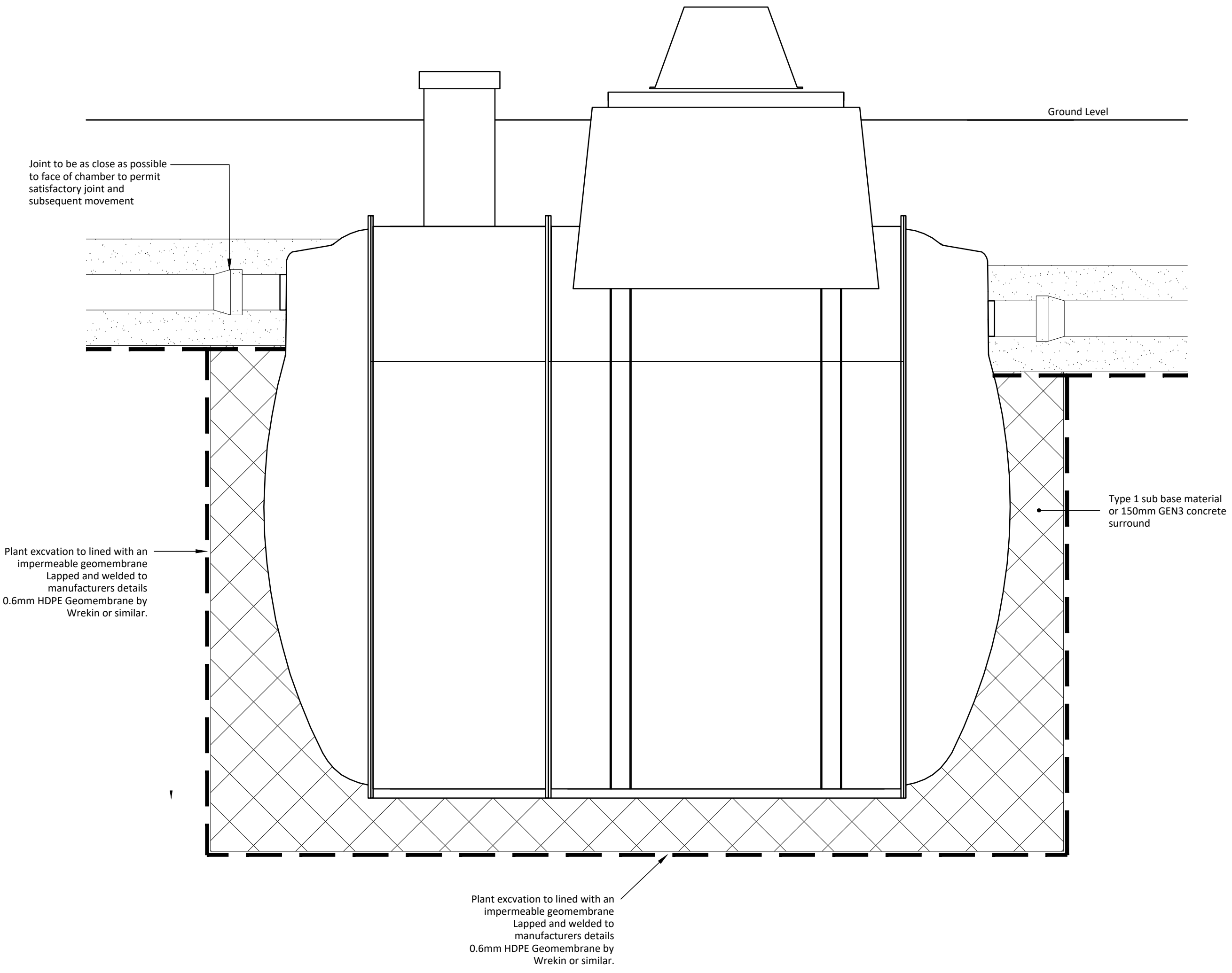
STATUS: FOR APPROVAL - NOT FOR CONSTRUCTION

DWG No: 00149/E01

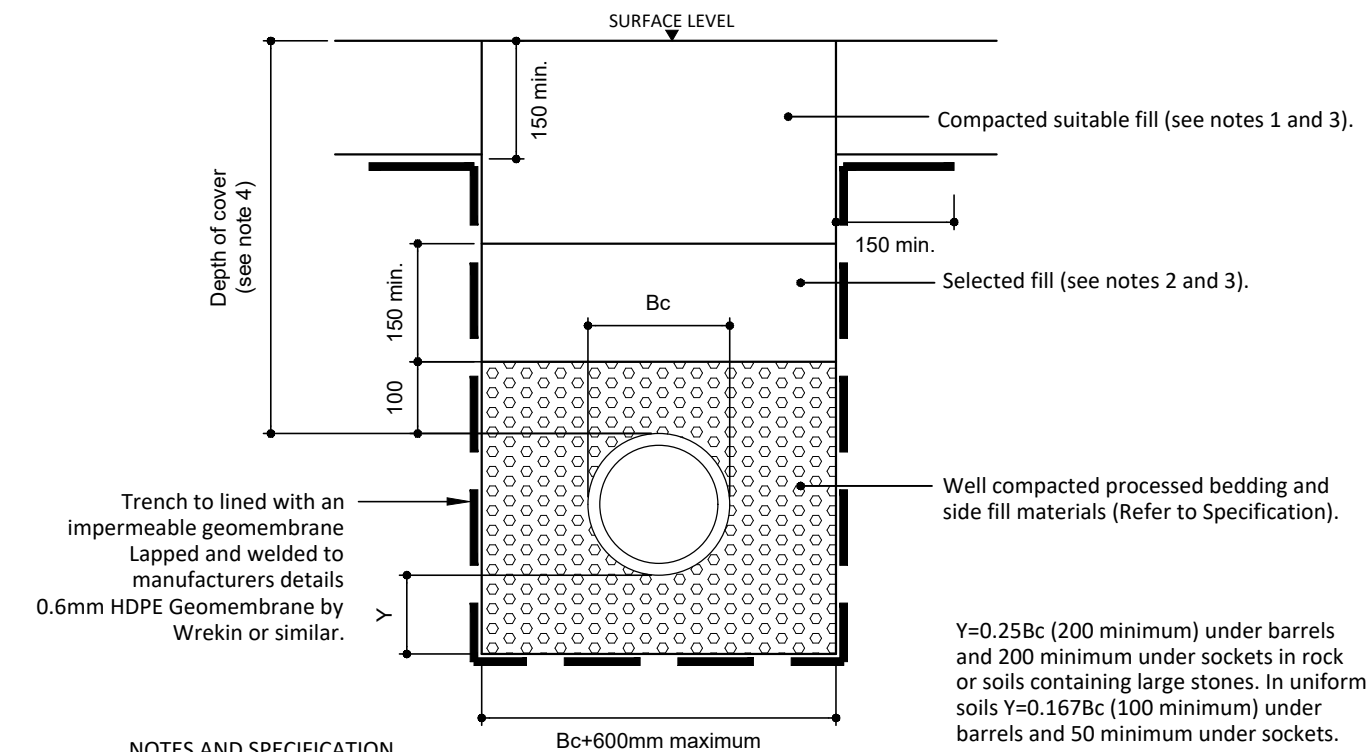
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INSPECTION CHAMBER CONSTRUCTION DETAIL



TREATMENT PLANT CONSTRUCTION DETAIL



NOTES AND SPECIFICATION.

- Suitable fills shall be capable of accepting compaction plant subject to the Engineer's approval and shall exclude boulders, lumps of concrete, bricks, timber and vegetable matter.
- Selected fill shall be readily compatible material free from roots, organic material, building material, and shall be in an unfrozen condition. Selected fill shall exclude clay lumps exceeding 25mm size. Selected fill shall be carefully compacted around and above the pipe, taking care not to damage the pipe.
- Where the pipe is installed in areas which are paved or future settlement of back fills is not acceptable then back filling of the trench shall be carried out using type 1 sub-base to Highways Agency specification for Highway Works compacted to the same specifications.
- Minimum cover:
Cover shall be greater than:
2000mm in areas subject to heavy construction plant.
1000mm in areas subject to normal construction traffic.
1200mm to finished level of new main road pavements.
600mm in landscape areas, foot ways, gardens or fields
Otherwise use class 2 bedding and surround or bridging slab if drainage is to be adopted by a Water Company.
- Rigid pipes shall be:
(i) Clay pipes with min FN of 40 to BS EN 295 and BS65.
- Construction, subsequent testing, operation and maintenance shall be carried out in accordance with BS EN 752. Sewers to be adopted by water companies shall be installed in accordance with the current edition the 'Design and Construction Guidance' produced by the Water Services Association. Sewers to be adopted by highway authorities shall be installed in accordance with the authority's specification.
- Workmanship shall be in accordance with BS 8000 - 14:1989

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

NOTES AND SPECIFICATION

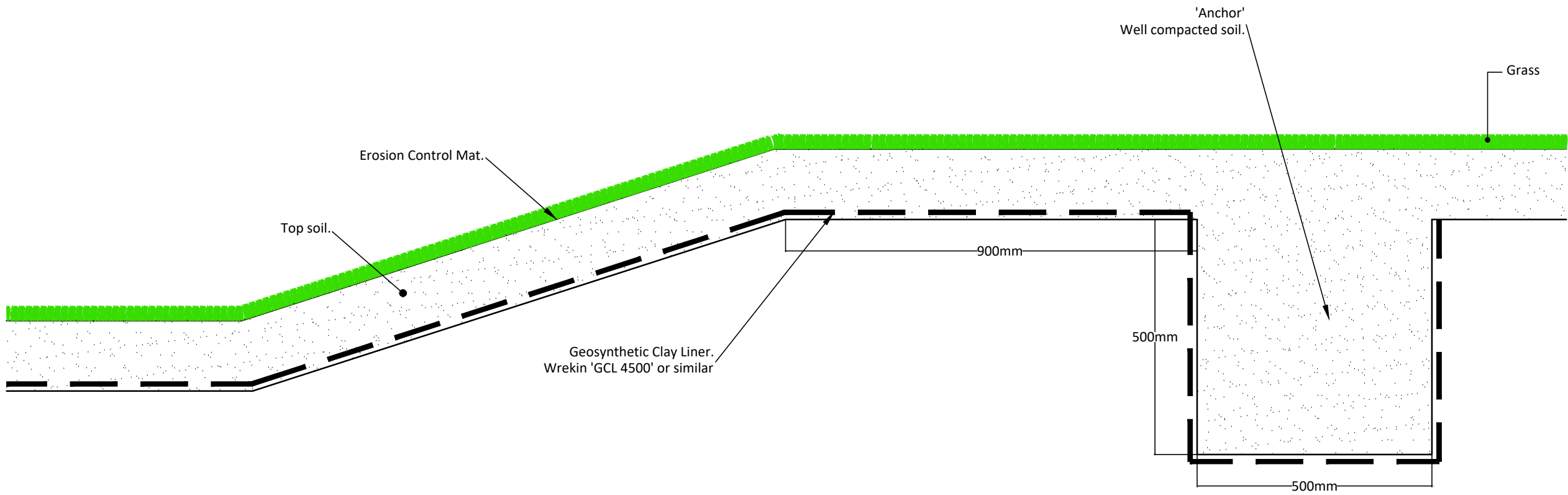
- Processed granular bedding and side fill materials shall include aggregates to BS EN 12620 + A1 and lightweight aggregates to BS EN 13055-1 and shall be graded as defined in the following tables:

TABLE 1

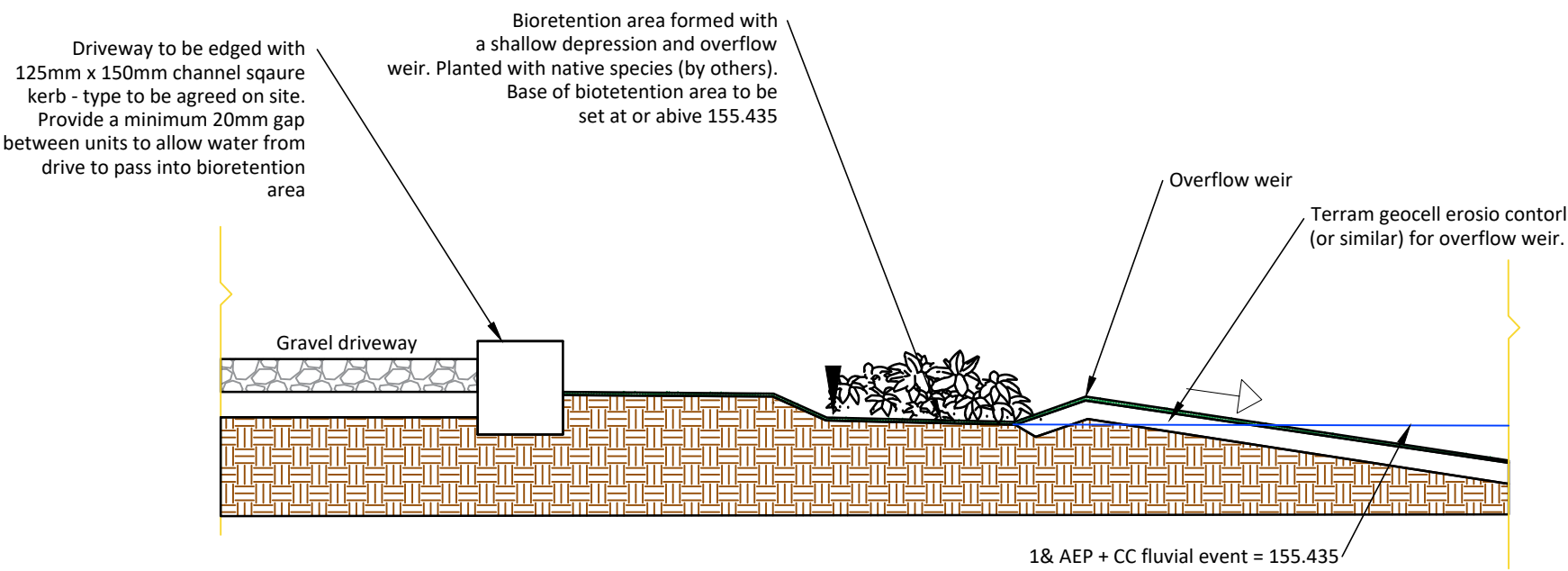
Pipe Nominal Size (mm)	Maximum Partial Size (mm)	Class of Bedding	Maximum CF Value	Material
100	10	S B	0.15 0.30	10mm nominal single size
over 100 to 150	15	S B	0.15 0.30	10 or 14mm nominal single size or 14 to 5mm graded.
over 150 to 300	20	S B	0.15 0.30	10, 14 or 20mm nominal single size or 14 to 5mm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

- The sulphate content of bedding and side fill materials shall not be greater than 0.3% as sulphur trioxide.
- The above specification has been produced based on the Water Industry specification publication No. 4-08-01 (issue 4) February 1994.
- 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)



POND CONSTRUCTION DETAIL



SECTION THROUGH BIORETENTION AREAS

A 12.01.24 WRA Section through bioretention area added			
Rev.	Date	By	Description
SEA CONSULTING ENGINEERS [CONSULTING CIVIL & STRUCTURAL ENGINEERS] E: warren@seace.co.uk T: 07976310054			
PROJECT LAND ADJ. KNOTT IN STATION LANE RUSHTON SPENCER			
DRAWING CONSTRUCTION DETAILS			
SCALE: NTS		DATE: 27.10.2023	
DRAWN BY: WRA		REV: A	
STATUS: FOR APPROVAL			

DWG No: 00149/E10

A

Appendix B
Pipework Specification



**Land Adjacent to the Knott Inn,
Station Road
Rushton Spencer**

Pipework Specification

S - 00149 – 001
January 2023

Report Originator(s)

Warren Allsopp, BEng (Hons)

Director for SEA Consulting Engineers Ltd.

warren@seace.co.uk

07976 310054

Revision Record

Revision	Date	Description	Written	Approved
0	12.01.	Initial Issue	WRA	WRA



CONSULTING ENGINEERS

[CONSULTING CIVIL & STRUCTURAL ENGINEERS]

T: 07976 310054

E: warren@seace.co.uk

Client

Chris Miles

Project

Station Road, Rushton Spencer

Title

Pipework Specification

Sheet no. 2

Project ref 00149

Date January 2024

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.

Jointing 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.



CONSULTING ENGINEERS

[CONSULTING CIVIL & STRUCTURAL ENGINEERS]

T: 07976 310054

E: warren@seace.co.uk

Client

Chris Miles

Project

Station Road, Rushton Spencer

Title

Pipework Specification

Sheet no. 3

Project ref 00149

Date January 2024

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.

Appendix C
Storm Water Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	18.600	Minimum Backdrop Height (m)	0.000
Ratio-R	0.343	Preferred Cover Depth (m)	0.250
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.004	5.00	155.900	450	393659.973	362464.696	0.350
2	0.004	5.00	155.900	450	393655.365	362461.092	0.408
3	0.005	5.00	155.900	450	393663.678	362450.462	0.543
4	0.013	5.00	155.900	450	393674.727	362452.648	0.656
5			155.750	450	393682.248	362447.445	0.600
6		5.00	155.750	450	393683.523	362446.720	0.600
7			155.700	450	393687.088	362447.085	0.586
Outfall			154.900	100	393687.102	362452.344	0.812

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	5.850	0.600	155.550	155.492	0.058	100.0	100	5.13	50.0
1.001	2	3	13.495	0.600	155.492	155.357	0.135	100.0	100	5.42	50.0
1.002	3	4	11.263	0.600	155.357	155.244	0.113	100.0	100	5.66	50.0
1.003	4	5	9.145	0.600	155.244	155.150	0.094	97.3	100	5.86	50.0
2.000	6	7	3.584	0.600	155.150	155.114	0.036	100.0	100	5.08	50.0
2.001	7	Outfall	20.513	0.600	155.114	154.088	1.026	20.0	100	5.27	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.769	6.0	0.5	0.250	0.308	0.004	0.0	21	0.479
1.001	0.769	6.0	1.1	0.308	0.443	0.008	0.0	29	0.579
1.002	0.769	6.0	1.8	0.443	0.556	0.013	0.0	37	0.667
1.003	0.779	6.1	3.5	0.556	0.500	0.026	0.0	54	0.806
2.000	0.769	6.0	0.0	0.500	0.486	0.000	0.0	0	0.000
2.001	1.734	13.6	0.0	0.486	0.712	0.000	0.0	0	0.000

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	5.850	100.0	100	Circular	155.900	155.550	0.250	155.900	155.492	0.308
1.001	13.495	100.0	100	Circular	155.900	155.492	0.308	155.900	155.357	0.443
1.002	11.263	100.0	100	Circular	155.900	155.357	0.443	155.900	155.244	0.556
1.003	9.145	97.3	100	Circular	155.900	155.244	0.556	155.750	155.150	0.500
2.000	3.584	100.0	100	Circular	155.750	155.150	0.500	155.700	155.114	0.486
2.001	20.513	20.0	100	Circular	155.700	155.114	0.486	154.900	154.088	0.712

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	450	Manhole	Adoptable	2	450	Manhole	Adoptable
1.001	2	450	Manhole	Adoptable	3	450	Manhole	Adoptable
1.002	3	450	Manhole	Adoptable	4	450	Manhole	Adoptable
1.003	4	450	Manhole	Adoptable	5	450	Manhole	Adoptable
2.000	6	450	Manhole	Adoptable	7	450	Manhole	Adoptable
2.001	7	450	Manhole	Adoptable	Outfall	100	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
1	393659.973	362464.696	155.900	0.350	450		0	1.000	155.550	100
2	393655.365	362461.092	155.900	0.408	450		1	1.000	155.492	100
							0	1.001	155.492	100
3	393663.678	362450.462	155.900	0.543	450		1	1.001	155.357	100
							0	1.002	155.357	100
4	393674.727	362452.648	155.900	0.656	450		1	1.002	155.244	100
							0	1.003	155.244	100
5	393682.248	362447.445	155.750	0.600	450		1	1.003	155.150	100
6	393683.523	362446.720	155.750	0.600	450					
							0	2.000	155.150	100
7	393687.088	362447.085	155.700	0.586	450		1	2.000	155.114	100
							0	2.001	155.114	100
Outfall	393687.102	362452.344	154.900	0.812	100		1	2.001	154.088	100

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Detailed
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	18.600	Drain Down Time (mins)	240
Ratio-R	0.343	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	45	0	0

Node 7 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.536	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	2.0		
Invert Level (m)	155.114	Diameter (m)	0.036		

Node 6 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	1.511
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	155.150	Main Channel Slope (1:X)	9999.0
Safety Factor	2.0	Time to half empty (mins)	30	Main Channel n	0.030

Inlets

5

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	0.7	0.0	0.600	17.7	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	155.570	0.019	0.5	0.0031	0.0000	OK
15 minute winter	2	11	155.520	0.027	1.0	0.0044	0.0000	OK
15 minute winter	3	11	155.392	0.035	1.6	0.0056	0.0000	OK
15 minute winter	4	10	155.296	0.052	3.1	0.0082	0.0000	OK
30 minute winter	5	24	155.288	0.138	2.6	0.0219	0.0000	OK
30 minute winter	6	24	155.288	0.138	1.8	0.0219	0.0000	SURCHARGED
30 minute winter	7	24	155.286	0.172	1.2	0.0274	0.0000	SURCHARGED
15 minute summer	Outfall	1	154.088	0.000	1.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	0.5	0.359	0.083	0.0082	
15 minute winter	2	1.001	3	1.0	0.479	0.165	0.0282	
15 minute winter	3	1.002	4	1.6	0.499	0.263	0.0362	
15 minute winter	4	1.003	5	3.1	0.732	0.508	0.0529	
30 minute winter	5	Flow through pond	6	1.8	0.049	0.005	0.3685	
30 minute winter	6	2.000	7	1.2	0.436	0.196	0.0280	
30 minute winter	7	Orifice	Outfall	1.1				2.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	155.580	0.030	1.2	0.0048	0.0000	OK
15 minute winter	2	10	155.535	0.043	2.4	0.0068	0.0000	OK
15 minute winter	3	13	155.510	0.153	3.8	0.0244	0.0000	SURCHARGED
30 minute winter	4	22	155.486	0.242	5.7	0.0384	0.0000	SURCHARGED
30 minute winter	5	27	155.462	0.312	5.0	0.0496	0.0000	OK
30 minute winter	6	27	155.462	0.312	3.4	0.0496	0.0000	FLOOD RISK
30 minute winter	7	27	155.459	0.345	1.7	0.0548	0.0000	FLOOD RISK
15 minute summer	Outfall	1	154.088	0.000	1.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	1.2	0.456	0.194	0.0151	
15 minute winter	2	1.001	3	2.3	0.585	0.382	0.0742	
15 minute winter	3	1.002	4	3.3	0.516	0.545	0.0881	
30 minute winter	4	1.003	5	5.0	0.644	0.823	0.0716	
30 minute winter	5	Flow through pond	6	3.4	0.067	0.010	1.6024	
30 minute winter	6	2.000	7	1.7	0.540	0.285	0.0280	
30 minute winter	7	Orifice	Outfall	1.5				4.9

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	13	155.839	0.289	2.3	0.0459	0.0000	FLOOD RISK
15 minute winter	2	13	155.835	0.343	4.1	0.0545	0.0000	FLOOD RISK
15 minute winter	3	13	155.805	0.448	5.4	0.0713	0.0000	FLOOD RISK
30 minute winter	4	21	155.750	0.506	8.9	0.0804	0.0000	FLOOD RISK
60 minute winter	5	49	155.673	0.523	6.3	0.0831	0.0000	OK
60 minute winter	6	49	155.673	0.523	4.2	0.0831	0.0000	FLOOD RISK
60 minute winter	7	49	155.667	0.553	2.1	0.0879	0.0000	FLOOD RISK
15 minute summer	Outfall	1	154.088	0.000	1.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	2.0	0.501	0.338	0.0458	
15 minute winter	2	1.001	3	3.2	0.595	0.523	0.1056	
15 minute winter	3	1.002	4	4.3	0.554	0.718	0.0881	
30 minute winter	4	1.003	5	8.3	1.059	1.354	0.0716	
60 minute winter	5	Flow through pond	6	4.2	0.064	0.012	4.2394	
60 minute winter	6	2.000	7	2.1	0.546	0.346	0.0280	
60 minute winter	7	Orifice	Outfall	2.0				11.8