

December 2024

TECHNICAL NOTE

Drainage Calculations

Garages at Heathland Road

1.0 Introduction

1.1 Lanmor Consulting Ltd has been appointed to prepare drainage calculations for the proposed development at Garages at Heathlands Road, Heathlands Road, Wokingham, Berkshire, RG40 3AY. The development proposals seek the *“Construction of a single detached dwellings with associated landscaping.”* Planning consent for the proposed erection of 1 no. two bedroom detached dwelling with associated bicycle store and access following demolition of the existing garage blocks, subject to planning conditions [REF: 240442]. Condition 4 requires details of the proposed surface water drainage to be submitted to the council prior to the commencement of construction work. The wording of the condition is set out below:

- 1. *“BRE 365 test results demonstrating that infiltration is achievable.***
- 2. *Full calculations demonstrating the performance of soakaways.***
- 3. *Groundwater monitoring confirming seasonal high groundwater levels in the area.***
- 4. *A drainage strategy plan indicating the location and sizing of SuDS features, with the base of any SuDS features located at least 1m above the seasonal high water table level.***
- 5. *build over agreement with Thames water is provided for the proposed drainage strategy.***

The approved scheme shall be implemented prior to the first occupation of the development and shall be maintained in the approved form for as long as the development remains on the site”.

“Reason: This is to prevent increased flood risk from surface water run-off. Relevant policy: NPPF (2023) Section 14 (Meeting the Challenge of Climate Change, Flooding and Coastal Change), Core Strategy policy CP1 and Managing Development Delivery Local Plan policies CC09 and CC10”.

2.0 Existing Site Conditions

- 2.1 The site is located in a rural area surrounded by framed fields with a mix of residential and other community uses. The site is currently occupied a number of vehicle garages used for parking cars. It is located in Wokingham Borough Council and accessed from Heathlands Road. The site covers an area of 0.195 hectares Figure 2.1 shows the location of the site.



Figure 2.1 – Site Location Plan

- 2.2 The British Geological Survey indicates that the site has an underlying bedrock of Bagshot Formation - Sand. Sedimentary bedrock formed between 56 and 47.8 million years ago during the Palaeogene period.

- 2.3 Superficial deposits of River Terrace Deposits, sand and gravel, sedimentary superficial deposit formed between 2.588 million years ago and the present during the Quaternary period are recorded overlying the bedrock.
- 2.4 The nearest historic borehole logs to the site indicated made ground to 0.5m with river terrace deposits to a depth of 2m and then bagshot formation to 4m, bottom of the borehole.

3.0 Existing Drainage

- 3.1 The survey of the site established a surface water culvert running to the front of the site manhole on the culvert are clearly visible to the north and south of the site. The existing garages have no foul or surface water connections. Thames water sewer records indicates that there is an adopted surface water sewer running through the site. it is assumed that culvert identified on site is the Thames Water sewer.

4.0 Proposed Drainage

Foul Water

- 4.1 There are no adopted foul sewers in the area that can provide a connection point. The next option would be to provide a package treatment plant on site to treat foul sewage so it can be discharged to ground or watercourse, while the ground conditions should be suitable for infiltration there is the room to accommodate a drainage field, there is no watercourse on site so the only options is discharge the treated effluent from the package treatment plant to the adopted surface water sewer.

Surface Water

- 4.2 The drainage strategy proposed a filter drain and permeable paving, however as development proposals changed the area for the filter drain reduced so it is no longer possible to achieve a 5m clearance from the building to the drain. The arboriculturists have now set the root protection zones and they cover over 50% of the preamble paving area. These areas are designated as no dig construction, so it is not possible to use permeable paving in these areas.

- 4.3 The limited areas available for permeable paving is not sufficient to accommodate and attenuate the runoff from the development and soakaways are not possible either given the tree protection zones and clearance required from building. The drainage design as therefore evolved and underground attenuation tank will be provided to store the runoff so the discharge can be restricted to greenfield rates.
- 4.4 The surface water sewer through the site is approximately 2.5m deep so a gravity connection will be made to the sewer via an orifice to control the flow rate for the site. The drainage strategy has employed the SuDS hierarchy has concluded the most appropriate solution is to attenuate the runoff from the development and discharge to the surface water sewer.
- 4.5 MicroDrainage software was used to estimate the Greenfield runoff and brownfield rates for the existing site. The resulting calculations and the proposed discharge rates for the site have been tabulated below. Full calculations are included in Appendix A.

Return Period	Discharge (l/s)			
	Greenfield Rate (l/s)	Brownfield Rate (l/s)	Proposed Rate (l/s)	% Difference
Q_{BAR}	0.0			
1 in 1	0.0	2.6	0.3	88.4%
1 in 30	0.0	6.2	0.5	91.9%
1 in 100	0.0	8.2	0.6	92.7%
1 in 100+CC			0.7	

Table 4.1 – Existing & Proposed Runoff Rates

- 4.6 The small area of development returned no greenfield discharge rate so therefore the discharge has been restricted as low as possible by the 20mm orifice. The runoff from the roof and hard surfaced areas will be collected via a new network of pipes and discharge to an attenuation tank located to the front of the site. The attenuation Tank has been sized at 9m x 2m x 0.8m deep, the attenuation tank has been sized using MicroDrainage software such that they can accommodate runoff from all storm events up to and including the 1 in 100-year +40%CC allowance. The layout of the proposed surface water drainage design has been included in Appendix B as drawing 241882/500/01.
- 4.7 A 40% climate change allowance has been factored into the calculations based the management catchment area. The full calculations for the development are included in Appendix C demonstrating the proposals are compliant with current standards and legislation.

5.0 SuDS Maintenance

- 5.1 Regular inspection of the surface water drainage network for blockages and clearing unwanted debris/silt from the system should improve the performance of the surface water network and decrease the need for future repairs. In the event of blockages, high pressure water jets can be used to clear the gullies and pipes to ensure they are functioning correctly. This should be undertaken by certified trained professionals.
- 5.2 The level and frequency of maintenance required on site is dependent on the type of facility. The type of maintenance will fall into one of three categories “regular maintenance”, “occasional maintenance” and “remedial maintenance”.
- 5.3 Regular maintenance of the drainage and SuDS features will include inspections, removal of litter/debris and sweeping of the surfaces. Occasional maintenance will include removal of sediment etc. and remedial maintenance may include structural repairs and infiltration reconditioning if required.
- 5.4 The drainage and SuDS elements after an initial inspection following construction should be inspected on a monthly basis for the first 12 months and after large storms. Thereafter the following maintenance regime should be applied and adjusted if the 12-month monitoring process has identified any issues.
- 5.5 For specialist equipment, maintenance brochures will be provided by the manufacturers. These will set out the frequency of inspections and correct methods of cleaning etc. that should be followed. It is recommended that once installed the facility should be inspected monthly for the first three months and thereafter at six monthly intervals or as advised in the maintenance brochure.
- 5.6 The freeholders will be responsible for the drainage and SuDS elements within their respective properties while a management company will be set up to maintain the drainage features of the shared access road. The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained.

Manholes, Catchpit Chambers and Pipes

- 5.7 The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained.
- 5.8 Pipes are intended for the conveyance of runoff across the development. They are intended to be dry except for rainfall events. These have been designed to be self-cleaning where possible for the smaller diameter pipes, the risk for large diameter pipes is reduced due to the size providing higher velocities.
- 5.9 For manholes, catchpit chambers and pipes, the following maintenance will be required:

Manhole / Pipe Maintenance Schedule		
	Required Action	Typical Frequency
Regular maintenance	Inspect for evidence of poor operation via water level in chambers. If required, take remedial action.	3-monthly, 48 hours after large storms.
	Check and remove large vegetation growth near pipe runs.	Monthly or as required
	Remove sediment from structures.	Annually or as required
Remedial Actions	Rod through poorly performing runs as initial remediation.	As required
	If continued poor performance jet and CCTV survey poorly performing runs.	As required
Monitoring	Inspect/check all inlets, outlets, to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of pipe manholes for sediment build-up and remove if necessary	Every 5 years or as required

Table 6.1 – Manhole and Pipe Maintenance Schedule

Attenuation Tanks

5.10 For attenuation tanks, the following maintenance will be required:

Attenuation Tank Maintenance Schedule		
	Required Action	Typical Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Annually
	Remove debris from the catchment surface (where it may cause risk to performance).	Monthly
	For systems where rainfall infiltrates in the tank from above, check surface of filter for blockage by sediment, algae or other matter, remove and replace surface infiltration medium as necessary	Annually
	Remove sediment from pre-treatment structures.	Annually or as required
Remedial Actions	Repair/rehabilitate inlets/outlets, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tanks for sediment build-up and remove if necessary	Every 5 years or as required

Table 6.2 – Attenuation Tank Maintenance Schedule

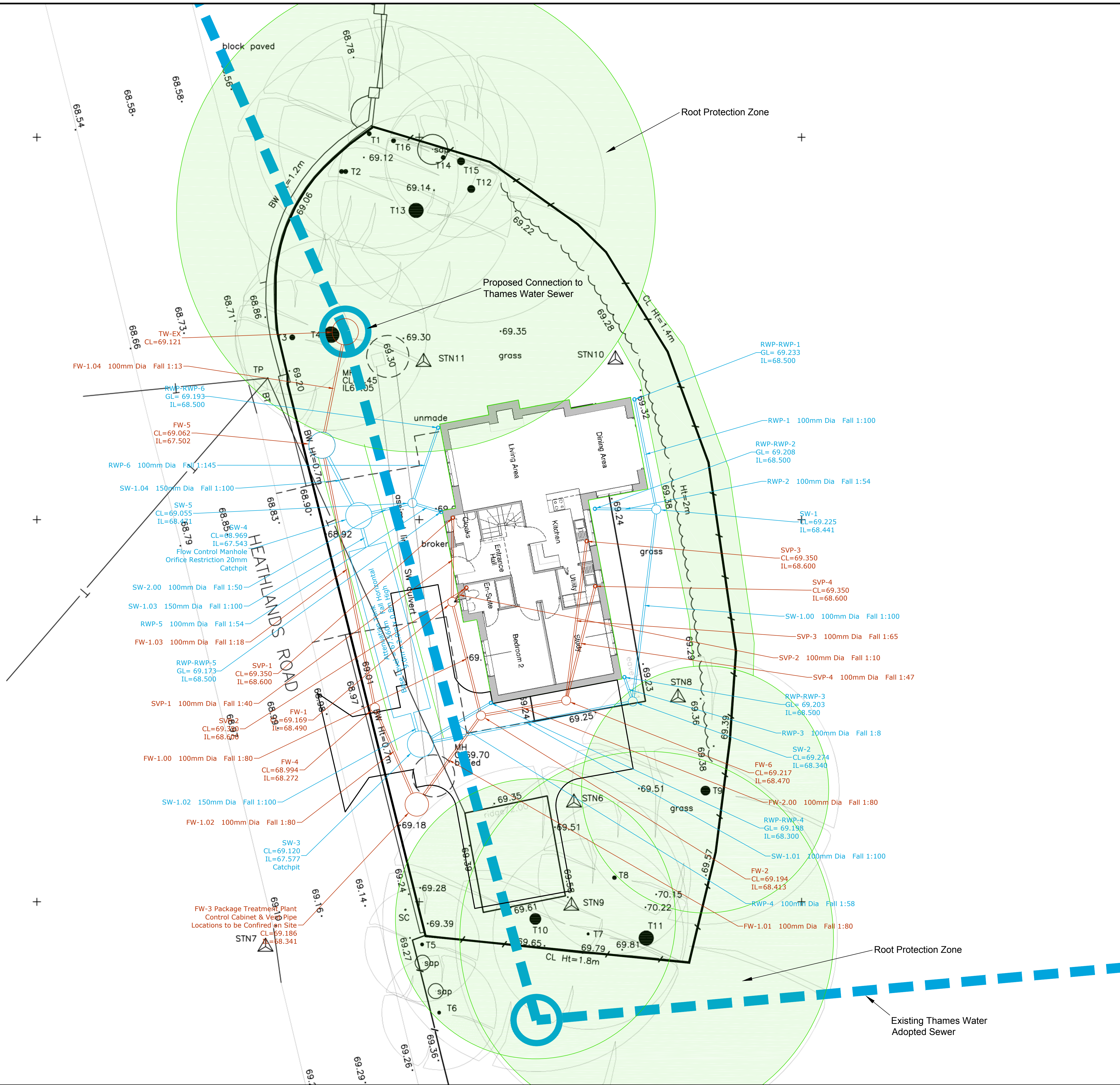
- 5.11 The above information is only intended as guidance in standard maintenance practise for surface water drainage and SuDS features. The above measures should be reviewed regularly and modified to suit the site conditions.

APPENDIX A

Greenfield Runoff Calculations

APPENDIX B

241882/500/01 – Proposed Drainage Layout



NOTES

- All dimensions are in meters unless expressed otherwise and all levels are shown in meters above Ordnance Datum.
- This drawing shall be read in conjunction with the drainage schedules and standard details.
- All existing sewer routes are to be proved on site by the contractor and any discrepancies notified to engineer.
- All sewers shall be constructed in accordance with Part H of the Building Regulations and Sewers Sector Guidance.
- It is the contractors responsibility to ensure compliance with current building regulations and codes of practice.
- Reference should be made to the structural engineers details for all aspects of foundation design and construction.
- The contractor should check all dimensions on site. Any discrepancies shall be reported to the engineer immediately.
- Connections to the adopted drainage authority sewers shall be made under the supervision of the authority. The contractor shall be responsible for obtaining the necessary consents required from the drainage authority.
- Bed type B,F and N shall be used for rigid pipes. Bed type Z shall be used for all gully connections and pipes under proposed carriageways with less than 700mm cover. The concrete bed and surround is to extend to the side of the trench or be of minimum width and voids filled with well compacted selected backfill.
- All precast concrete manhole units are to conform to B.S. 5911. Precast concrete cover slabs are to be heavy duty.
- Downstream exit pipes of 600mm dia. and over should be fitted with heavy duty safety chains across their mouths.
- Where large differential settlement is probable, several short lengths of pipe with flexible joints should be laid on either side of the chamber.
- Where drains pass through foundations, a flexible joint should be provided within 150mm of the face of the structure.
- Fast setting resin mortars may be used in lieu of cement mortar for bedding manhole frames where agreed with the Engineer to enable early cover loading.
- The concrete base slab shall be 225mm minimum thickness for chambers up to 4500mm deep. Manholes over 4500mm deep require a slab 450mm thick.
- All manholes over 2000mm deep are to be fitted with a "DANGER TEST FOR OXYGEN" sign
- Appropriate measures (to be agreed with the district council's building control section) are to be taken to discourage rodent entry into the properties.
- The contractor is to keep a record of any variations made on site, including the relocation of sewers or drains, so that an as built drawing can be prepared upon completion of the project.
- Location of RWP's and SVP's to be confirmed by the architect, Sub Stacks shall not be used unless connected to a ventilated section of the sewer in accordance with Building Regulations.

Rev	Amendment	Drawn	Checked	Approved	Date

LANMOR Consulting
Civil Engineers & Transport Planning
Thorogood House, 34 Tolworth Close, Surbiton, Surrey, KT6 7EW
Telephone: 0208 339 7899 Fax: 0208 339 7898
e-mail: info@lanmor.co.uk
www.lanmor.co.uk

Garages at
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SCALE	1:100	PRJ No.	241882	SIZE	REV
DWG No.	241882/500/01			A1	

FOUL MANHOLE SCHEDULE							
MH Ref	MH Internal Diameter	Cover Level	Depth of MH	MH Type	MH Cover	Pipe Connections	Comments
FW-1	450 mm	69.169 m	0.679 m	PVC	Min Opening 430 x 430 Grade D400	No of pipe connections 3 SVP-1 100 mm Dia IL=68.490 m SVP-2 100 mm Dia IL=68.490 m FW-1.00 100 mm Dia IL=68.490 m	
FW-2	450 mm	69.194 m	0.781 m	PVC	Min Opening 430 x 430 Grade D400	No of pipe connections 3 FW-1.00 100 mm Dia IL=68.413 m FW-2.00 100 mm Dia IL=68.413 m FW-1.01 100 mm Dia IL=68.413 m	
FW-3	1,050 mm	69.186 m	0.845 m	GRP	Min Opening 750 x 675 Grade D400	No of pipe connections 2 FW-1.01 100 mm Dia IL=68.341 m FW-1.02 100 mm Dia IL=68.341 m	Package Treatment Plant Control Cabinet & Vent Pipe Locations to be Confined on Site
FW-4	450 mm	68.994 m	0.722 m	PVC	Min Opening 430 x 430 Grade D400	No of pipe connections 2 FW-1.02 100 mm Dia IL=68.272 m FW-1.03 100 mm Dia IL=68.272 m	
FW-5	1,200 mm	69.062 m	1.560 m	PC Concrete	Min Opening 600 x 600 Grade B125	No of pipe connections 2 FW-1.03 100 mm Dia IL=67.502 m FW-1.04 100 mm Dia IL=67.502 m	
FW-6	450 mm	69.217 m	0.748 m	PVC	Min Opening 430 x 430 Grade D400	No of pipe connections 3 SVP-3 100 mm Dia IL=68.470 m SVP-4 100 mm Dia IL=68.470 m FW-2.00 100 mm Dia IL=68.470 m	

SURFACE WATER MANHOLE SCHEDULE								
MH Ref	MH Internal Diameter	Cover Level	Depth of MH	Sump Depth	MH Type	MH Cover	Pipe Connections	Comments
SW-1	450 mm	69.225 m	0.784 m	0.000 m	PVC	Min Opening 430 x 430 Grade B125	No of pipe connections 3 RWP-1 100 mm Dia IL=68.441 m RWP-2 100 mm Dia IL=68.441 m SW-1.00 100 mm Dia IL=68.441 m	
SW-2	450 mm	69.274 m	0.934 m	0.000 m	PVC	Max Opening 300 x 300 Grade B125	No of pipe connections 3 SW-1.00 100 mm Dia IL=68.340 m RWP-3 100 mm Dia IL=68.340 m SW-1.01 100 mm Dia IL=68.340 m	
SW-3	1,200 mm	69.120 m	1.843 m	0.300 m	PC Concrete	Min Opening 600 x 600 Grade D400	No of pipe connections 3 SW-1.01 100 mm Dia IL=68.227 m RWP-4 100 mm Dia IL=68.227 m SW-1.02 150 mm Dia IL=67.577 m	Catchpit
SW-4	1,200 mm	68.969 m	1.726 m	0.300 m	PC Concrete	Min Opening 600 x 600 Grade D400	No of pipe connections 3 SW-1.03 150 mm Dia IL=67.543 m SW-2.00 100 mm Dia IL=68.414 m SW-1.04 150 mm Dia IL=67.543 m	Flow Control Manhole Orifice Restriction 20mm Catchpit
SW-5	450 mm	69.055 m	0.584 m	0.000 m	PVC	Min Opening 430 x 430 Grade B125	No of pipe connections 3 RWP-6 100 mm Dia IL=68.471 m RWP-5 100 mm Dia IL=68.471 m SW-2.00 100 mm Dia IL=68.471 m	

FOUL PIPE SCHEDULE									
Pipe Name	Diameter	Length	Slope	Material	Pipe Bed	Upstream Manhole	Upstream Invert	Downstream Manhole	Downstream Invert
FW-1.00	100 mm	6.131 m	1:80	PVC	S or Z	FW-1	68.490 m	FW-2	68.413 m
FW-1.01	100 mm	5.733 m	1:80	PVC	S or Z	FW-2	68.413 m	FW-3	68.341 m
FW-1.02	100 mm	5.520 m	1:80	PVC	S or Z	FW-3	68.341 m	FW-4	68.272 m
FW-1.03	100 mm	14.009 m	1:18	PVC	S or Z	FW-4	68.272 m	FW-5	67.502 m
FW-1.04	100 mm	6.066 m	1:13	Vitrified Clay to SSG E2.18	B, N, F or Z to SSG E2.25	FW-5	67.502 m	TW-EX	67.050 m
FW-2.00	100 mm	4.529 m	1:80	PVC	S or Z	FW-6	68.470 m	FW-2	68.413 m
SVP-1	100 mm	4.407 m	1:40	PVC	S or Z	SVP-1	68.600 m	FW-1	68.490 m
SVP-2	100 mm	1.049 m	1:10	PVC	S or Z	SVP-2	68.600 m	FW-1	68.490 m
SVP-3	100 mm	8.401 m	1:65	PVC	S or Z	SVP-3	68.600 m	FW-6	68.470 m
SVP-4	100 mm	6.165 m	1:47	PVC	S or Z	SVP-4	68.600 m	FW-6	68.470 m

SURFACE WATER PIPE SCHEDULE									
Pipe Name	Diameter	Length	Slope	Material	Pipe Bed	Upstream Manhole	Upstream Invert	Downstream Manhole	Downstream Invert
RWP-1	100 mm	5.873 m	1:100	PVC	S or Z	RWP-1	68.500 m	SW-1	68.441 m
RWP-2	100 mm	3.214 m	1:54	PVC	S or Z	RWP-2	68.500 m	SW-1	68.441 m
RWP-3	100 mm	1.344 m	1:8	PVC	S or Z	RWP-3	68.500 m	SW-2	68.340 m
RWP-4	100 mm	4.268 m	1:58	PVC	S or Z	RWP-4	68.300 m	SW-3	68.227 m
RWP-5	100 mm	1.565 m	1:54	PVC	S or Z	RWP-5	68.500 m	SW-5	68.471 m
RWP-6	100 mm	4.164 m	1:145	PVC	S or Z	RWP-6	68.500 m	SW-5	68.471 m
SW-1.00	100 mm	10.126 m	1:100	PVC	S or Z	SW-1	68.441 m	SW-2	68.340 m
SW-1.01	100 mm	11.330 m	1:100	PVC	S or Z	SW-2	68.340 m	SW-3	68.227 m
SW-1.02	150 mm	1.690 m	1:100	PVC	S or Z	SW-3	67.577 m	Tank in	67.560 m
SW-1.03	150 mm	1.690 m	1:100	PVC	S or Z	Tank out	67.560 m	SW-4	67.543 m
SW-1.04	150 mm	4.163 m	1:100	PVC	S or Z	SW-4	67.543 m	FW-5	67.502 m
SW-2.00	100 mm	2.886 m	1:50	PVC	S or Z	SW-5	68.471 m	SW-4	68.414 m
Tank	2.00m x 800mm deep	9.000 m	Horizontal	Cellular Crate	To Manufacturer's Specification	Tank in	67.560 m	Tank out	67.560 m

- NOTES
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2.

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3.

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4.

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Reference should be made to the structural engineers details for all aspects of foundation design and construction.
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9.

Bed type B,F and N shall be used for rigid pipes. Bed type Z shall be used for all gully connections and pipes under proposed carriageways with less than 700mm cover. The concrete bed and surround is to extend to the side of the trench or be of minimum width and voids filled with well compacted selected backfill.
10.

All precast concrete manhole units are to conform to B.S. 5911. Precast concrete cover slabs are to be heavy duty.
11.

Downstream exit pipes of 600mm dia. and over should be fitted with heavy duty safety chains across their mouths.
12.

Where large differential settlement is probable, several short lengths of pipe with flexible joints should be laid on either side of the chamber.
13.

Where drains pass through foundations, a flexible joint should be provided within 150mm of the face of the structure.
14.

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15.

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18.

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19.

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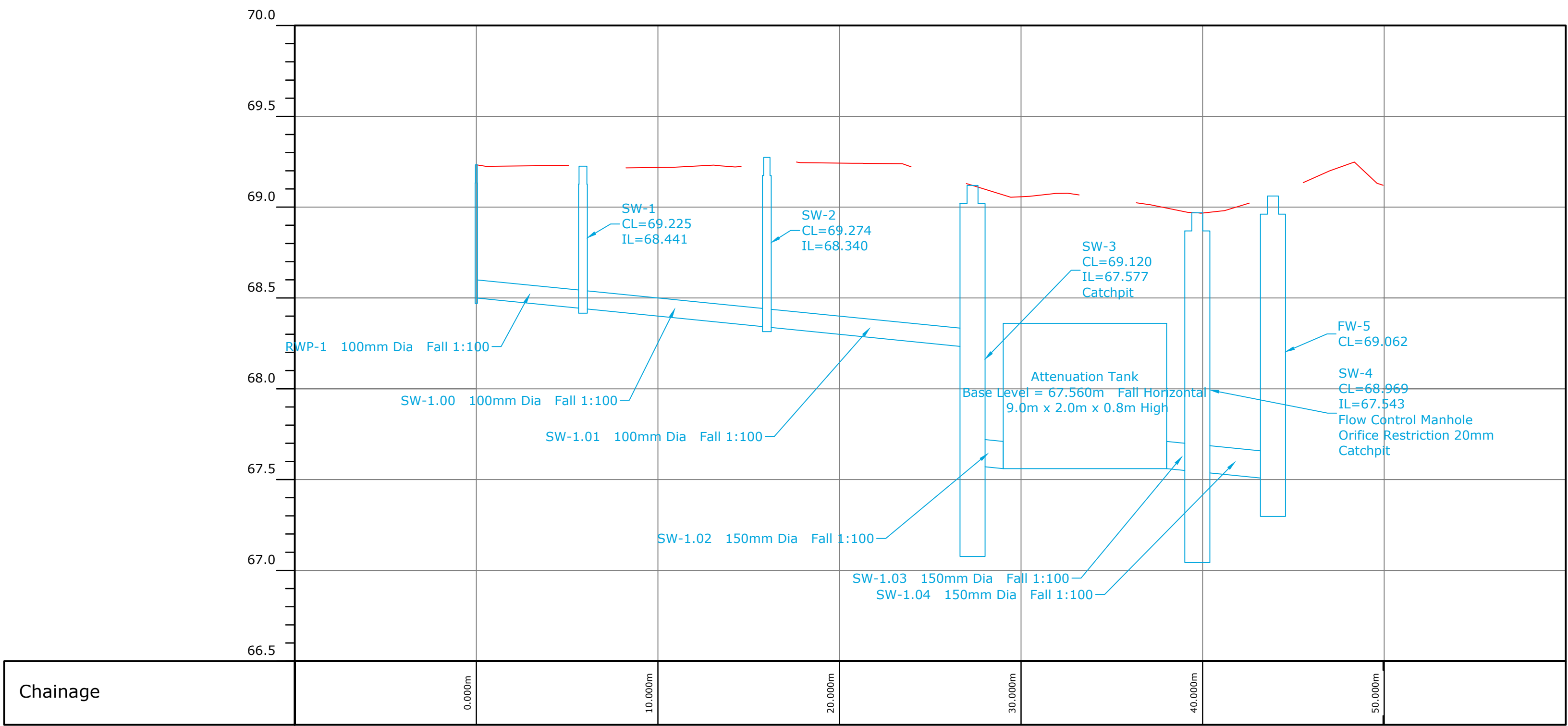
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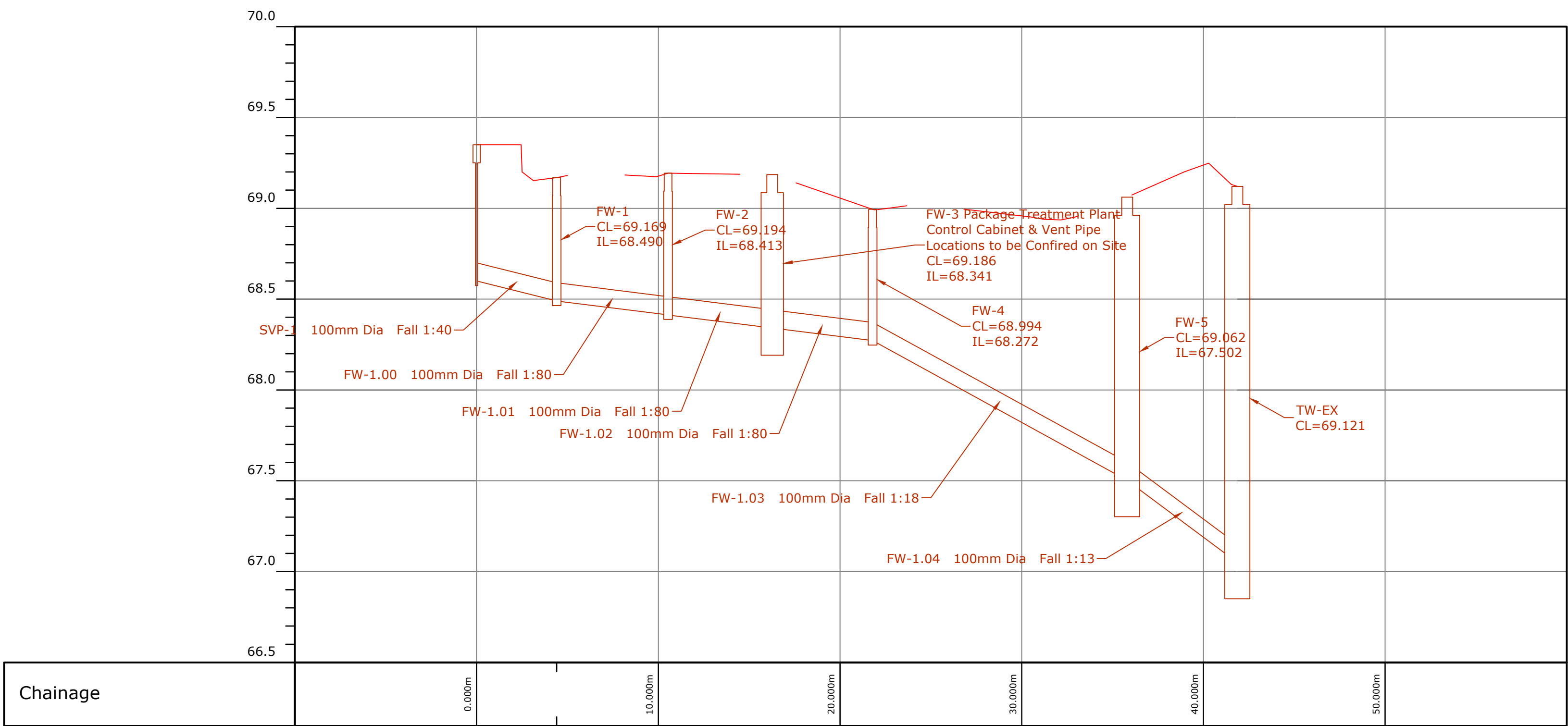
Garages at
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SW Branch 1



Foul Branch 1



NOTES

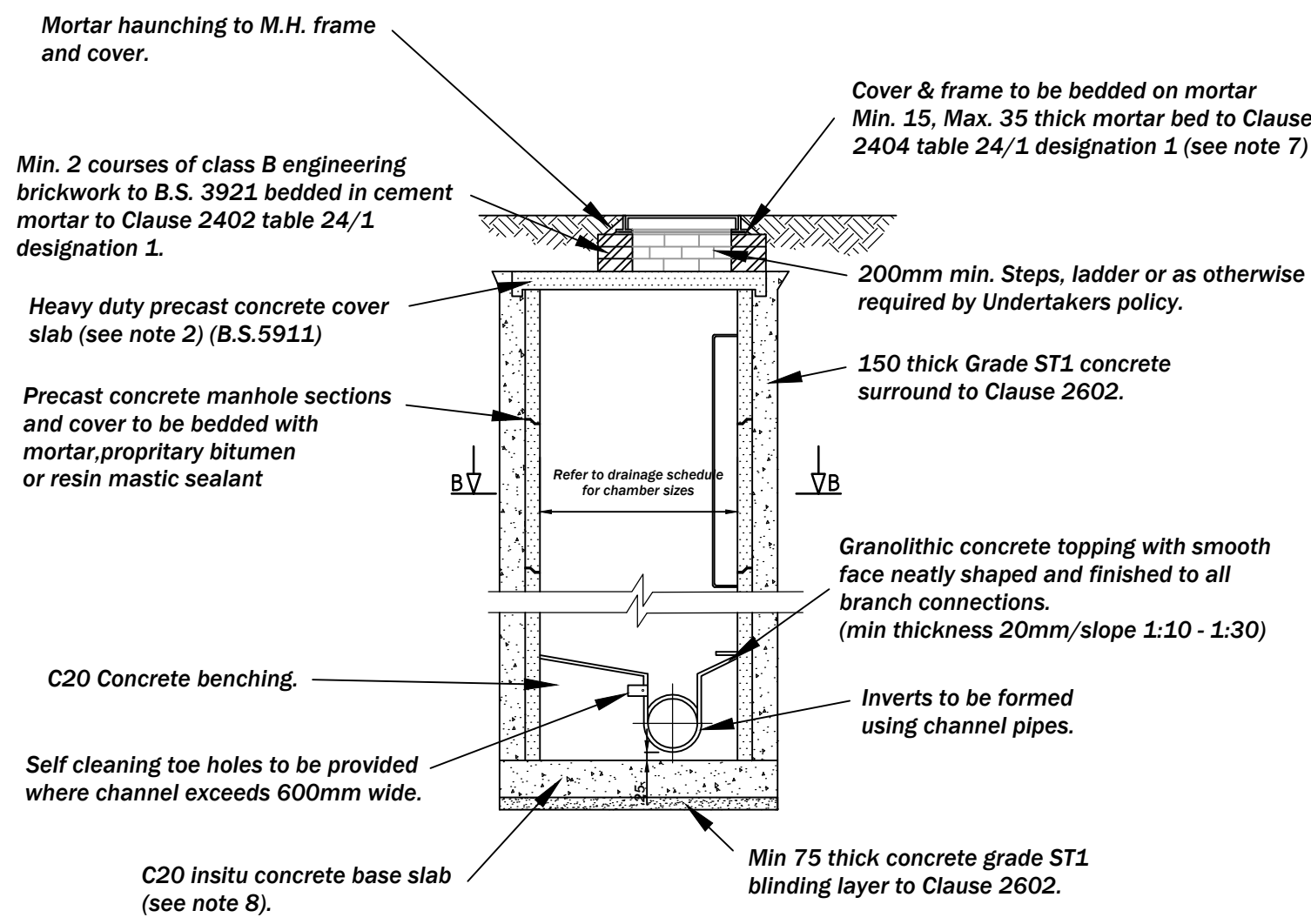
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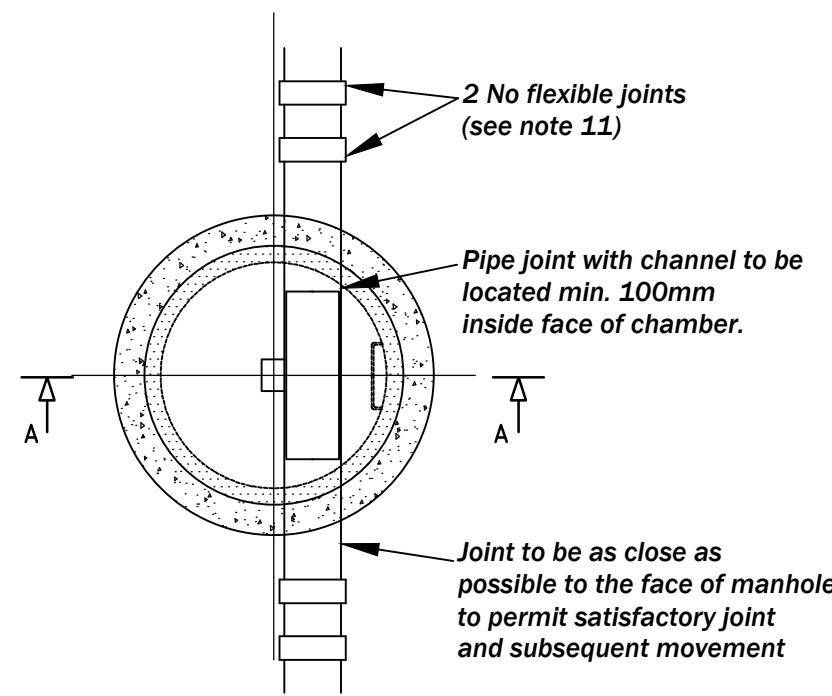
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Garages at
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Profiles

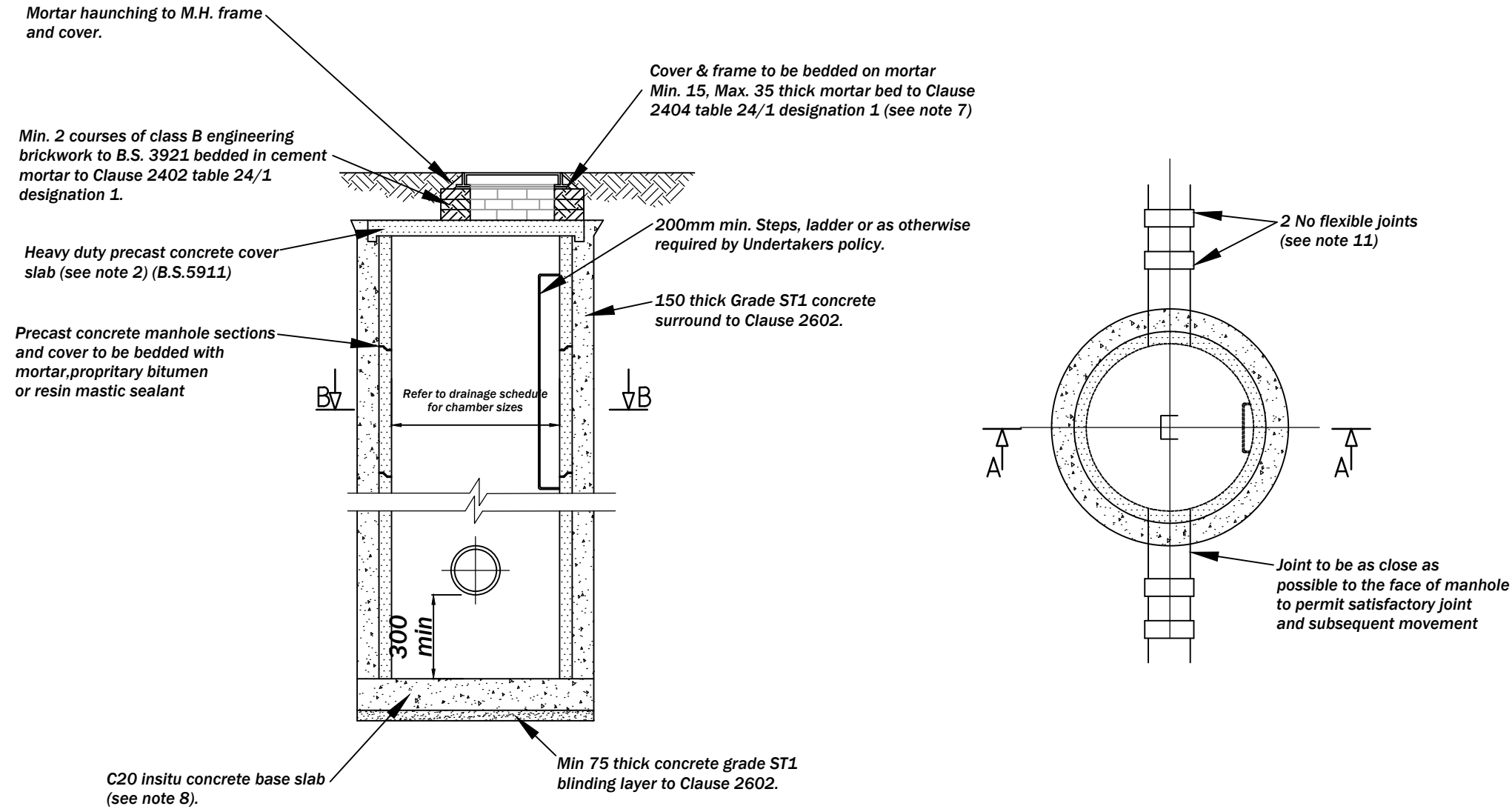
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SCALE	Horz 1:100 Vert 1:10	PRJ No.	241882	SIZE	REV
DWG No.	241882/520/01			A1	



SECTION A - A



SECTIONAL PLAN B - B

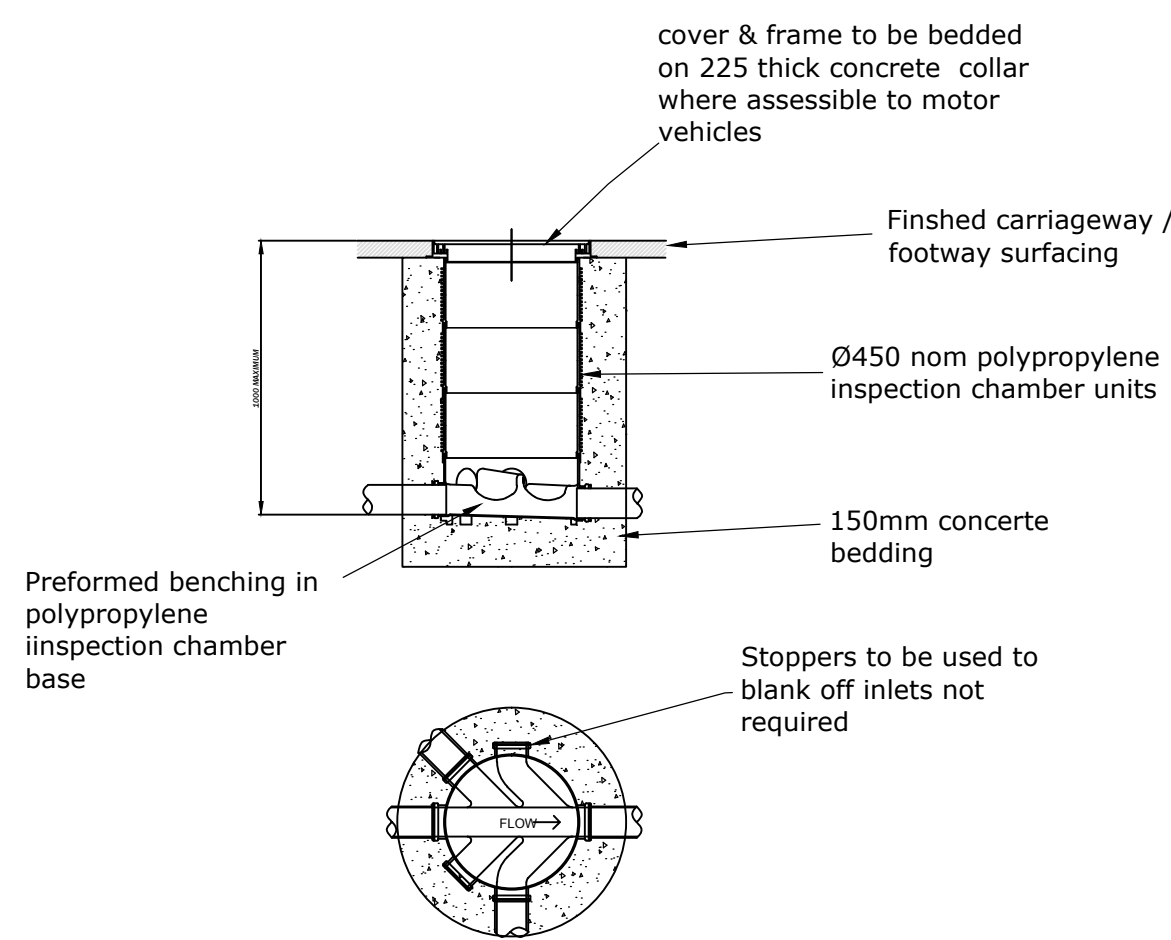


SECTION A - A

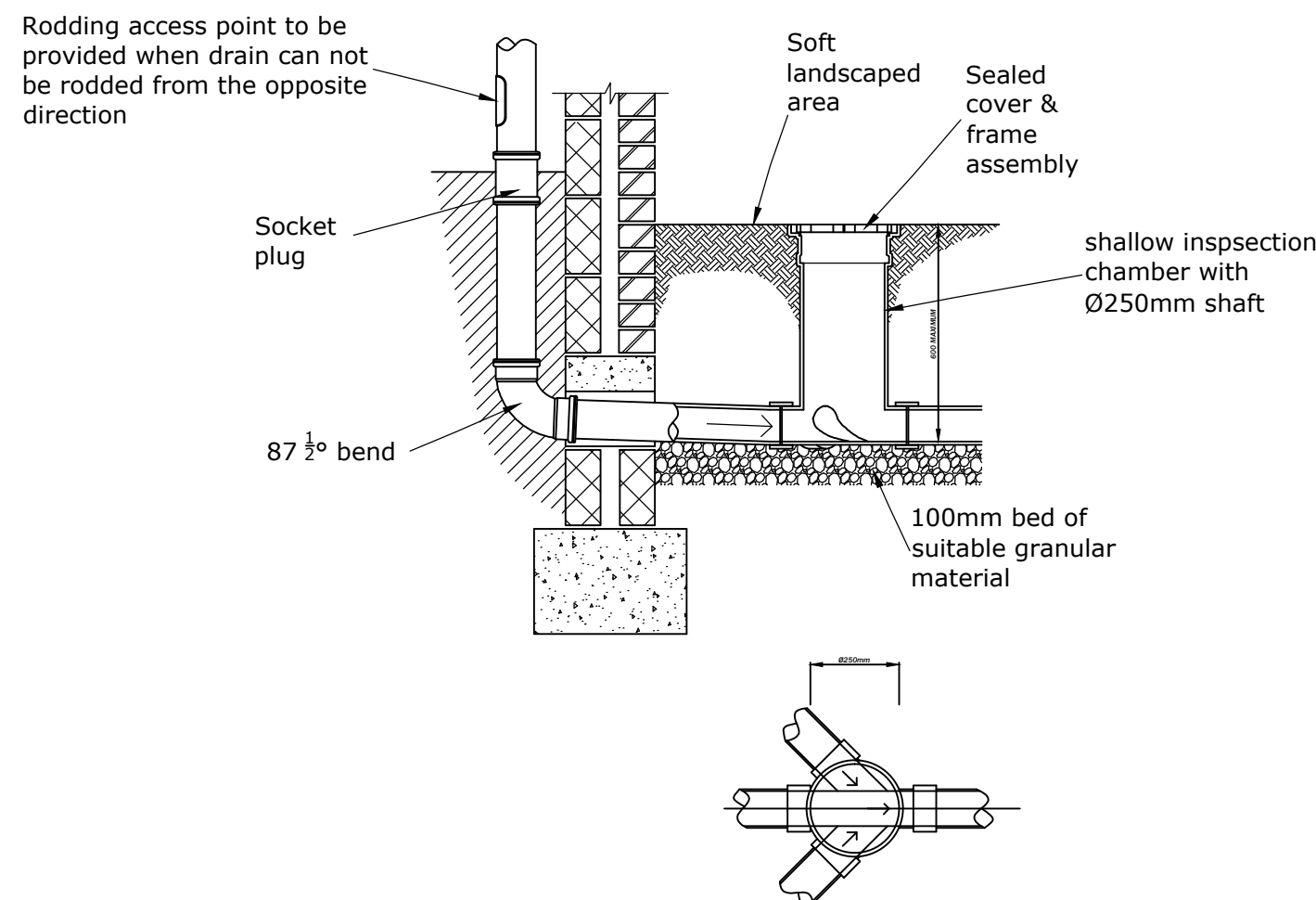
SECTIONAL PLAN B - B

Manhole detail for depths up to 3000mm to invert.

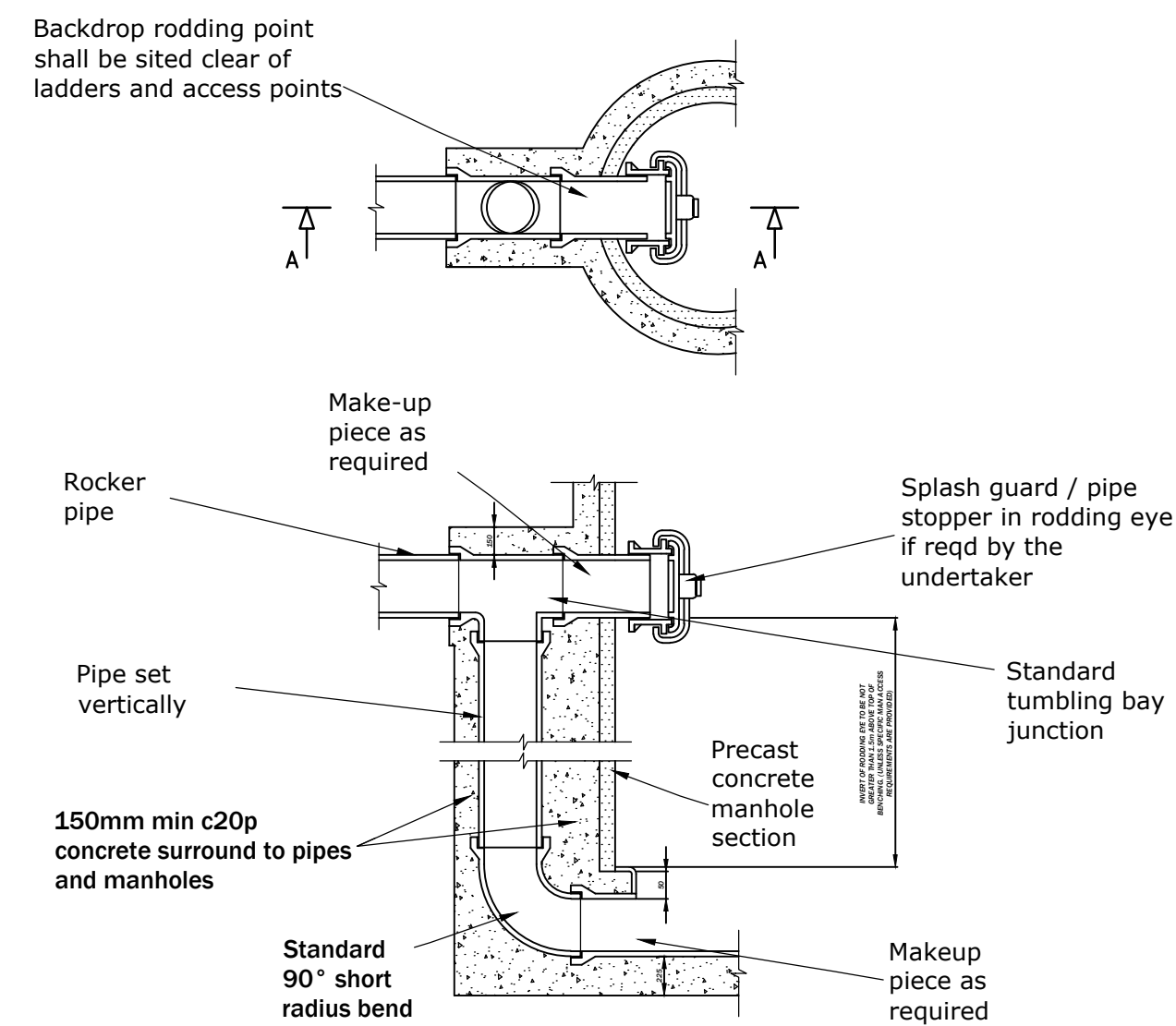
Catchpit detail for depths up to 3000mm to invert.



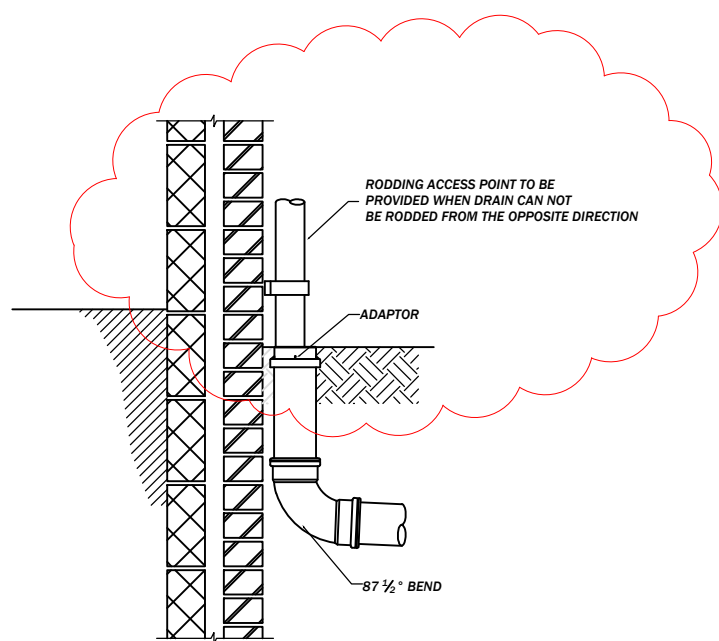
Inspection chamber.



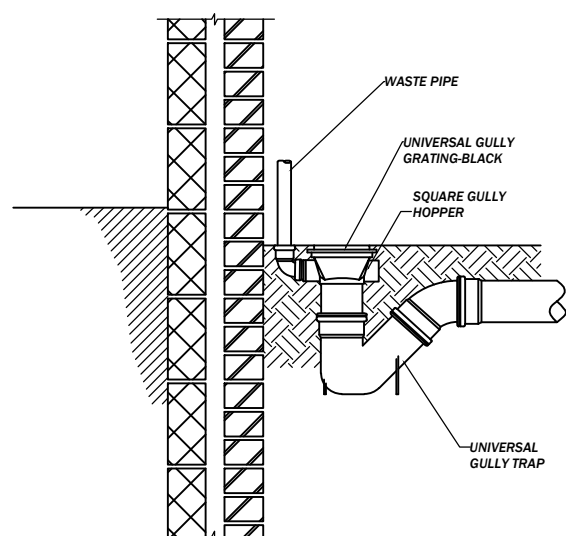
Shallow Inspection Chamber / SVP Detail.



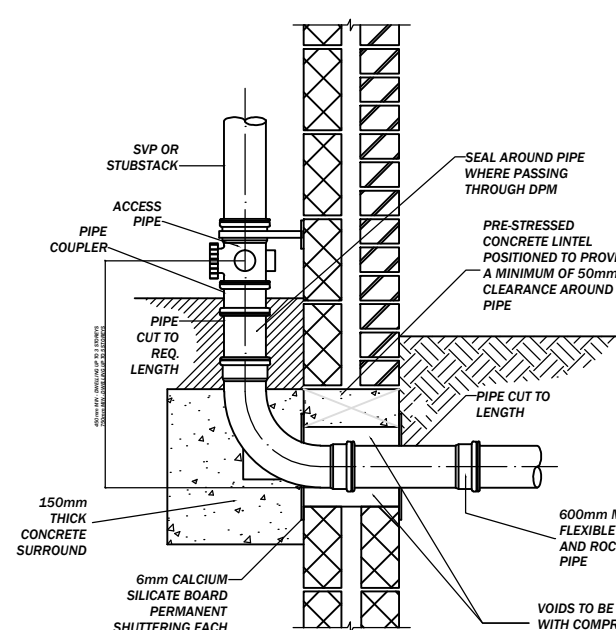
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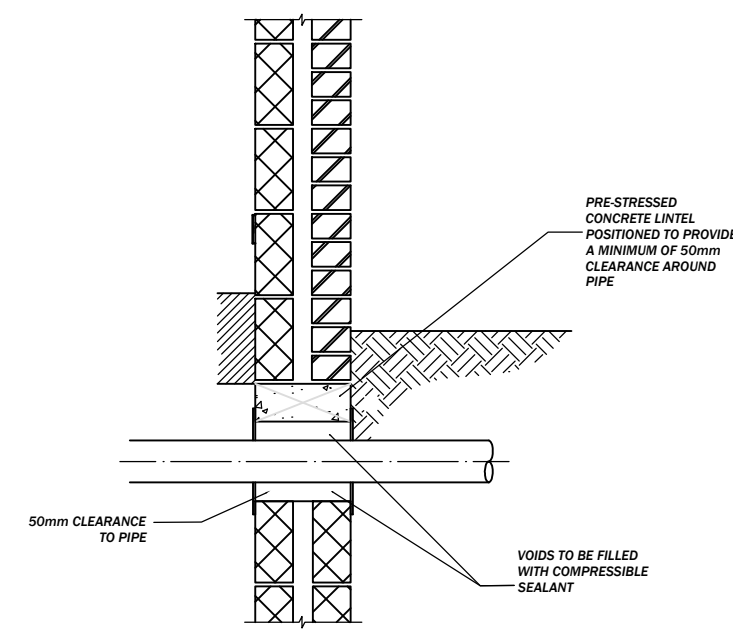
Rainwater down pipe detail



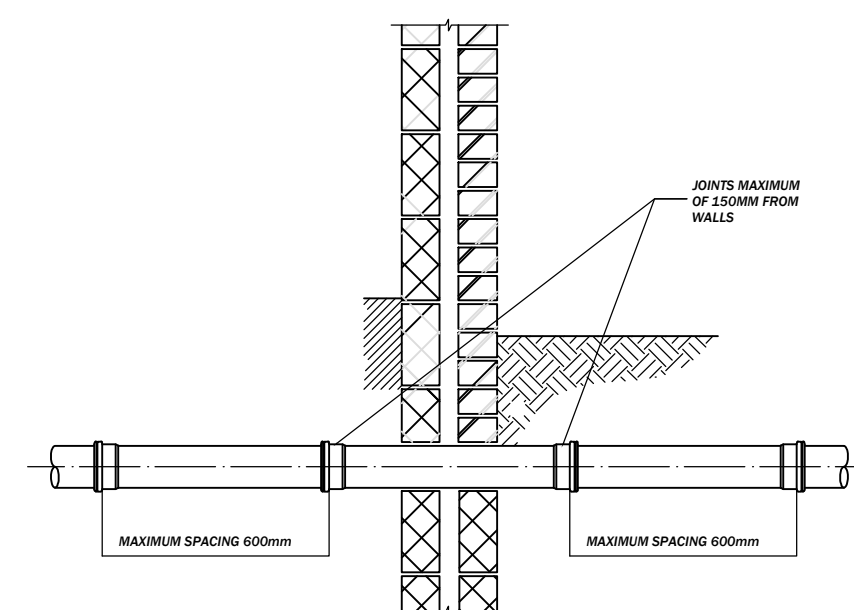
External gully and rainwater pipe detail



Internal SVP detail



Pipe penetration through wall



NOTES

- All dimensions are in meters unless expressed otherwise and all levels are shown in meters above Ordnance Datum.
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- All precast concrete manhole units are to conform to B.S. 5911. Precast concrete cover slabs are to be heavy duty.
- Downstream exit pipes of 600mm dia. and over should be fitted with heavy duty safety chains across their mouths.
- Where large differential settlement is probable, several short lengths of pipe with flexible joints should be laid on either side of the chamber.
- Where drains pass through foundations, a flexible joint should be provided within 150mm of the face of the structure.
- Fast setting resin mortars may be used in lieu of cement mortar for bedding manhole frames where agreed with the Engineer to enable early cover loading.
- The concrete base slab shall be 225mm minimum thickness for chambers up to 4500mm deep. Manholes over 4500mm deep require a slab 450mm thick.
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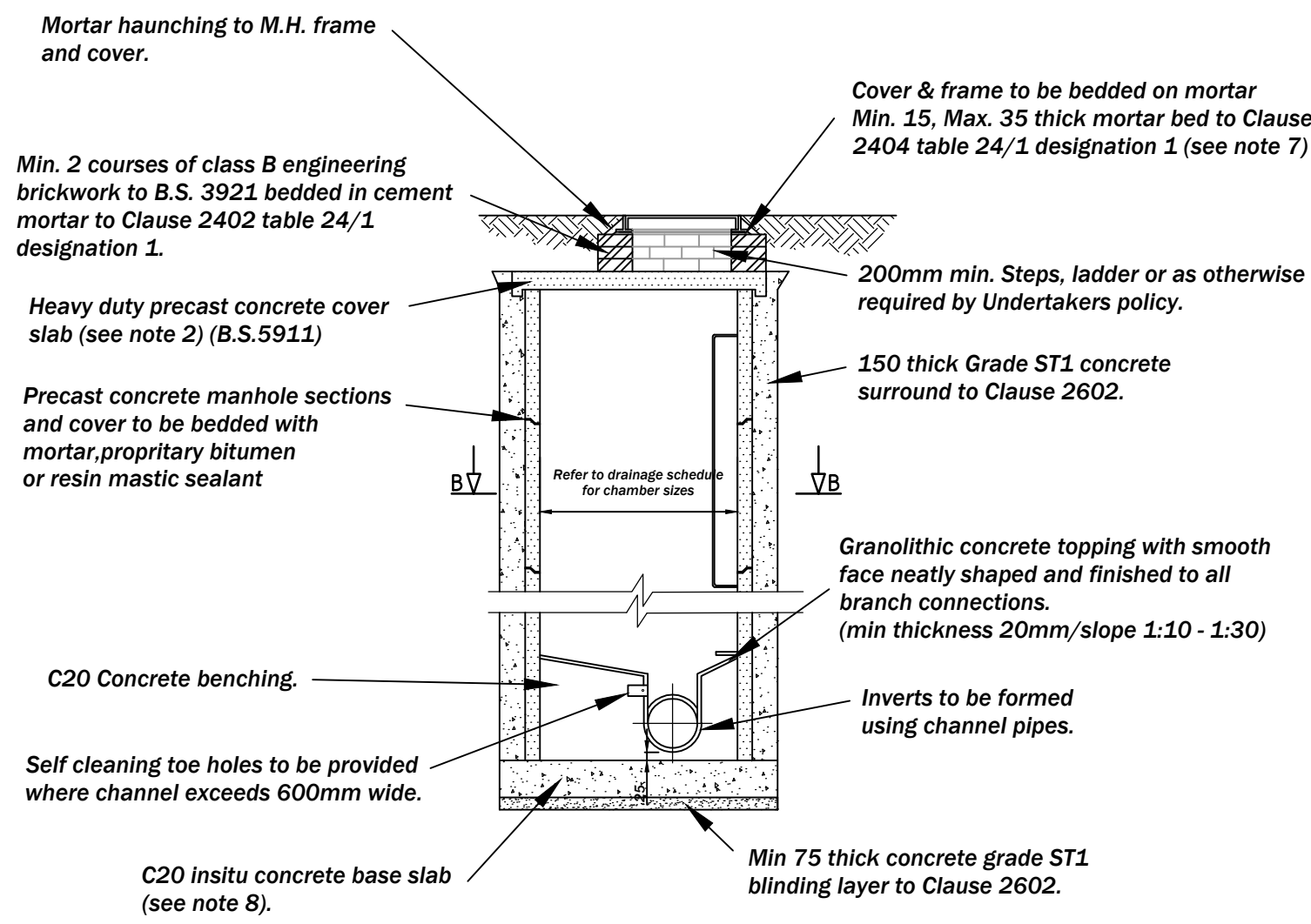
Rev	Amendment	Drawn	Checked	Approved	Date

LANMOR Consulting
Civil Engineers & Transport Planning
Thorogood House, 34 Tolworth Close, Surbiton, Surrey, KT6 7EW
Telephone: 0208 339 7899 Fax: 0208 339 7898
e-mail: info@lanmor.co.uk
www.lanmor.co.uk

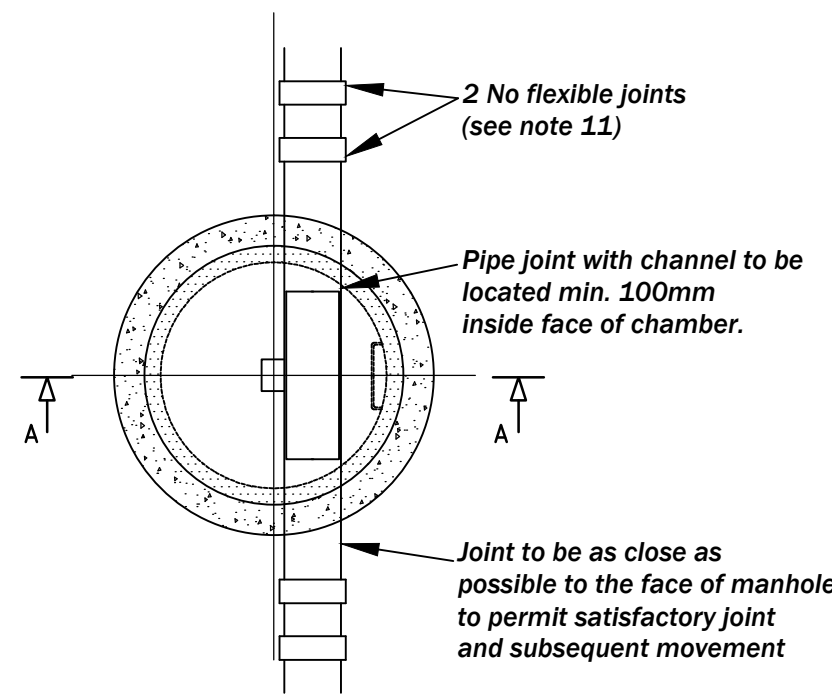
Garages at
Heathland Road
Proposed Drainage
Construction Details

Sheet 1 of 2

DRAWN	RS	CHECKED	KBL	APPROVED	KBL
DATE	Dec-24	DATE	Dec-24	DATE	Dec-24
SCALE	N.T.S.	PRJ No.	241882	SIZE	REV
DWG No.	241882/SD/01			A1	

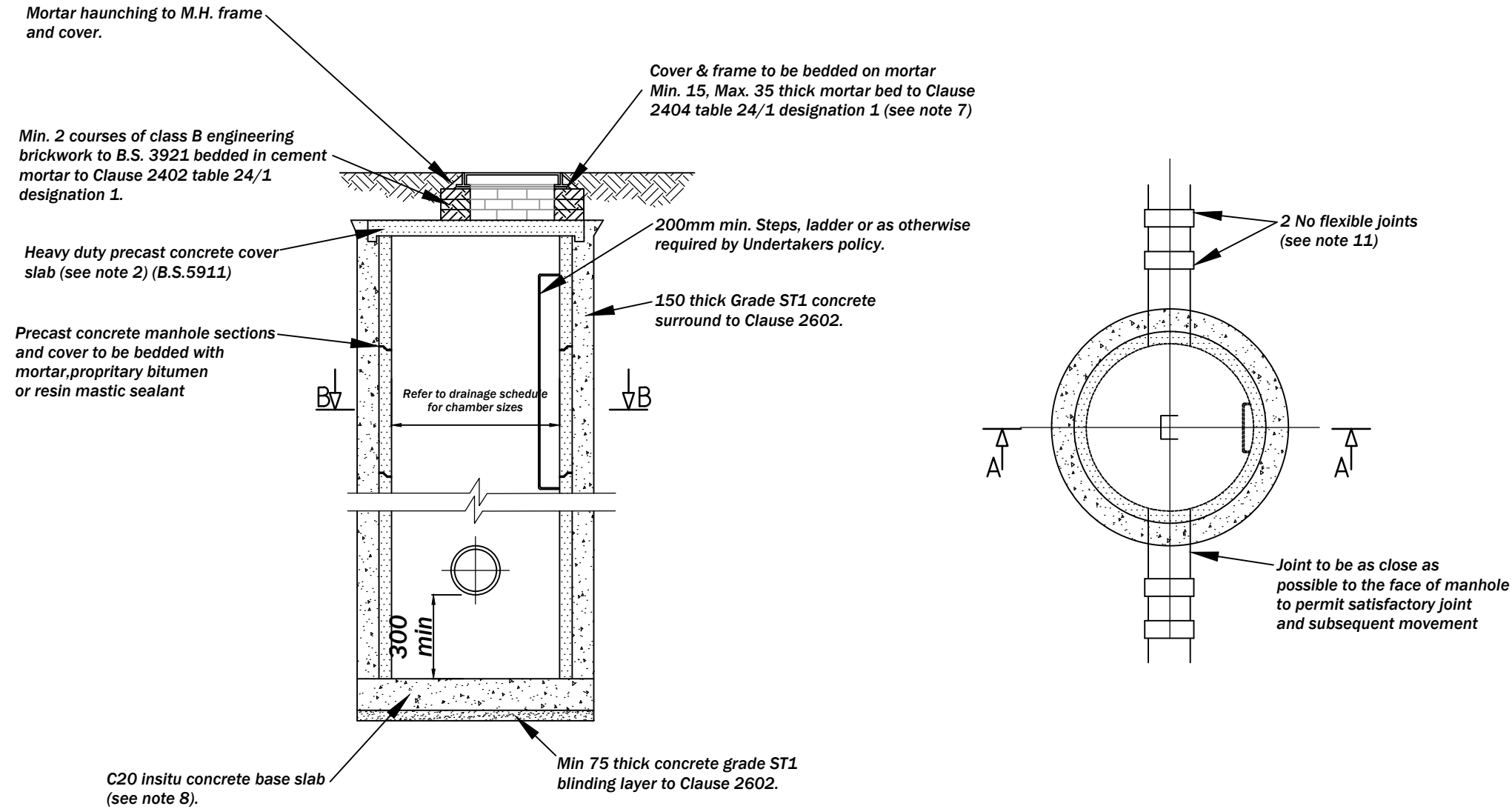


SECTION A - A



SECTIONAL PLAN B - B

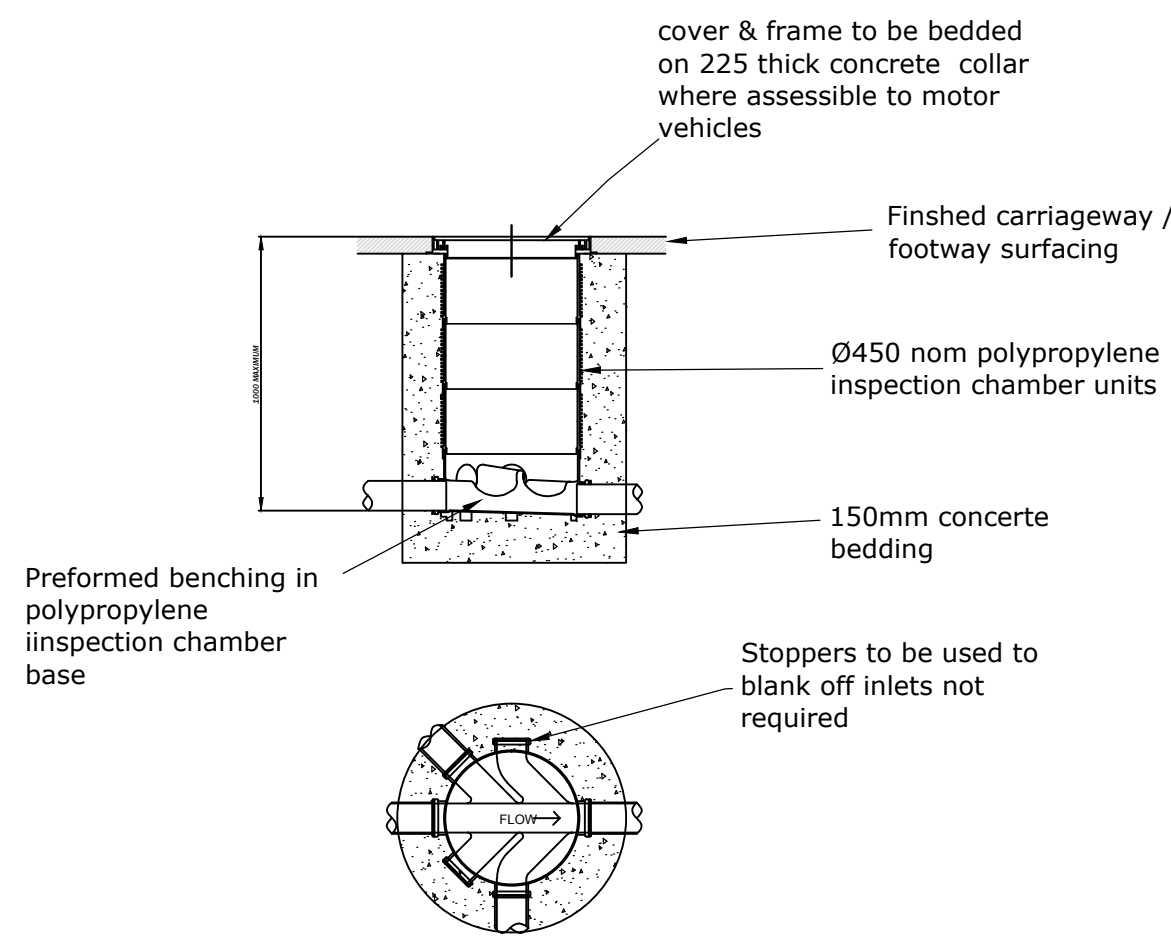
Manhole detail for depths up to 3000mm to invert.



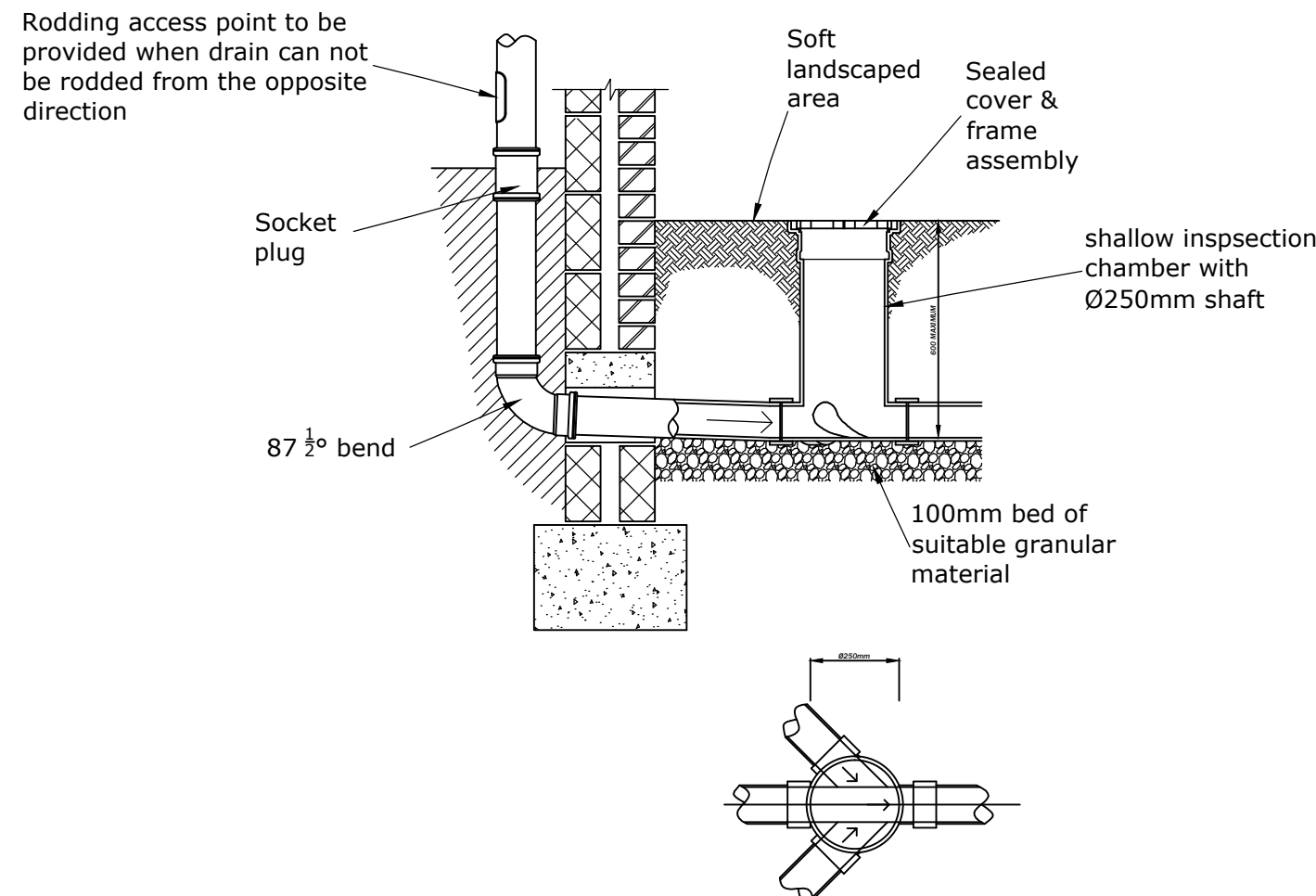
SECTION A - A

SECTIONAL PLAN B - B

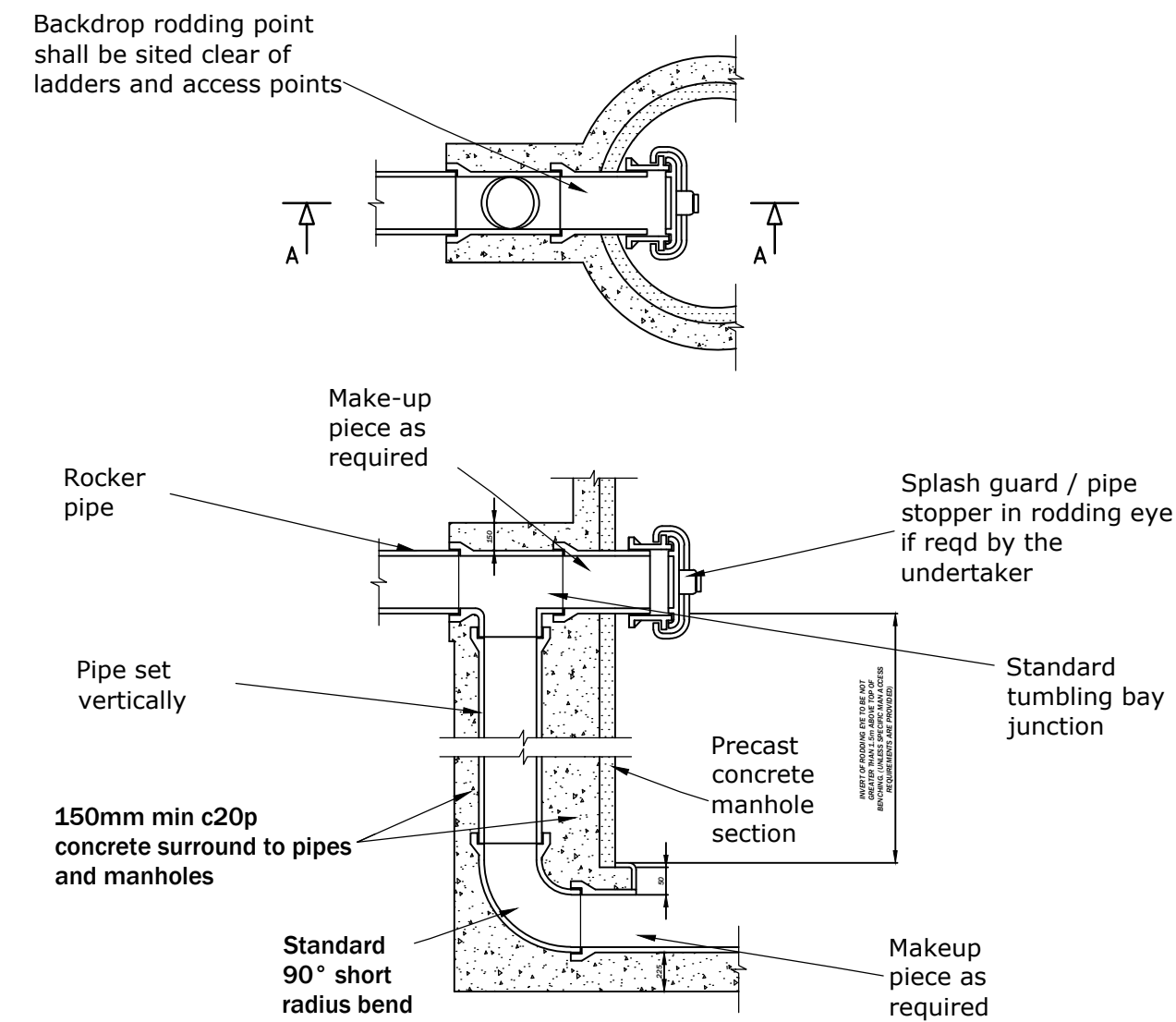
Catchpit detail for depths up to 3000mm to invert.



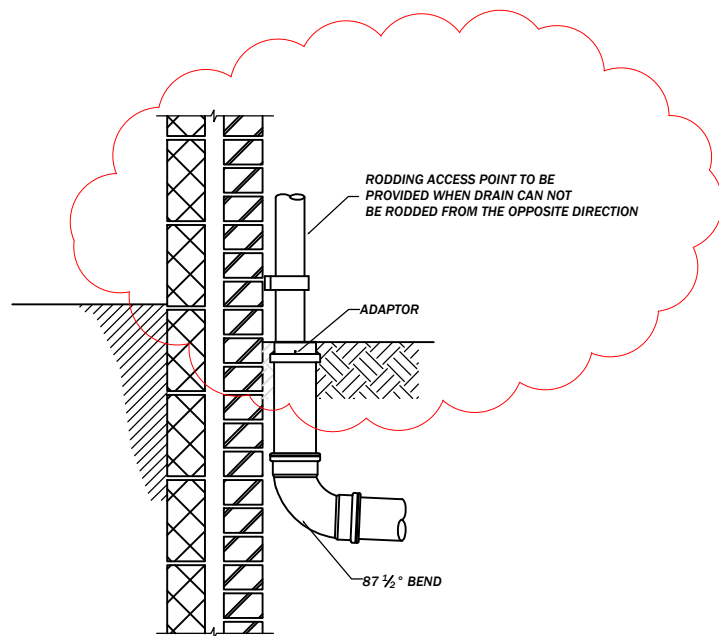
Inspection chamber.



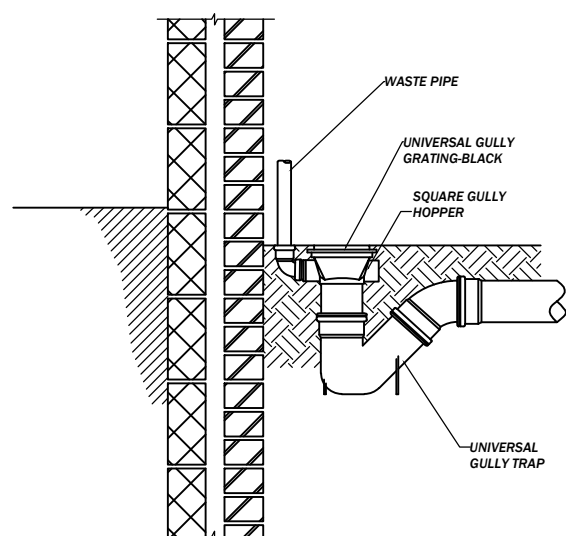
Shallow Inspection Chamber / SVP Detail.



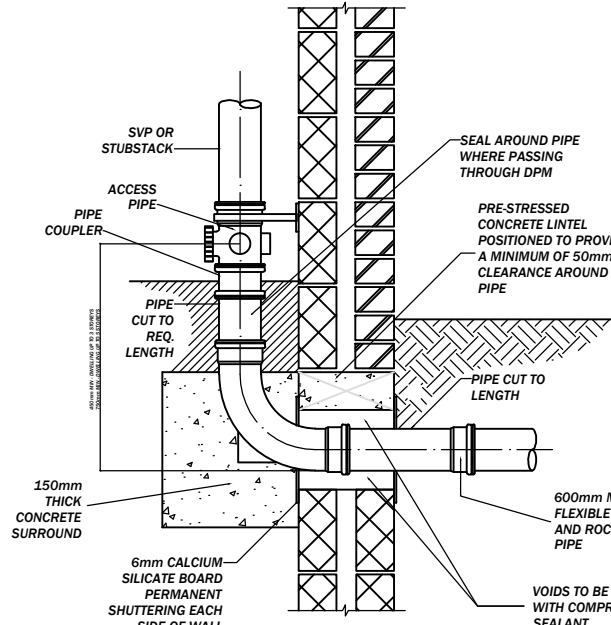
Backdrop Detail.



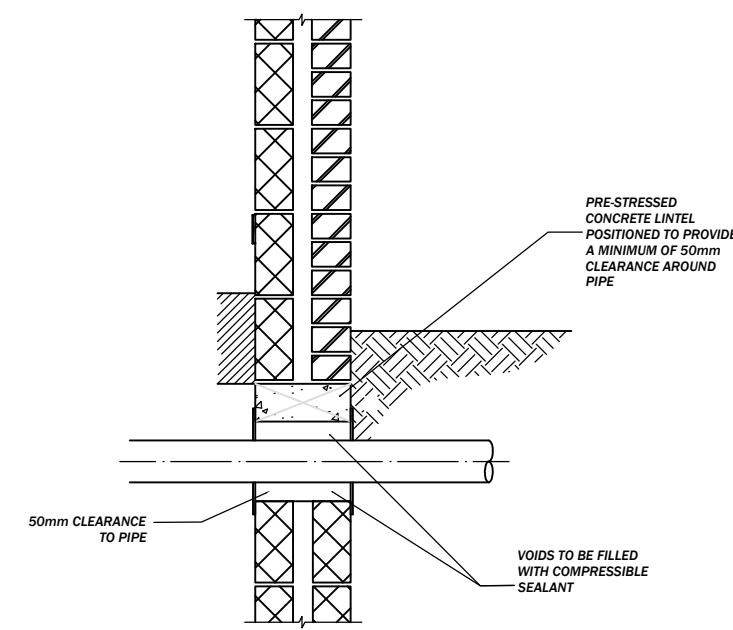
Rainwater down pipe detail



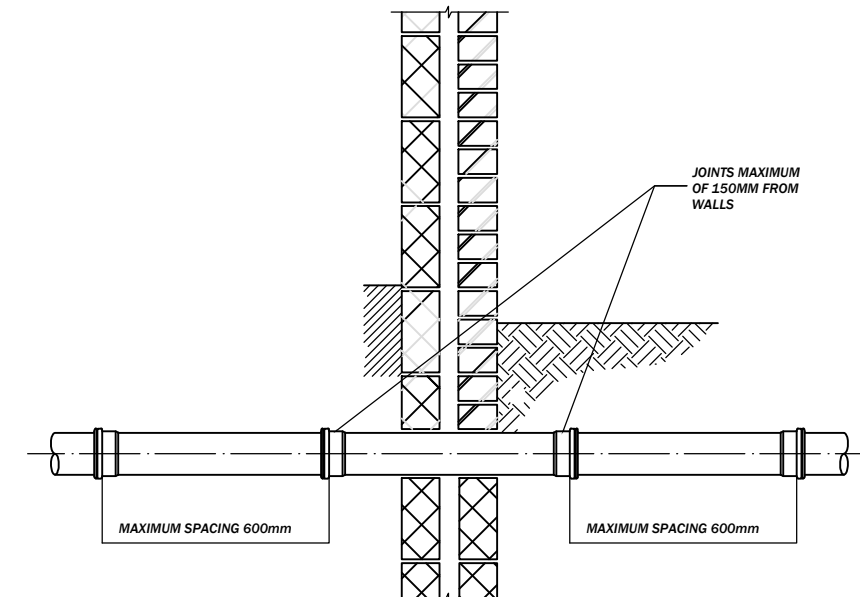
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Rev	Amendment	Drawn	Checked	Approved	Date

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Garages at
Heathland Road
Proposed Drainage
Construction Details

Sheet 1 of 2

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SCALE	N.T.S.	PRJ No.	241882	SIZE	REV
DWG No.	241882/SD/01			A1	

APPENDIX C

MicroDrainage Calculations

Lanmor Consulting Ltd		Page 3
Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW		
Date 22/12/2024 19:10 File Tank.srcx	Designed by Kunal Checked by	
XP Solutions Source Control 2015.1		

Rainfall Details

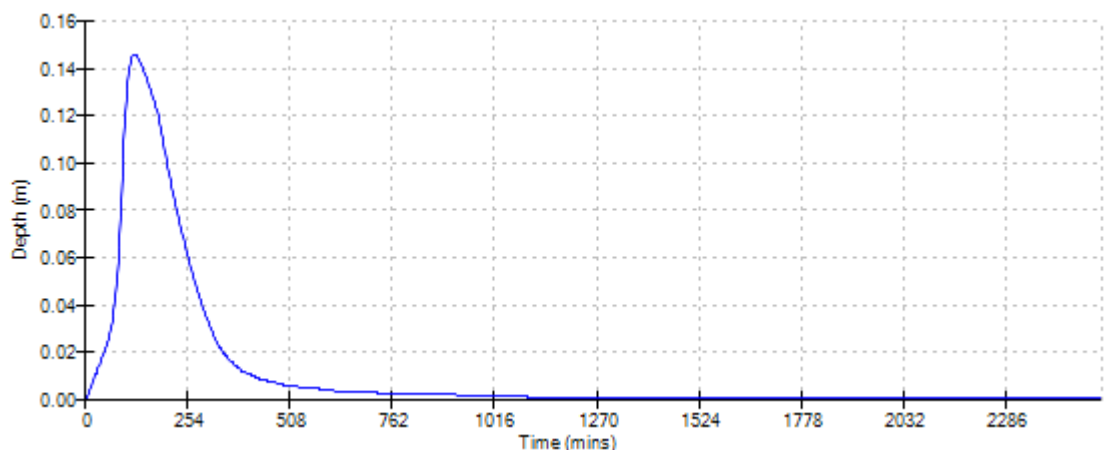
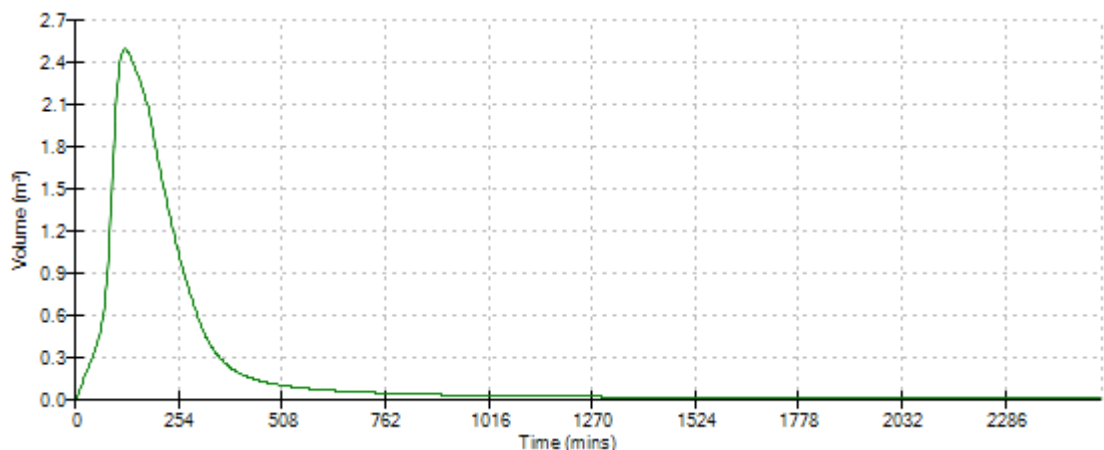
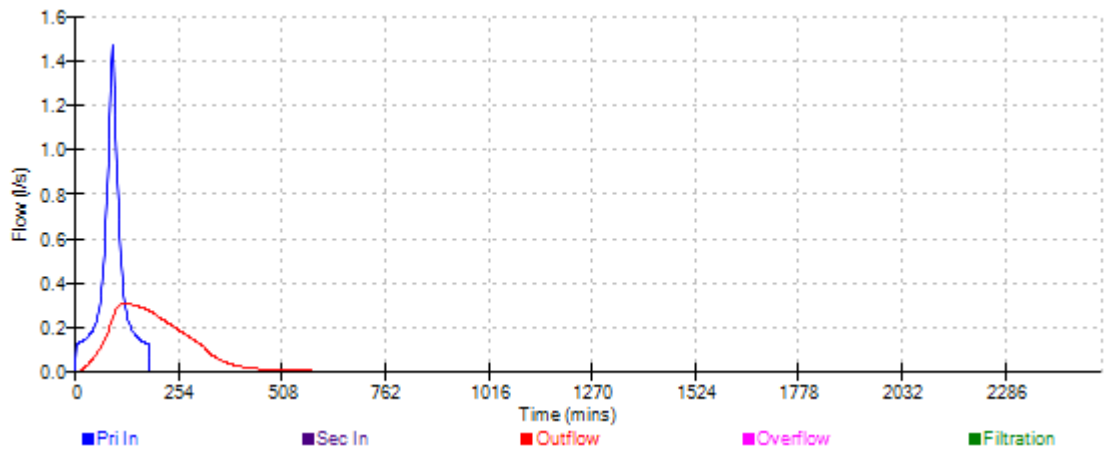
Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.950
Region	England and Wales	Cv (Winter)	0.950
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.024

Time (mins)		Area
From:	To:	(ha)
0	4	0.024

Event: 180 min Summer



Lanmor Consulting Ltd		Page 3
Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW		
Date 22/12/2024 19:09	Designed by Kunal	
File Tank.srcx	Checked by	
XP Solutions	Source Control 2015.1	

Rainfall Details

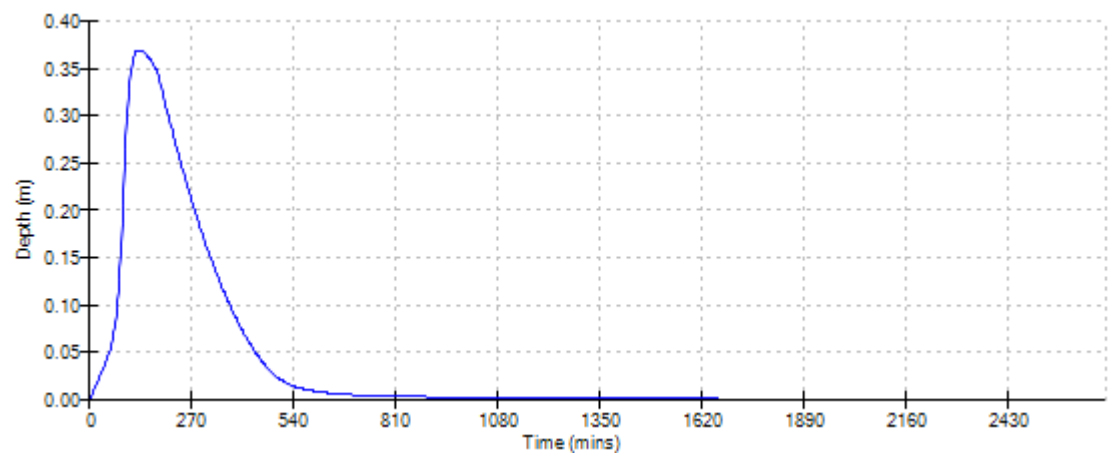
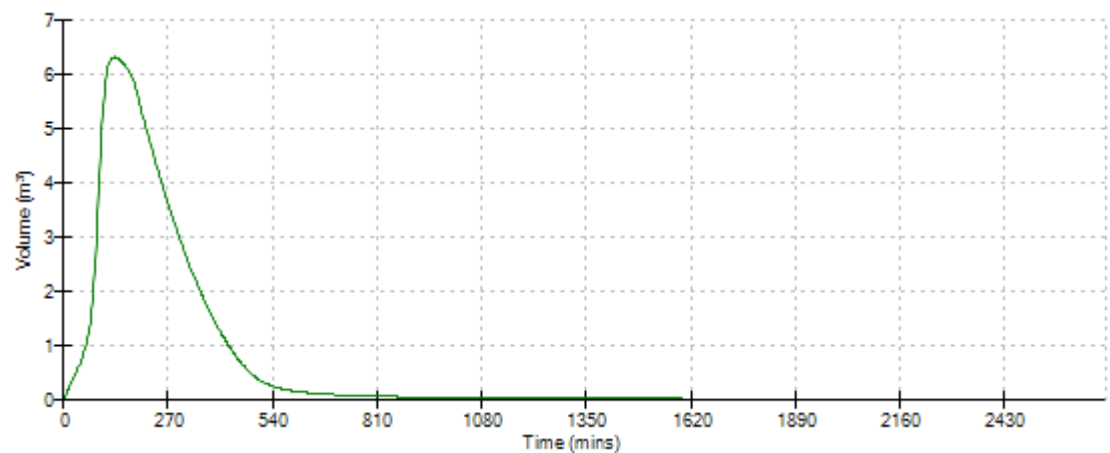
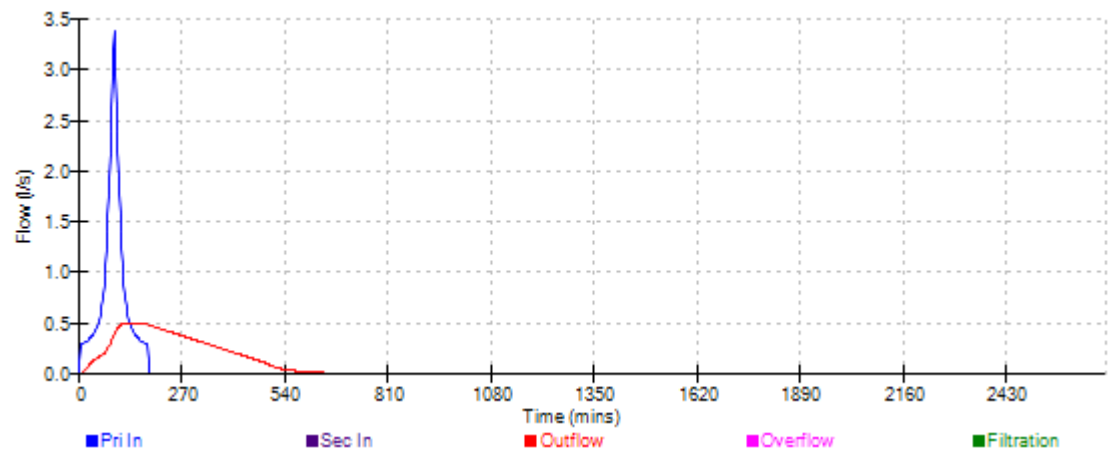
Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.950
Region	England and Wales	Cv (Winter)	0.950
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.024

Time (mins)		Area
From:	To:	(ha)
0	4	0.024

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Lanmor Consulting Ltd		Page 3
Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW		
Date 22/12/2024 19:09	Designed by Kunal	
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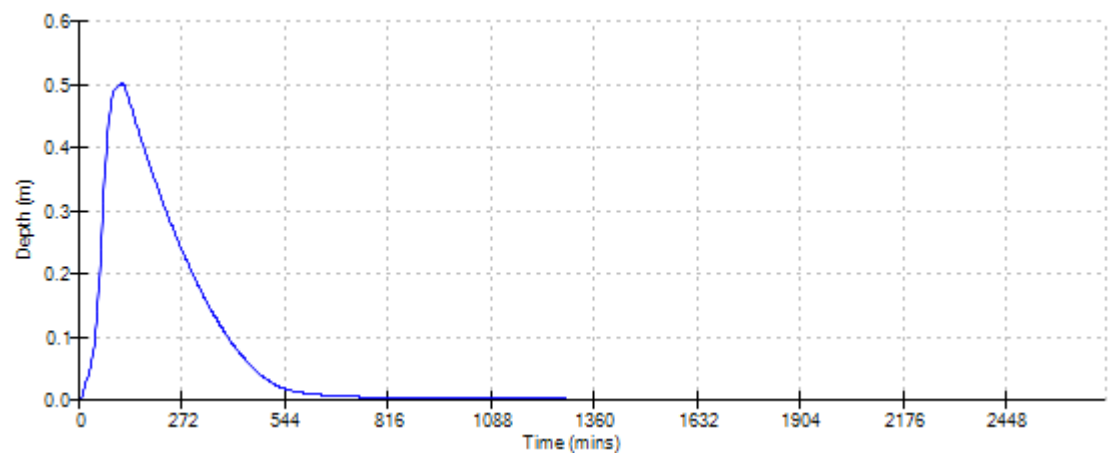
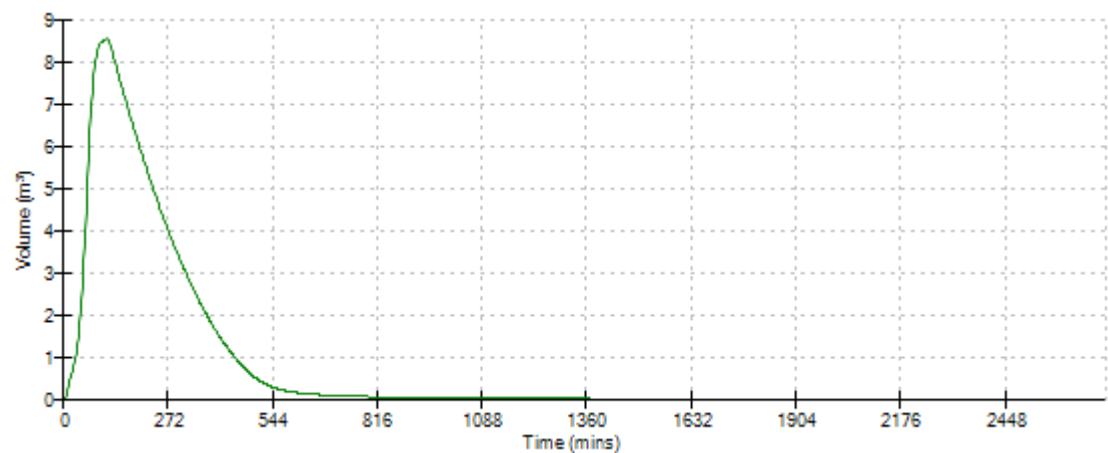
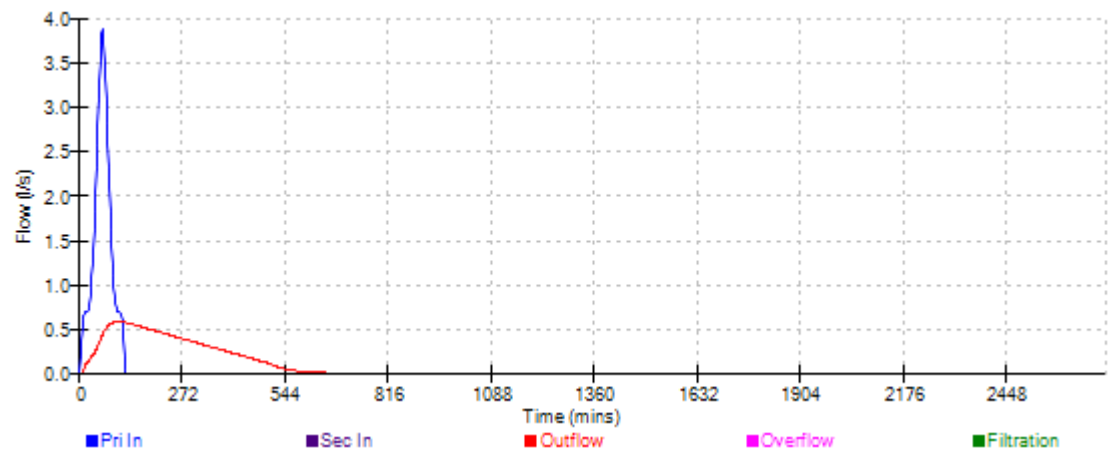
Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.950
Region	England and Wales	Cv (Winter)	0.950
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.024

Time (mins)		Area
From:	To:	(ha)
0	4	0.024

Event: 120 min Winter



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Thorogood House
34 Tolworth Close
Surbition Surrey KT6 7EW

Date 22/12/2024 19:08
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Page 1



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Source Control 2015.1

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 178 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	67.739	0.439	0.0	0.5	0.5	7.5	O K
30 min Summer	67.861	0.561	0.0	0.6	0.6	9.6	O K
60 min Summer	67.965	0.665	0.0	0.7	0.7	11.4	O K
120 min Summer	68.023	0.723	0.0	0.7	0.7	12.4	O K
180 min Summer	68.029	0.729	0.0	0.7	0.7	12.5	O K
240 min Summer	68.024	0.724	0.0	0.7	0.7	12.4	O K
360 min Summer	68.005	0.705	0.0	0.7	0.7	12.0	O K
480 min Summer	67.979	0.679	0.0	0.7	0.7	11.6	O K
600 min Summer	67.951	0.651	0.0	0.7	0.7	11.1	O K
720 min Summer	67.923	0.623	0.0	0.7	0.7	10.7	O K
960 min Summer	67.871	0.571	0.0	0.6	0.6	9.8	O K
1440 min Summer	67.782	0.482	0.0	0.6	0.6	8.2	O K
2160 min Summer	67.684	0.384	0.0	0.5	0.5	6.6	O K
2880 min Summer	67.614	0.314	0.0	0.5	0.5	5.4	O K
4320 min Summer	67.523	0.223	0.0	0.4	0.4	3.8	O K
5760 min Summer	67.467	0.167	0.0	0.3	0.3	2.9	O K
7200 min Summer	67.431	0.131	0.0	0.3	0.3	2.2	O K
8640 min Summer	67.406	0.106	0.0	0.3	0.3	1.8	O K
10080 min Summer	67.388	0.088	0.0	0.2	0.2	1.5	O K
15 min Winter	67.740	0.440	0.0	0.5	0.5	7.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	138.153	0.0	7.9	18
30 min Summer	90.705	0.0	10.3	33
60 min Summer	56.713	0.0	12.9	62
120 min Summer	34.246	0.0	15.6	120
180 min Summer	25.149	0.0	17.2	148
240 min Summer	20.078	0.0	18.3	180
360 min Summer	14.585	0.0	19.9	246
480 min Summer	11.622	0.0	21.2	316
600 min Summer	9.738	0.0	22.2	384
720 min Summer	8.424	0.0	23.0	452
960 min Summer	6.697	0.0	24.4	586
1440 min Summer	4.839	0.0	26.5	848
2160 min Summer	3.490	0.0	28.6	1216
2880 min Summer	2.766	0.0	30.3	1584
4320 min Summer	1.989	0.0	32.6	2292
5760 min Summer	1.573	0.0	34.4	3008
7200 min Summer	1.311	0.0	35.8	3744
8640 min Summer	1.129	0.0	37.0	4416
10080 min Summer	0.994	0.0	38.1	5144
15 min Winter	138.153	0.0	7.9	18

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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW		
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XP Solutions Source Control 2015.1		

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Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.024

Time (mins)	Area
From:	To: (ha)
0	4 0.024

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Lanmor Consulting Ltd		Page 4																		
Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW																				
Date 22/12/2024 19:08 File Tank.srcx	Designed by Kunal Checked by																			
XP Solutions Source Control 2015.1																				
Model Details Storage is Online Cover Level (m) 69.100 Cellular Storage Structure Invert Level (m) 67.300 Safety Factor 1.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>18.0</td><td>18.0</td><td>0.801</td><td>0.0</td><td>35.6</td></tr><tr><td>0.800</td><td>18.0</td><td>35.6</td><td></td><td></td><td></td></tr></tbody></table> Orifice Outflow Control Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 67.300			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	18.0	18.0	0.801	0.0	35.6	0.800	18.0	35.6			
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©1982-2015 XP Solutions																				

Event: 180 min Winter

