



2-4 Queens Road, Hinckley



Surface Water Drainage Strategy

Site Address: 2-4 Queens Road
Hinckley
Leicestershire
LE10 1EF

UK Experts in Flood Modelling, Flood Risk
Assessments, and Surface Water Drainage Strategies



Document Issue Record

Project: Surface Water Drainage Strategy

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Site Location: 2-4 Queens Road, Hinckley, Leicestershire, LE10 1EF

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1. Introduction

- 1.1. Aegaea were commissioned by All Cars Repaired Ltd (the "client") to prepare a Surface Water Drainage Strategy to support a planning application associated with the proposed development at the below address.

Site Overview

- 1.2. The site of the proposed development is located at 2-4 Queens Road, Hinckley, Leicestershire, LE10 1EF.

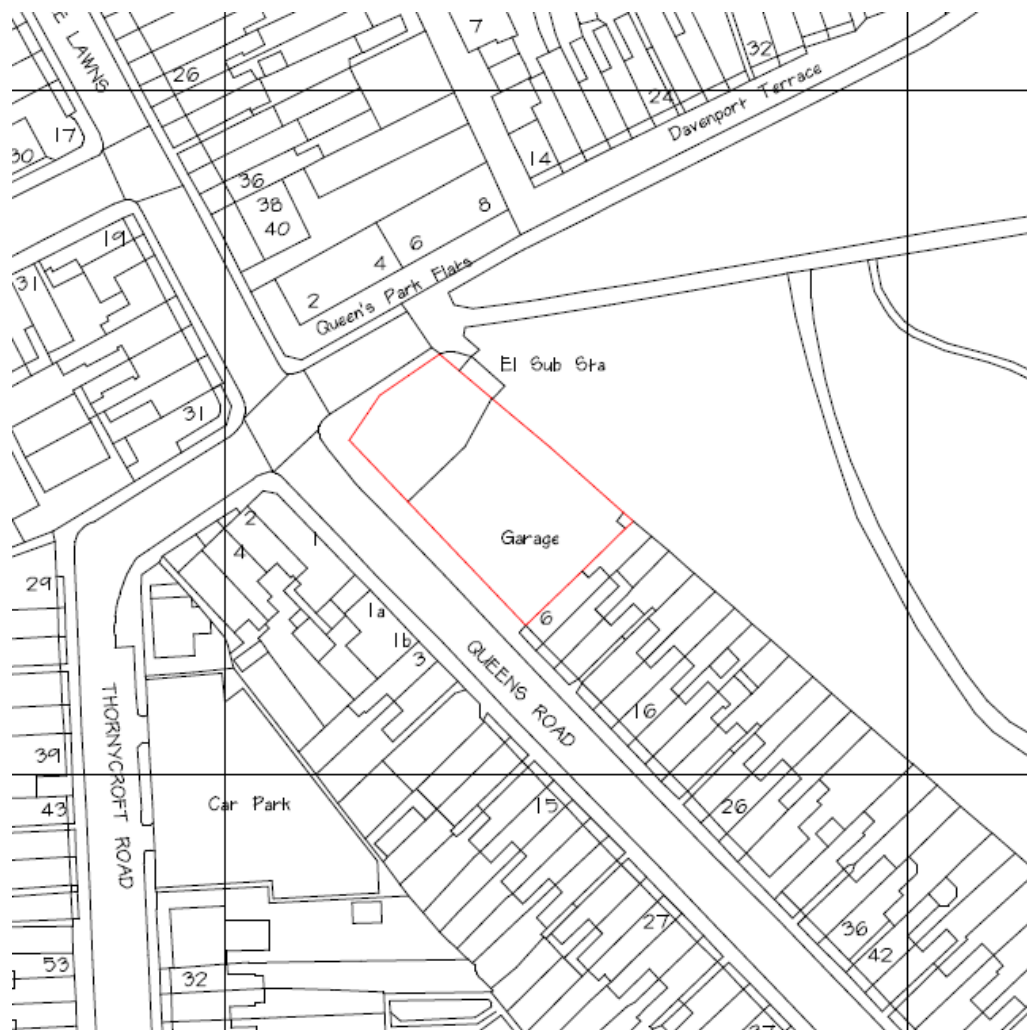


Figure 1: Site Location

- 1.3. The proposed development site measures 773m² (0.0773ha) and is entirely impermeable, comprising of building roofs and hardstanding surfaces.
- 1.4. The site is bounded by Queens Road to the west, a road leading to Queens Park to the north, Queens Park to the east, and residential properties to the south.
- 1.5. The existing site consists of an existing car/bike service and repair garage, accessed via the road leading to Queens Park to the north.
- 1.6. The site generally falls from south, 128.38m Above Ordnance Datum (AOD), to north, 130.24m AOD. The existing site layout is included in Appendix A.
- 1.7. Hinckley and Bosworth Borough Council is the Local Planning Authority (LPA) for the site.
- 1.8. Leicestershire County Council is the designated Lead Local Flood Authority (LLFA) for the area.
- 1.9. Severn Trent Water is the Sewerage Undertaker for the area. Severn Trent Water's sewer records are included as Appendix B.

Development Proposals

- 1.10. The proposed development comprises of the erection of 14 no. self-contained flats with ancillary car parking and landscaping, following demolition of the existing garage.
- 1.11. The proposed development plans are contained within Appendix C.

2. Surface Water Drainage Strategy

Existing Drainage System

- 2.1. Severn Trent Water's sewer records indicate a 225mm dia. public combined sewer located in Queens Road to the south-west of the site. A 300mm dia. public combined sewer is also located in the road leading to Queens Park to the north-west of the site.
- 2.2. An extract of Severn Trent Water's sewer records is shown in Figure 2 below, with the site shaded red.

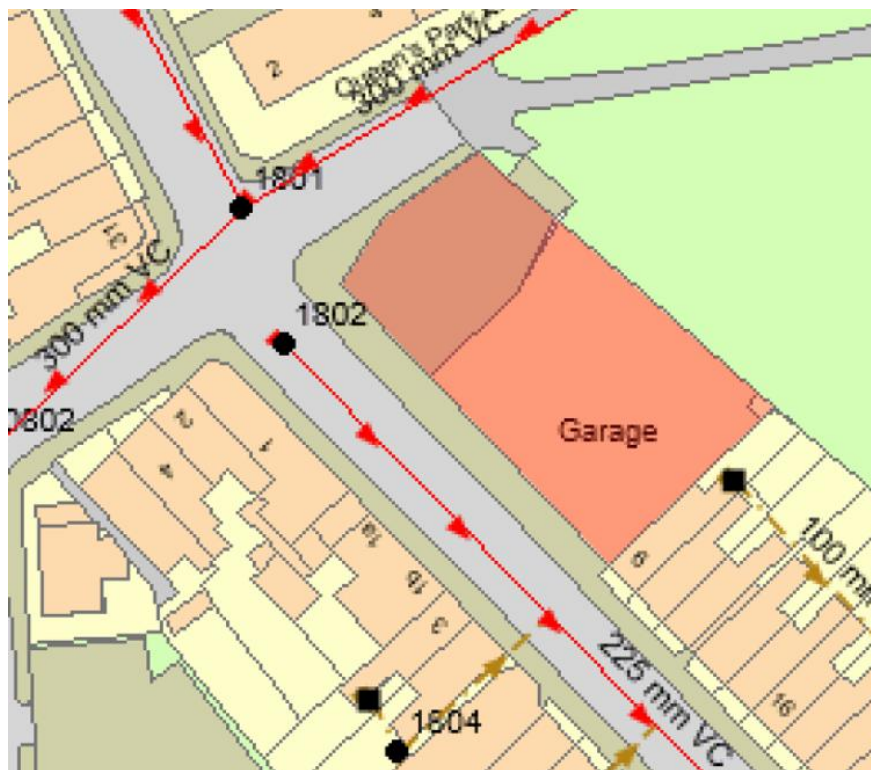


Figure 2: Extract of Severn Trent Water's Sewer Records

- 2.3. No details of any existing on-site private surface water drainage arrangements have been provided.

Ground Conditions

- 2.4. Soilscape Viewer (LandIS) indicates that the site is in an area of “Slightly acid loamy and clayey soils with impeded drainage”.
- 2.5. British Geological Survey (BGS) data indicates that the bedrock underlying the site is “Mercia Mudstone Group - Mudstone”.
- 2.6. Infiltration tests cannot be undertaken at the site before site work begins due to the current site use; however, based on anticipated soil conditions it is not considered that the disposal of surface water flows via infiltration is feasible, therefore an alternative solution in line with the SuDS hierarchy is to be sought.

Proposed Drainage Hierarchy

- 2.7. Current guidance indicates that the following surface water disposal options should be considered, listed in order of preference:
 - i. **Disposal via rainwater harvesting:** Rainwater harvesting such as above ground SuDS/bioretention planters, rainwater butts etc. are to be used for collection and reuse of rainwater where feasible.
 - ii. **Disposal via on-site infiltration systems:** As discussed above, the disposal of surface water flows via infiltration has been discounted as a feasible solution.
 - iii. **Disposal to a watercourse/surface water body:** There are no known watercourses or water bodies within the vicinity of the site.
 - iv. **Disposal to surface water sewer:** Severn Trent Water’s sewer records indicate that there are no public surface water sewers within the vicinity of the proposed development.
 - v. **Disposal to combined sewer:** As mentioned above, Severn Trent Water’s sewer records indicate public combined sewers located in Queens Road to the west of the site and the road leading to Queens Park to the north.

Existing Runoff Rates

- 2.8. An assessment of the existing runoff rate from the site (0.0773ha) was made using the Modified Rational Method as set out in CIRIA C753, which has calculated that the existing runoff rate from the site is 7.52 l/s.
- 2.9. The greenfield (Q_{BAR}) runoff rate for the site has been calculated as 0.2 l/s, however; where a site is below 1ha and greenfield runoff rates are low, it is considered that 1 l/s forms a practical minimum flow rate that balances and mitigates both the increased flood risk and blockage risk to the proposed drainage system. It is therefore proposed to restrict flows to 1 l/s as an appropriate minimum flow for small sites.
- 2.10. As the site is currently a brownfield, the proposed discharge rate of 1 l/s provides a betterment of 86.7% over the existing scenario.
- 2.11. Refer to Appendix D for existing runoff calculations.

Proposed Drainage Strategy

- 2.12. In accordance with the SuDS hierarchy, it is proposed that surface water flows from the development are to discharge via gravity, at a controlled rate, to the existing 300mm dia. Severn Trent Water public combined sewer located in the road leading to Queens Park to the north of the site.
- 2.13. It is proposed that surface water flows from the roof area are to discharge via a green roof to slow flows and to provide treatment and improve water quality.
- 2.14. The use of permeable paving within the parking bays and bioretention areas/trees pits within open spaces has been proposed which will improve water quality, slow surface water flows and provide attenuation for the proposed development, prior to discharging at a controlled rate into an existing Severn Trent Water surface water sewer within the road leading to Queens Park.
- 2.15. Geocellular attenuation has been proposed to attenuate flows in excess of the proposed discharge rate.
- 2.16. All proposed on site drainage has been designed to accommodate surface water runoff from all impermeable areas on site, including all modelled 1 in 100-year storm events plus 40% climate change.

- 2.17. The proposed surface water drainage layout can be found within Appendix E, with supporting surface water drainage calculations included in Appendix F.
- 2.18. It is recommended that a survey is undertaken of any existing on-site private drainage arrangements to confirm the location of existing assets and if the site has an established drainage connection to the Severn Trent Water public combined network that could be utilised.

3. Future Maintenance Strategy

General Maintenance

- 3.1. The surface water drainage network will be managed throughout the lifetime by the owners of the proposed development in accordance with details set out below.
- 3.2. All drainage, whether piped or SuDS require regular maintenance. The tables below provide an overview of general maintenance tasks and frequency of which they need to be undertaken.

Maintenance Schedule	Required Action	Typical frequency
Regular Maintenance	Inspect for sediment and debris in catchpit manholes and gullies. Clean out as required	Twice Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris in catchpits, gullies, attenuation devices and inside concrete manhole rings.	As required, based on inspections.
Remedial actions	Reconstruct and/or replace components, if performance deteriorates or failure/blockage occurs.	As required
	Replacement of clogged components (flow restriction)	As required
Monitoring	Inspect silt traps/gullies/catchpits and note rate of sediment accumulation.	Monthly in the first year and then annually
	Check attenuation devices	Annually

General maintenance for Surface Water Drainage Systems as per CIRIA C753.

- 3.3. The required maintenance for each component making up the drainage system is scheduled in the tables below, based on CIRIA report C753 – The SuDS manual.

Permeable Paving (Type C - Tanked)

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Regular raking to ensure even spread and smooth surface, may require additional top up.	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment.
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying.	As required – once per year on less frequently used pavements
Remedial Maintenance	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required
	Remediate work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action.	Three-monthly, 48 hr after large storms in the first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Cellular attenuation tank

Maintenance Schedule	Required Action	Typical frequency
Regular Maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings.	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings.	As required, based on inspections.
Remedial actions	Reconstruct tank and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of tank)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation.	Monthly in the first year and then annually
	Check tank to ensure emptying is occurring	Annually

Maintenance will usually be carried out manually, although a suction tanker can be used for sediment/debris removal for large systems. If maintenance is not undertaken for long periods, deposits can become hard packed and require considerable effort to remove.

Bioretention Systems

Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc. and replace as necessary.	Quarterly
	Inspect inlets and outlets for blockage	Quarterly
Regular Maintenance	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or forebays	Quarterly to biannually
Occasional Maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required.	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
Monitoring	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

Green Roof

Maintenance Schedule	Required Action	Typical frequency
Regular inspections	Inspect all components including soil substate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability.	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular Maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (i.e. year one), replace dead plants as required	Six monthly and annually or as required
	Post establishment, replace dead plants as required (where >5% of coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required- Clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial Maintenance	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

The list of maintenance requirements is not exhaustive, and some actions may not always be required. Actual requirements will depend on the planting, the aesthetic and visual effect and the biodiversity objectives. The proprietary blue/green roof manufacturer/landscape architect should confirm the planting requirements. Specific maintenance needs of the green roof should be monitored and maintenance schedules adjusted to suit requirements. The proprietary blue/green roof manufacturer's maintenance specification shall take precedence over the above.

Hydro-Brake (Vortex Flow Control)

Maintenance Schedule	Required Action	Typical frequency
Regular Maintenance	Remove sediment and debris from flow control chambers and upstream manholes. Check for signs of damage, wear and tear. Check any visible fixing bolts.	Monthly (for the first 12 months, then 6 monthly).
Remedial Actions	Replace or clean hydrobrake if performance deteriorates or failure occurs. In the event of the blockage, the blockage/foreign material should be manually removed	As necessary.
Monitoring	Check flow control to ensure emptying is occurring.	Quarterly and post high intensity storm event.

4. Pollution Prevention & Water Quality Management

SuDS Mitigation Indices

- 4.1. Chapter 26 of the CIRIA C753 The SuDS Manual, provides design advice to meet water quality standards by adopting the SuDS train treatment mechanism and thereby reduce the risk of pollution by evaluating potential pollution hazards at the outset.
- 4.2. The proposed site layout provides the opportunity to introduce SuDS into the scheme to reduce potential contaminant risk further.
- 4.3. Runoff from individual property driveways, residential car parks and low traffic roads are generally viewed as low risk (as per Table 26.2 of C753), shown in the tables below.

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Individual property driveways, residential car parks and low traffic roads	Low	0.5	0.4	0.4

Pollutant Hazard Indices

	Mitigation Indices				Indices for Calculation		
	TSS	Metals	Hydrocarbons		TSS	Metals	Hydrocarbons
Permeable Paving	0.7	0.6	0.7	100%	0.7	0.6	0.7
Total Mitigation Indices score					0.7	0.6	0.7
Sufficiency of Pollution Mitigation Indices					Sufficient (No additional mitigation required)		

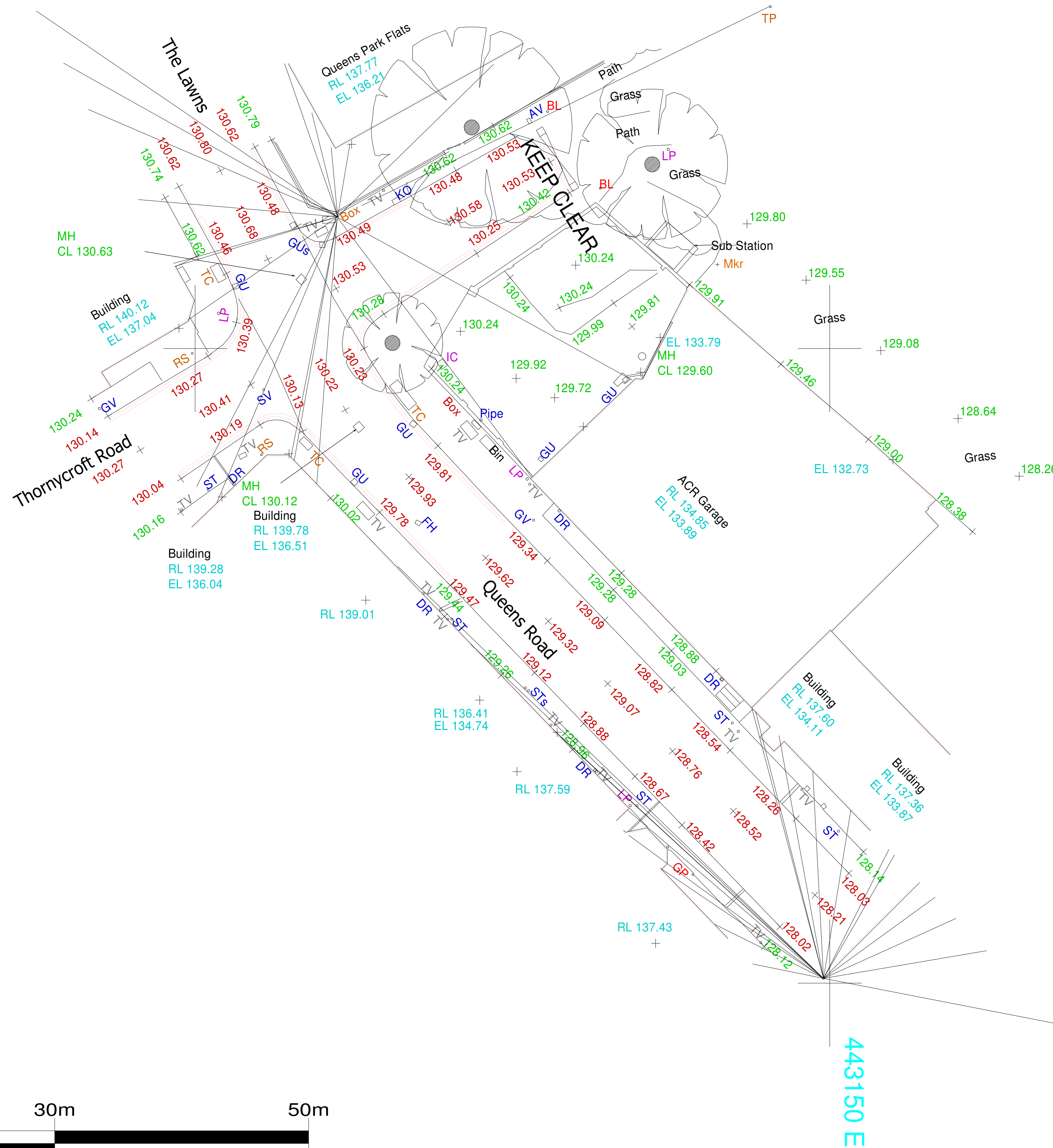
SuDS Mitigation Indices

	Mitigation Indices				Indices for Calculation		
	TSS	Metals	Hydrocarbons		TSS	Metals	Hydrocarbons
Bioretention Systems	0.8	0.8	0.8	100%	0.8	0.8	0.8
Total Mitigation Indices score					0.8	0.8	0.8
Sufficiency of Pollution Mitigation Indices					Sufficient (No additional mitigation required)		

SuDS Mitigation Indices

- 4.4. Pollutant removal mechanisms in green roofs include filtering and absorption by the substrate, drainage layers and retention by plants. Green roofs remove leaves, roof litter and reduce pollutant loads.
- 4.5. The proposed drainage is required to demonstrate sufficient treatment capability to manage the specified Pollution Hazard Indices and is an improvement on the current arrangement where no treatment is provided. All areas on the proposed development site receive treatment from green roof areas or permeable paving prior to existing surface water sewer.

Appendix A - Existing Site Layout



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REVISIONS			
Rev	Description	Date	By

NOTES

Job:

Proposed Development for
14 Apartments,
All Cars Repaired Ltd,
Queens Road,
Hinckley,
Leics.

For

Title : Existing Site Layout

Scale: 1:200	Drwg No: 3374/2	Date: Dec 25	Rev:
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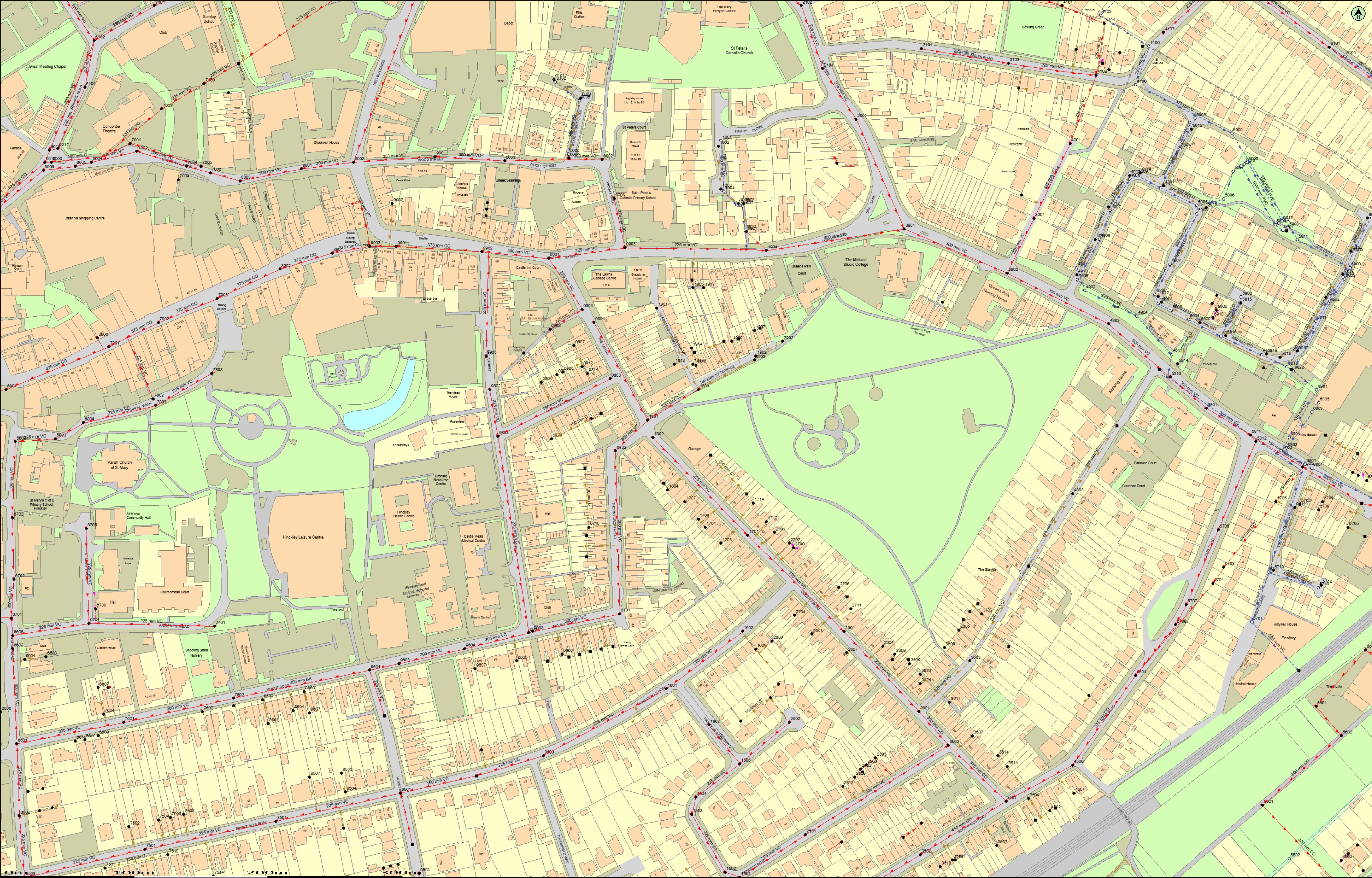
The Drawing Room, Gunnesbrooke Close, Great Bowden, Leics, LE16 7HB



Email: jedesign@yahoo.com

Mobile: 07760 224851

Appendix B - Severn Trent Water Sewer Records



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1. Do not scale off this Map. 2. This plan and any information supplied with it is furnished as a general guide, is only valid at the date of issue and no warranty as to its correctness is given or implied. In particular this plan and any information shown on it must not be relied upon in the event of any development or works (including but not limited to excavations) in the vicinity of SEVERN TRENT WATER assets or for the purposes of determining the suitability of a point of connection to the sewerage or distribution systems. 3. On 1 October 2013, most private sewers and private lateral drains in Severn Trent Water's sewerage area, which were connected to a public sewer as at 1 July 2013, transferred to the ownership of Severn Trent Water and became public sewers and public lateral drains. A further transfer takes place on 1 October 2012. Private pumping stations, which form part of these sewers or lateral drains, will transfer to ownership of Severn Trent Water on or before 1 October 2012. Severn Trent Water does not possess complete records of these assets. These assets may not be displayed on the map. 4. Reproduction by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database rights 2026 OS AC0000808122. All rights reserved. 5. Document users other than SEVERN TRENT WATER business users are advised that this document is provided for reference purpose only and is subject to copyright, therefore, no further copies should be made from it.

Public Foul Gravity/Lateral Drain	Public Combined Water Gravity/Lateral Drain	Public Surface Water Gravity/Lateral Drain	Pressure Foul	Pressure Combined	Pressure Surface Water
Highway Drain	Overflow Pipe	Disposal Pipe	Manhole Foul	Manhole Surface	Chamber
Abandoned Pipe	Culverted Water Course	Pumping Station	Filling	Section 104 sewers are shown in green	Private sewers are shown in magenta

Drainage Nature Based
Source Area (aka SuDS)

nick@aegaea.com

11398



Wastewater Plan A1
Powered by digipal

GENERAL CONDITIONS AND PRECAUTIONS TO BE TAKEN WHEN CARRYING OUT WORK ADJACENT TO SEVERN TRENT WATER'S APPARATUS

Please ensure that a copy of these conditions is passed to your representative and/or your contractor on site. If any damage is caused to Severn Trent Water Limited (STW) apparatus (defined below), the person, contractor or subcontractor responsible must inform STW immediately on: **0800 783 4444 (24 hours)**

- a) These general conditions and precautions apply to the public sewerage, water distribution and cables in ducts including (but not limited to) sewers which are the subject of an Agreement under Section 104 of the Water Industry Act 1991(a legal agreement between a developer and STW, where a developer agrees to build sewers to an agreed standard, which STW will then adopt); mains installed in accordance with an agreement for the self-construction of water mains entered into with STW and the assets described at condition b) of these general conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions.
- b) Please be aware that due to The Private Sewers Transfer Regulations June 2011, the number of public sewers has increased, but many of these are not shown on the public sewer record. However, some idea of their positions may be obtained from the position of inspection covers and their existence must be anticipated.
- c) On request, STW will issue a copy of the plan showing the approximate locations of STW Apparatus although in certain instances a charge will be made. The position of private drains, private sewers and water service pipes to properties are not normally shown but their presence must be anticipated. This plan and the information supplied with it is furnished as a general guide only and STW does not guarantee its accuracy.
- d) STW does not update these plans on a regular basis. Therefore the position and depth of STW Apparatus may change and this plan is issued subject to any such change. Before any works are carried out, you should confirm whether any changes to the plan have been made since it was issued.
- e) The plan must not be relied upon in the event of excavations or other works in the vicinity of STW Apparatus. It is your responsibility to ascertain the precise location of any STW Apparatus prior to undertaking any development or other works (including but not limited to excavations).
- f) No person or company shall be relieved from liability for loss and/or damage caused to STW Apparatus by reason of the actual position and/or depths of STW Apparatus being different from those shown on the plan.

In order to achieve safe working conditions adjacent to any STW Apparatus the following should be observed:

1. All STW Apparatus should be located by hand digging prior to the use of mechanical excavators.
2. All information set out in any plans received from us, or given by our staff at the site of the works, about the position and depth of the mains, is approximate. Every possible precaution should be taken to avoid damage to STW Apparatus. You or your contractor must ensure the safety of STW Apparatus and will be responsible for the cost of repairing any loss and/or damage caused (including without limitation replacement parts).
3. Water mains are normally laid at a depth of 900mm. No records are kept of customer service pipes which are normally laid at a depth of 750mm; but some idea of their positions may be obtained from the position of stop tap covers and their existence must be anticipated.
4. During construction work, where heavy plant will cross the line of STW Apparatus, specific crossing points must be agreed with STW and suitably reinforced where required. These crossing points should be clearly marked and crossing of the line of STW Apparatus at other locations must be prevented.
5. Where it is proposed to carry out piling or boring within 20 metres of any STW Apparatus, STW should be consulted to enable any affected STW Apparatus to be surveyed prior to the works commencing.
6. Where excavation of trenches adjacent to any STW Apparatus affects its support, the STW Apparatus must be supported to the satisfaction of STW. Water mains and some sewers are pressurised and can fail if excavation removes support to thrust blocks to bends and other fittings.
7. Where a trench is excavated crossing or parallel to the line of any STW Apparatus, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus which has been exposed over a length of the excavation before backfilling and reinstatement is carried out. There should be no concrete backfill in contact with the STW Apparatus.
8. No other apparatus should be laid along the line of STW Apparatus irrespective of clearance. Above ground apparatus must not be located within a minimum of 3 metres either side of the centre line of STW Apparatus for smaller sized pipes and 6 metres either side for larger sized pipes without prior approval. No manhole or chamber shall be built over or around any STW Apparatus.
9. A minimum radial clearance of 300 millimetres should be allowed between any plant or equipment being installed and existing STW Apparatus. We reserve the right to increase this distance where strategic assets are affected.
10. Where any STW Apparatus coated with a special wrapping is damaged, even to a minor extent, STW must be notified and the trench left open until the damage has been inspected and the necessary repairs have been carried out. In the case of any material damage to any STW Apparatus causing leakage, weakening of the mechanical strength of the pipe or corrosion-protection damage, the necessary remedial work will be recharged to you.
11. It may be necessary to adjust the finished level of any surface boxes which may fall within your proposed construction. Please ensure that these are not damaged, buried or otherwise rendered inaccessible as a result of the works and that all stop taps, valves, hydrants, etc. remain accessible and operable. Minor reduction in existing levels may result in conflict with STW Apparatus such as valve spindles or tops of hydrants housed under the surface boxes. Checks should be made during site investigations to ascertain the level of such STW Apparatus in order to determine any necessary alterations in advance of the works.
12. With regard to any proposed resurfacing works, you are required to contact STW on the number given above to arrange a site inspection to establish the condition of any STW Apparatus in the nature of surface boxes or manhole covers and frames affected by the works. STW will then advise on any measures to be taken, in the event of this a proportionate charge will be made.
13. You are advised that STW will not agree to either the erection of posts, directly over or within 1.0 metre of valves and hydrants,
14. No explosives are to be used in the vicinity of any STW Apparatus without prior consultation with STW.

TREE PLANTING RESTRICTIONS

There are many problems with the location of trees adjacent to sewers, water mains and other STW Apparatus and these can lead to the loss of trees and hence amenity to the area which many people may have become used to. It is best if the problem is not created in the first place. Set out below are the recommendations for tree planting in close proximity to public sewers, water mains and other STW Apparatus.

15. Please ensure that, in relation to STW Apparatus, the mature root systems and canopies of any tree planted do not and will not encroach within the recommended distances specified in the notes below.
16. Both Poplar and Willow trees have extensive root systems and should not be planted within 12 metres of a sewer, water main or other STW Apparatus.
17. The following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 metres of a sewer, water main or other STW Apparatus. E.g. Ash, Beech, Birch, most Conifers, Elm, Horse Chestnut, Lime, Oak, Sycamore, Apple and Pear. Asset Protection Statements Updated May2014
18. STW personnel require a clear path to conduct surveys etc. No shrubs or bushes should be planted within 2 metre of the centre line of a sewer, water main or other STW Apparatus.
19. In certain circumstances, both STW and landowners may wish to plant shrubs/bushes in close proximity to a sewer, water main of other STW Apparatus for screening purposes. The following are shallow rooting and are suitable for this purpose: Blackthorn, Broom, Cotoneaster, Elder, Hazel, Laurel, Privet, Quickthorn, Snowberry, and most ornamental flowering shrubs.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
	C		0	0
	C		0	0
	C		0	0
	C		0	0
	C		0	0
	C		0	0
	C		0	0
0001	C	133.25	131.11	2.14
0002	C	134.64	132.94	1.7
0003	C	134.11	132.69	1.42
0007	C	134.11	132.16	1.95
0601	C	126.48	123.31	3.17
0602	C	126.54	123.4	3.14
0603	C	123.65	120.44	3.21
0701	C	126.45	124.14	2.31
0802	C	129.95	127.06	2.89
0803	C	130.28	129.16	1.12
0901	C	132.82	129.66	3.16
0902	C	132.21	131.32	0.89
0903	C	132.78	130.58	2.2
0904	C	131.39	0	0
0905	C	133.04	130.58	2.46
1501	C	118.51	116.76	1.75
1502	C	118.76	116.92	1.84
1503	C	121.22	119.14	2.08
1504	C	121.7	119.92	1.78
1505	C	121.83	120.35	1.48
1601	C	124.78	122.57	2.21
1602	C	124.7	123.29	1.41
1603	C	123.35	121.7	1.65
1701	C	126.25	123.75	2.5
1801	C	130.62	127.59	3.03
1802	C	130.12	127.42	2.7
1803	C	130.09	127.7	2.39
1904	C	131.74	128.85	2.89
1921	C	131.08	129.08	2
2001	C		0	0
2101	C	132.92	130.27	2.65
2102	C	133.45	131.24	2.21
2500	C		0	0
2501	C	118.07	116.21	1.86
2502	C		0	0
2601	C		0	0
2602	C	121.89	0	0
2605	C		0	0
3001	C	125.15	122.39	2.76
3101	C	129.72	128.17	1.55
3103	C	126.57	124.91	1.66
3501	C	115.27	111.88	3.39
3502	C	115.05	111.66	3.39
3601	C	119.03	116.19	2.84
3602	C	117.61	114.84	2.77
3901	C	128.13	125.23	2.9
3902	C	124.63	121.96	2.67
4001	C	124.43	122.48	1.95
4101	C	126.17	0	0
4102	C	123.54	122.61	0.93
4104	C		0	0
4107	C	124.59	123.11	1.48
4506	C	115.19	112.27	2.92
4601	C	114.45	112.44	2.01
4903	C	121.28	118.65	2.63
5501	C	110.53	109.59	0.94
5703	C	114.52	0	0
5704	C	114.51	0	0
5705	C	114.26	112.8	1.46
5706	C	115.78	112.71	3.07
5707	C	114.78	112.59	2.19
5708	C	114.63	112.56	2.07
5801	C	117.86	114.97	2.89
5805	C	116.16	112.95	3.21
5811	C	116.6	113.78	2.82
5812	C	116.79	112.94	3.85
5900	C		0	0
5910	C		0	0
6003	C	115.17	113.19	1.98
6004	C	115.67	113.03	2.64
6005	C	115.29	112.78	2.51
6006	C	114.92	112.12	2.8
6010	C	115.09	113.06	2.03
6014	C		0	0
6015	C		0	0
6101	C	119.46	117.3	2.16
6101	C	124.08	121.37	2.71
6102	C	122.25	120.2	2.05
6502	C	116.11	113.64	2.47
6503	C	115.91	113.05	2.86
6601	C	114.77	111.84	2.93
6601	C		0	0
6602	C	112.83	109.69	3.14
6602	C	111.39	109.84	1.55
6603	C		0	0
6606	C	112.83	109.42	3.41
6701	C	112.91	109.2	3.71
6702	C	113.55	110.31	3.24
6703	C	114.54	112.27	2.27
6704	C	113.18	111.12	2.06
6705	C	114.81	112.84	1.97
6801	C	114.88	113.08	1.8
6802	C	115.53	112.9	2.63
6803	C	117.03	116.21	0.82
6804	C	118.61	117.24	1.37
6900	C		0	0

[illegible]

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
2604	F		0	0
2607	F		0	0
2609	F		0	0
2700	F		0	0
2701	F		0	0
2702	F		0	0
2704	F		0	0
2706	F		0	0
2711	F		0	0
2902	F	129.88	128.9	0.98
3507	F		0	0
3509	F		0	0
3514	F		0	0
3518	F		0	0
3520	F		0	0
3521	F		0	0
3603	F	117.91	116.33	1.58
3605	F		0	0
3606	F		0	0
3607	F		0	0
3609	F		0	0
3614	F		0	0
3617	F		0	0
3623	F		0	0
3624	F		0	0
3702	F		0	0
4011	F	121.29	118.68	2.61
4012	F	123.05	119.83	3.22
4013	F	122.18	119.12	3.07
4014	F	121.97	118.93	3.04
4502	F		0	0
4504	F		0	0
4803	F	119.05	116.74	2.31
4910	F	122.78	120.53	2.25
4911	F	123.09	120.16	2.93
4912	F	120.72	117.3	3.42
4914	F	120.68	117.26	3.42
5015	F	121.67	119.07	2.6
5016	F	120.75	117.81	2.94
5702	F		0	0
5712	F	113.48	112.82	0.66
5713	F	113.11	112.1	1.01
5714	F	113.96	111.77	2.19
5814	F	119.63	116.81	2.82
5816	F	119	116.35	2.65
5909	F	119.66	117.05	2.61
5915	F	119.13	117.37	1.77
5916	F	118.8	0	0
5917	F	117.73	115.62	2.11
5918	F	117.41	115.53	1.88
5919	F	117.36	0	0
6006	F	120.13	118	2.13
6600	F		0	0
6603	F		0	0
6604	F		0	0
6607	F		0	0
6608	F		0	0
6610	F		0	0
6611	F		0	0
6700	F		0	0
6705	F		0	0
6708	F		0	0
6709	F		0	0
6800	F		0	0
6915	F	120.43	117.66	2.77
6916	F	120.33	117.43	2.91
6917	F	119.48	117.12	2.36
7009	F		0	0
7502	F		0	0
7504	F		0	0
7506	F		0	0
7508	F		0	0
7510	F		0	0
7511	F		0	0
7514	F		0	0
7604	F		0	0
7607	F		0	0
8503	F		0	0
8504	F		0	0
8507	F		0	0
8601	F		0	0
8602	F		0	0
8604	F		0	0
8607	F		0	0
8608	F		0	0
9002	F		0	0
9607	F		0	0
0005	S	134.18	132.69	1.49
0006	S	134.15	132.24	1.91
0102	S	134.08	133.04	1.04
1001	S	132.97	130.92	2.05
1004	S	131.18	129.52	1.66
1005	S	131.08	129.31	1.77
1007	S	131.02	129.26	1.76
1920	S	131.05	129.09	1.96
4007	S	123.11	120.41	2.7
4008	S	122.27	119.78	2.49
4009	S	122	119.45	2.55
4010	S	121.31	119.1	2.21
4100	S	123	121.45	1.55
4103	S		0	0
4106	S	124.08	122.45	1.63
4901	S	122.79	121.6	1.19
4902	S	122.46	121.46	1

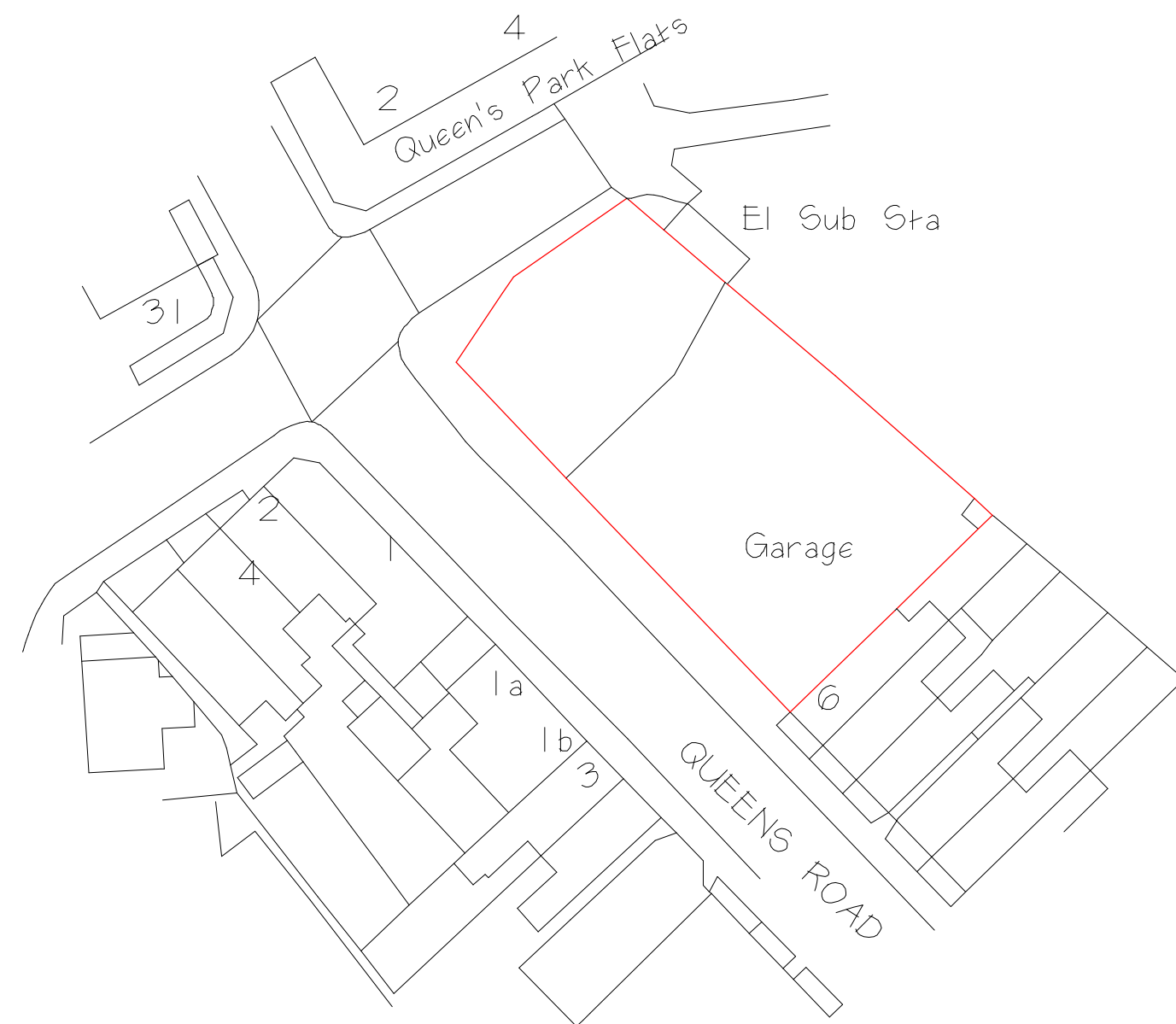
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Appendix C - Proposed Site Layout

REVISIONS

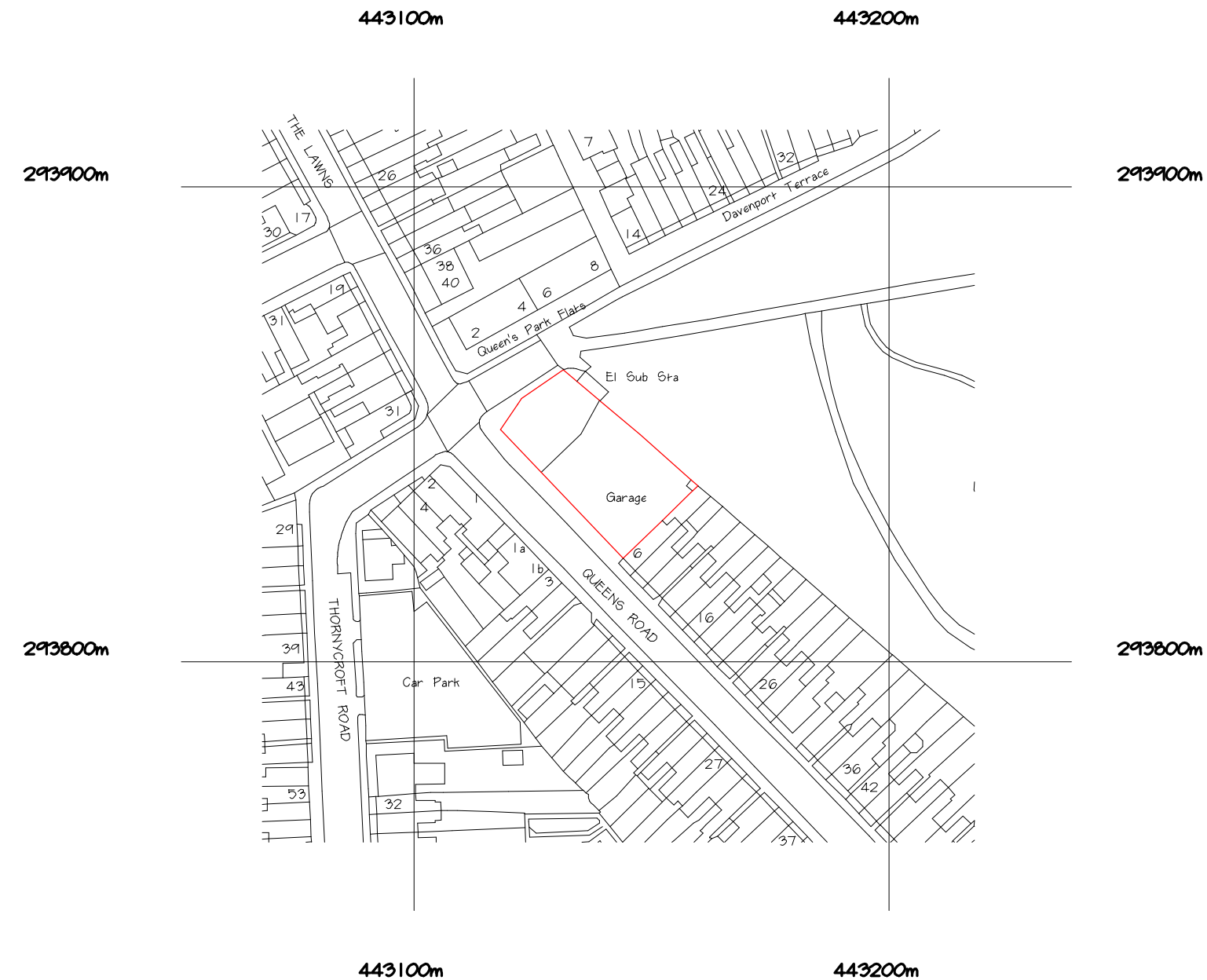
Rev	Description	Date	By

NOTES



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BLOCK PLAN Scale : 1:1500



Crown Copyright and database rights 2024 OS Licence no. 100041041

LOCATION PLAN Scale : 1:1250

Job:
Proposed Development,
All Cars Repaired,
Queens Road,
Hinckley,
Leics.

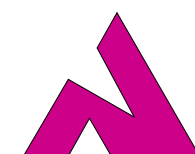
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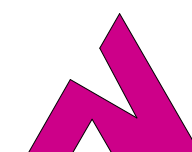
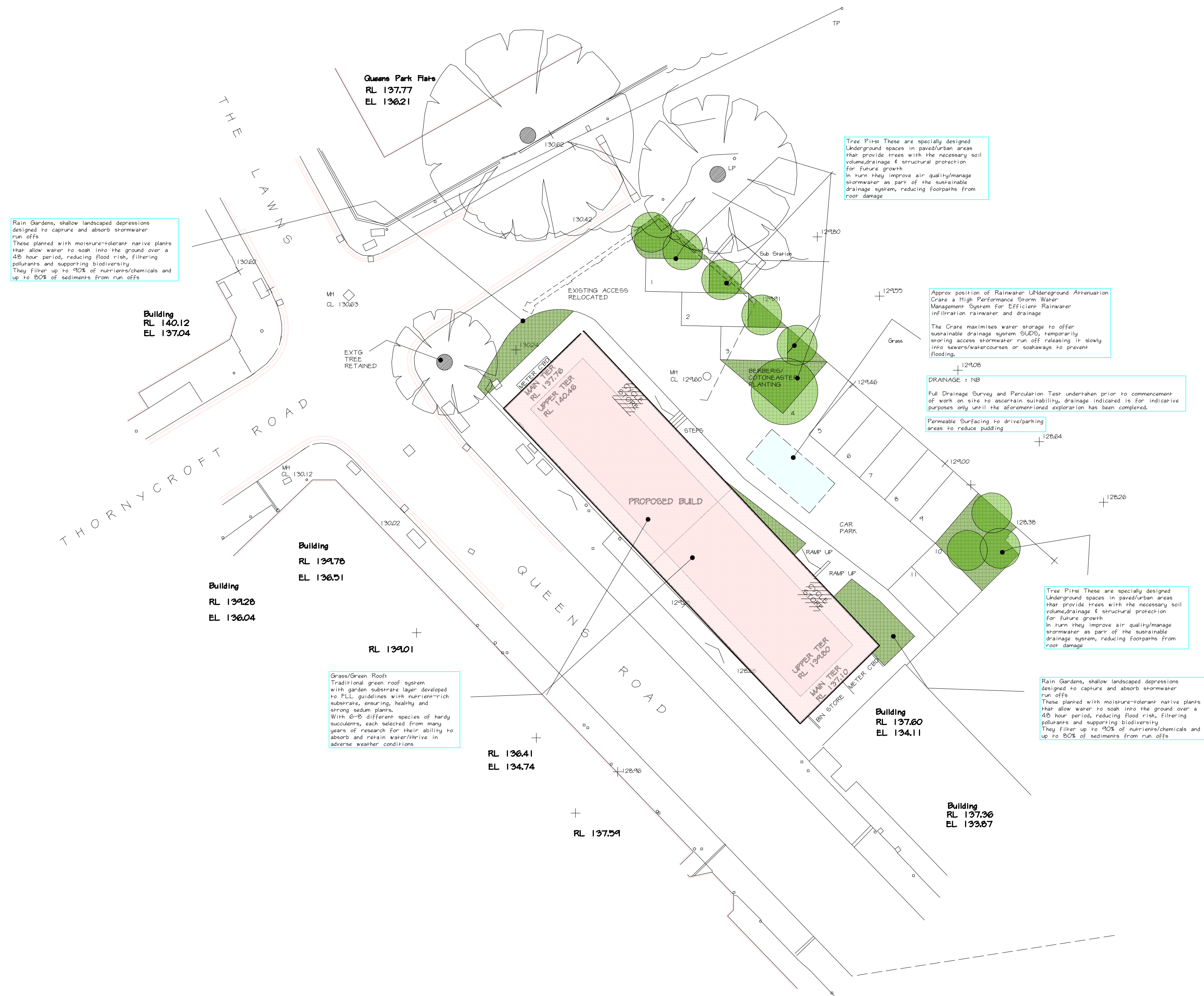
MR N.MUNTON

Title :
Planning

Scale: 1:1250/500	Drwg No: 3374/1	Date: Apr 25	Rev:
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J.E.D. Design
(Architectural Services) Ltd
Member of the Chartered Institute of Architectural Technologists
The Drawing Room, Gunbrooke Close, Great Bowden, Leics, LE16 7HB
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REVISIONS			
Rev	Description	Date	By
A	6UD6 Details Added	07/05/26	TMB

NOTES

Job:

Proposed Development for
14 Apartments,
All Cars Repaired Ltd,
Queens Road,
Hinckley,
Leics.

For

Title :
Proposed Site Layout

Scale:	Drug No:	Date:	Rev:
1200	3374/3	Dec 25	A

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(Architectural Services) Ltd
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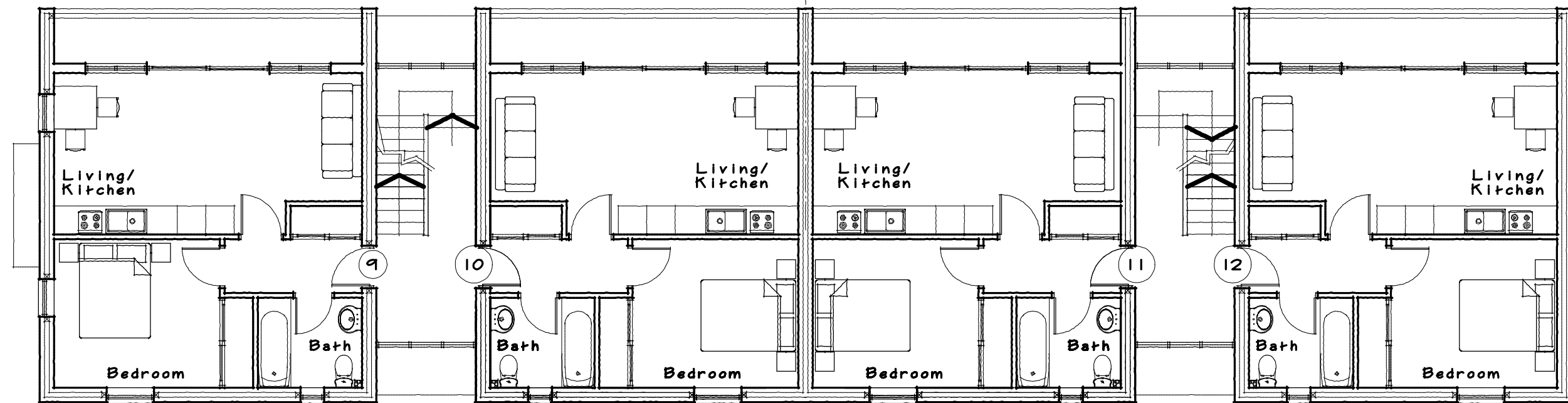
The Drawing Room, Gunnsbrooke Close, Great Bowden, Leics, LE16 7HB
Email: jeddesign@yahoo.com Mobile: 07760 224851

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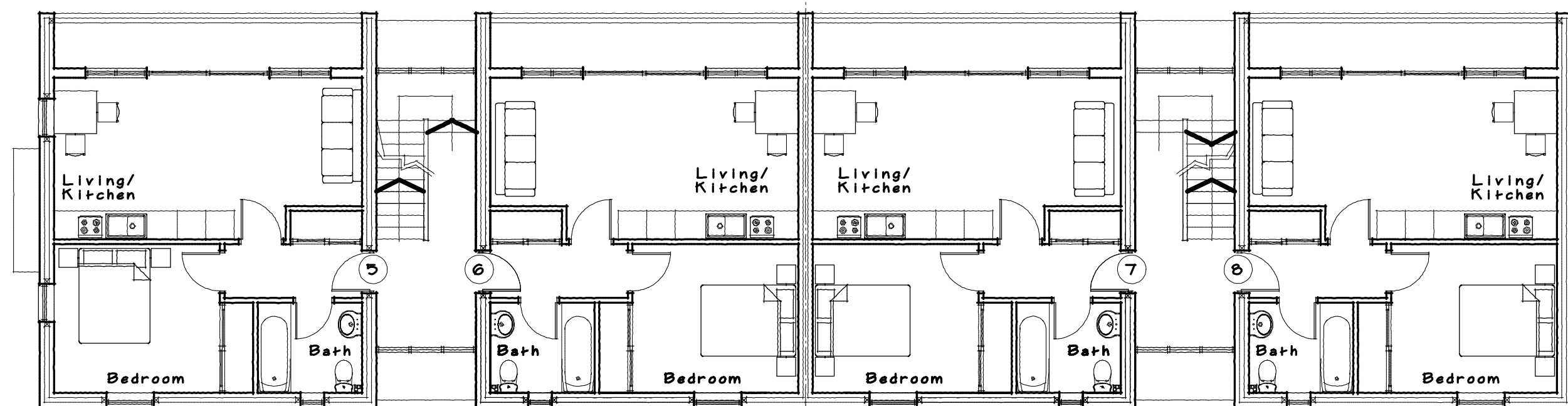
REVISIONS

Rev	Description	Date	By
A	WINDOWS ADDED/ AREAS CONFIRMED	30.04.26	TMB

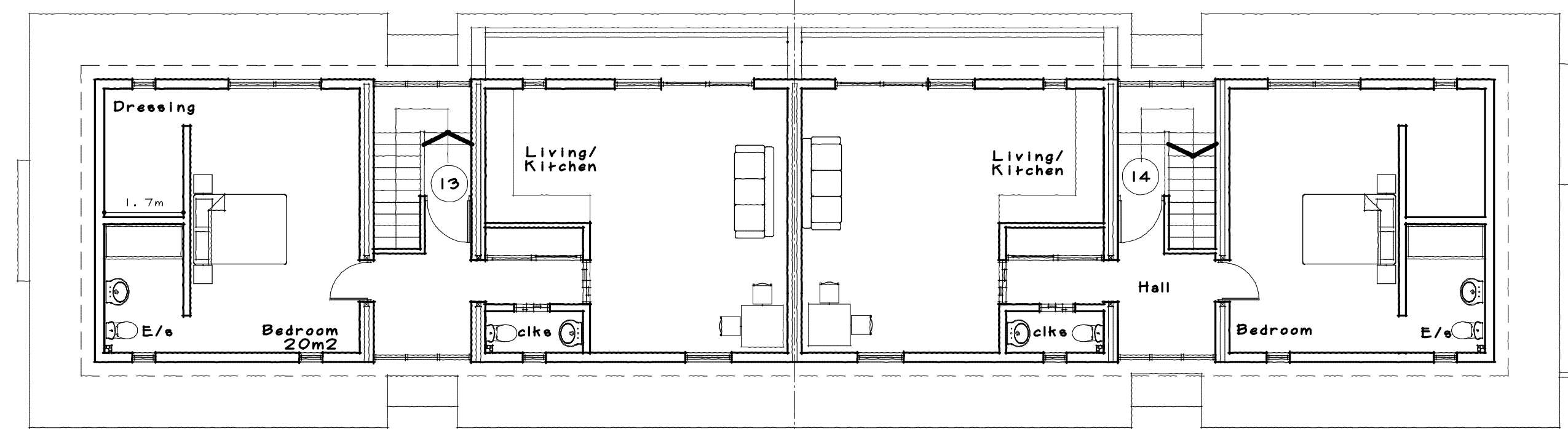
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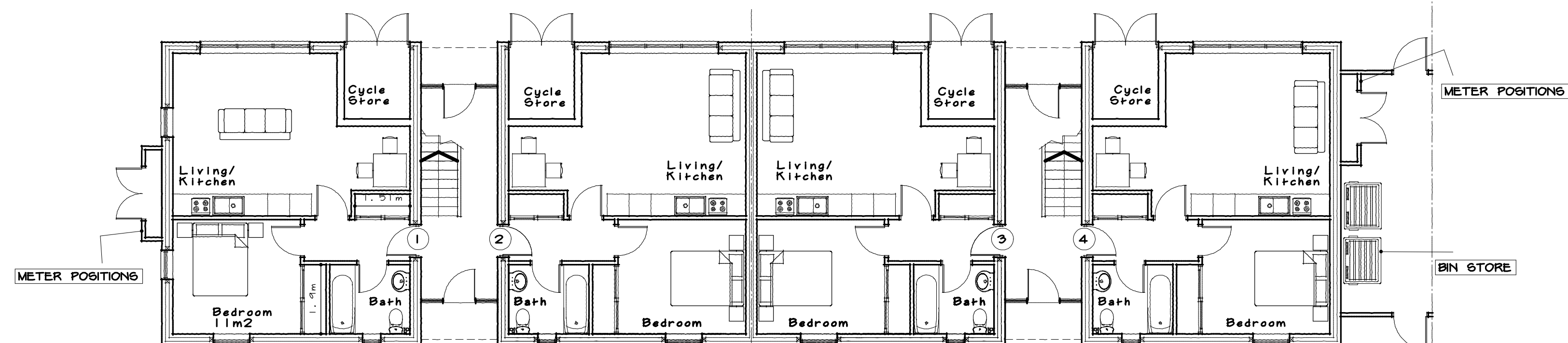
PROPOSED SECOND FLOOR LAYOUT



PROPOSED FIRST FLOOR LAYOUT



PROPOSED THIRD FLOOR LAYOUT



PROPOSED GROUND FLOOR LAYOUT

FLOOR AREAS:

Ground Floor Units 1-4 = 46.00m²
Upper Floor Units 5-12 = 50.7m²
Top Floor Units 13-14 = 75m²

STORAGE AREAS:

Ground Floor Units 1-4 = 2.34m²/ UNIT
Upper Floor Units 5-12 = DITTO
Top Floor Units 13-14 = 5.72

Job:
Proposed Development to Form
14 No Apartments,
All Car Repaired Ltd,
Queen's Road,
Hinckley,
Leics.

For

Title:
Planning : Floor Plans

Scale: 1:100 Drwg No: 3374/4 Date: Dec 25 Rev: A

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REVISIONS

Rev	Description	Date	By
A	WINDOWS ADDED TO NORTH WEST	30/04/26	TMB

NOTES



PROPOSED SOUTH WEST ELEVATION



PROPOSED NORTH WEST ELEVATION



PROPOSED NORTH WEST ELEVATION



PROPOSED SOUTH EAST ELEVATION

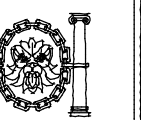
PROPOSED NORTH EAST ELEVATION

Job:
Proposed Development to Form
14 No Apartments,
All Car Repaired Ltd,
Queen's Road,
Hinckley,
Leics.
For

Title :
Planning : Elevations

Scale: 1:100	Drawg No: 3374/5	Date: Dec 25	Rev: A
-----------------	---------------------	-----------------	-----------

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Appendix D - Existing Runoff Rate Calculations

	Project 2-4 Queens Road, Hinckley, Leicestershire, LE10 1EF		Job Ref. AEG11398	
	Client All Cars Repaired Ltd		Sheet 1	Rev. A01
	Element Brownfield Runoff Calculations	Date	Calc by CM	Check by JM
Ref	Calculations			Output
	Using the Modified Rational Method (as set out in CIRIA C753) to calculate the Brownfield runoff rate. $Q = 2.78 \times C \times i \times A$ (EQ. 24.5) i = Average rainfall intensity of the design storm in millimetres per hour, mm/hr. A = Effective impermeable area of the existing site in hectares, ha. = 773 m² = 0.0773 ha Q = Rainfall runoff rate in litres per second, l/s. C = Dimensionless Runoff Coefficient * = 1.0 2.78 = Conversion factor to address the rainfall unit being in mm/hr. *Ciria C753 (Section 24.6.2), volumetric and routing coefficients CV & CR (CV of the order 0.6 and the routing coefficient, CR of the order of 1.3) the two coefficients are usually incorporated into a single term with a value of between 0.8 and 1.0 depending on how effectively the catchment is drained. A constant rainfall intensity of 35 mm/hr has been assumed # # C753 24.6.2 – Rainfall intensity - For the design of pipework (pipe full flow), a constant rainfall intensity of 35mm/hr can be assumed, or 50mm/hr may be required by some approving bodies for a more conservative solution (May and Kellagher 2004.) The estimated brownfield rainfall rate has been based on the existing drainage systems draining a total area of 0.0773 ha. $Q = 2.78 \times 1.0 \times 35 \times 0.0773 = 7.52 \text{ l/s}$ The above calculation demonstrates that the development currently drains to the existing sewer network unrestricted at 7.52 l/s It is proposed to restrict flows to 1 l/s, which equates to a betterment of 86.7% over the existing runoff rate			
enquiries@aegaea.com - civils@aegaea.com - www.aegaea.com				

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	16/09/2026
Calculated by	CM
Reference	Queens Road
Model version	2.2.3

Location

Site name	2-4 Queens Road
Site location	Hinckley



Site easting (British National Grid)	443109
Site northing (British National Grid)	293828

Site details

Total site area (ha)	0.0773	ha
----------------------	--------	----

Greenfield runoff

Method

Method	FEH statistical (2025)
--------	------------------------

FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	679	mm
BFIHOST19scaled	0.435	
QMed-QBar conversion	1.124	1.124
QMed (l/s)	0.2	l/s
QBar (FEH statistical 2025) (l/s)	0.3	l/s

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	4	4
1 year growth factor	0.83	
2 year growth factor	0.89	
10 year growth factor	1.49	
30 year growth factor	2	
100 year growth factor	2.57	
200 year growth factor	3.04	

Results

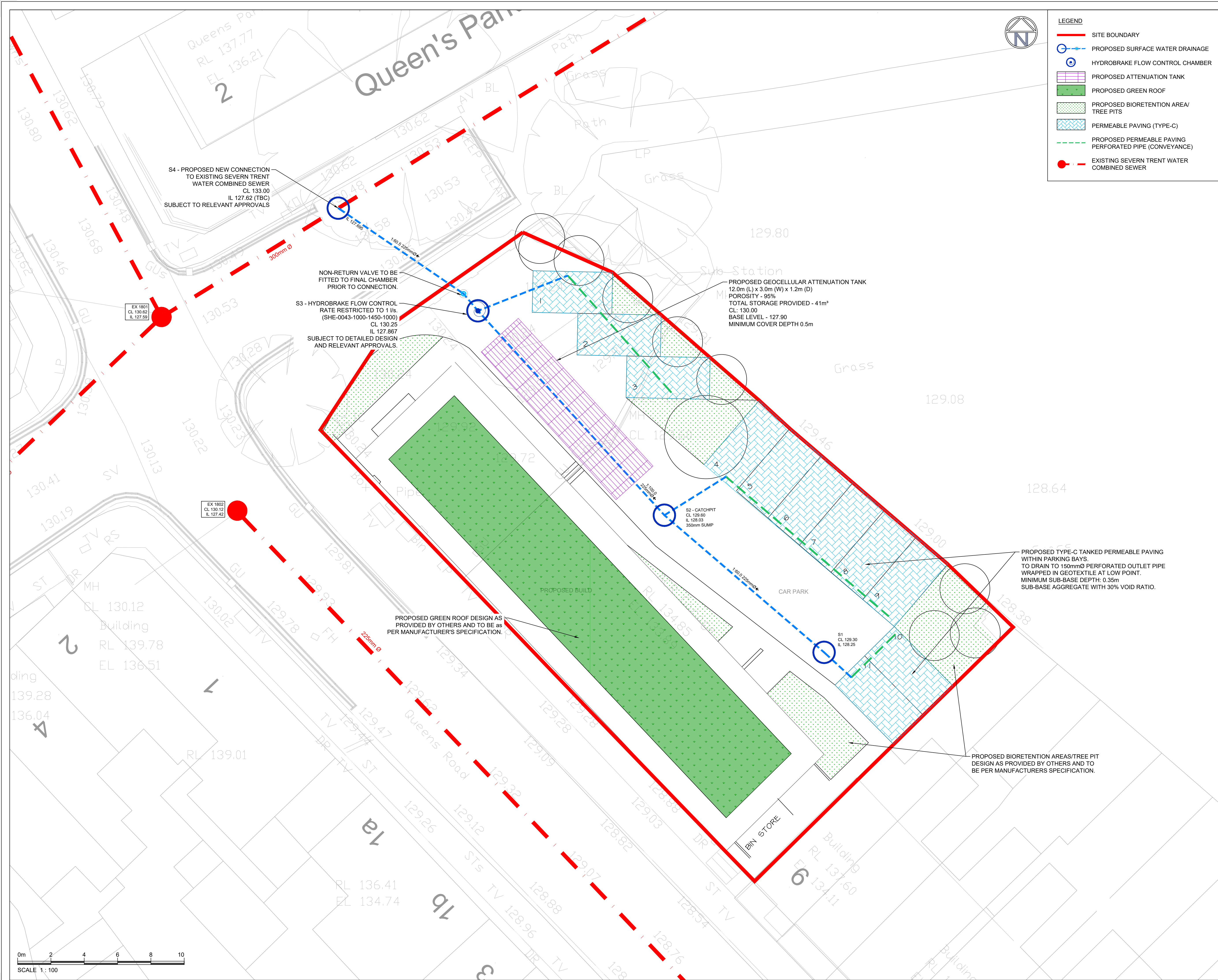
Method	FEH statistical (2025)
Flow rate 1 year (l/s)	0.2
Flow rate 2 year (l/s)	0.2
Flow rate 10 years (l/s)	0.4
Flow rate 30 years (l/s)	0.5
Flow rate 100 years (l/s)	0.7
Flow rate 200 years (l/s)	0.8

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.3) developed by HR Wallingford and available at uksuds.com (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Appendix E - Proposed Surface Water Drainage Strategy



DO NOT SCALE THIS DRAWING. USE FIGURED DIMENSIONS ONLY.

THE CONTRACTOR MUST CHECK & VERIFY ALL DIMENSIONS ON SITE. ANY DISCREPANCIES MUST BE REPORTED IMMEDIATELY TO THE ENGINEER FOR CLARIFICATION BEFORE PROCEEDING.

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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

REFER TO THE RELEVANT CONSTRUCTION (DESIGN AND MANAGEMENT) DOCUMENTATION WHERE APPLICABLE.

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WORKING WHERE APPROPRIATE TO AN APPROVED METHOD STATEMENT.

LEGEND

- SITE BOUNDARY
- PROPOSED SURFACE WATER DRAINAGE
- HYDROBRAKE FLOW CONTROL CHAMBER
- PROPOSED ATTENUATION TANK
- PROPOSED GREEN ROOF
- PROPOSED BIORETENTION AREA/ TREE PITS
- PERMEABLE PAVING (TYPE-C)
- PROPOSED PERMEABLE PAVING PERFORATED PIPE (CONVEYANCE)
- EXISTING SEVERN TRENT WATER COMBINED SEWER

GENERAL NOTES

- THIS DRAWING IS SUBJECT TO CHANGE DURING THE APPROVALS PROCESS WITH RELEVANT STATUTORY BODIES.
- EXACT LINE, LEVEL & FLOWS OF THE EXISTING SEWERS TO BE CONFIRMED.
- DEPTH/INVERT LEVEL OF EXISTING PUBLIC SEWERS TO BE ESTABLISHED TO CONFIRM THAT THERE ARE NO CLASHES WITH THE PROPOSED DRAINAGE ARRANGEMENTS. POSITIONS OF EXISTING SERVICES/STATUTORY UNDERTAKERS APPARATUS ADJACENT TO OR CROSSING PROPOSED EXCAVATIONS ARE TO BE CONFIRMED PRIOR TO START ON SITE.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH AND CHECKED AGAINST ALL, ENGINEERING DETAILS, SPECIFICATIONS, GEOTECHNICAL AND OTHER RELEVANT DOCUMENTATION PROVIDED.
- POSITIONS OF PIPE RUNS AND MANHOLES MAY VARY ON SITE DUE TO SITE CONDITIONS.
- WHERE EXISTING OR PROPOSED TREES ARE ADJACENT TO HIGHWAYS OR DRAINAGE, ROOT BARRIERS (TYPE TO BE APPROVED) ARE REQUIRED TO PREVENT STRUCTURAL DAMAGE.
- ANY ANOMALY OR CONTRADICTIONS BETWEEN ANY OF THE ABOVE IS TO BE REPORTED IMMEDIATELY.
- THE DESIGN IS TO COMPLY IN ALL ASPECTS WITH THE CURRENT BRITISH STANDARDS, BUILDING REGULATIONS AND BUILDING LEGISLATION ETC.
- ALL PIPE SIZES, CHAMBER DEPTHS, SIZE & QUANTITY SUBJECT TO REVIEW AND DETAILED DESIGN. ALL ADOPTED PIPE WORK ROUTING AND ANY EASEMENTS SUBJECT TO FULL DESIGN REVIEW AND APPROVAL BY THE RELEVANT BODIES.
- ALL ATTENUATION HAS SIZED BASED UPON THE CURRENT SITE LAYOUT AND IS SUBJECT TO CHANGE FOLLOWING RECEIPT OF ANY REVISED LAYOUT AND APPROVAL BY THE WATER AUTHORITY/LPA.
- SUBJECT TO DETAILED DESIGN AND THE RELEVANT TECHNICAL APPROVALS/LEGAL AGREEMENTS.

THIS DRAWING IS FOR PLANNING PURPOSES ONLY AND NOT FOR CONSTRUCTION.

SUBJECT TO WATER AUTHORITY TECHNICAL APPROVAL

A01	16.09.26	FIRST ISSUE	CM
Rev	Date	Description	By
Client			
ALL CARS REPAIRED LTD			
Project			
2-4 QUEENS ROAD, HINCKLEY			
Title			
PROPOSED SURFACE WATER DRAINAGE STRATEGY			
Project No.	Drawing No.	Revision	
AEG11398	CIV-001	A01	
Drawn	Checked	Approved	Date
CM	DB	JM	SEPT 2026
Scale @ A1			
1:100			
Drawing Status			
PLANNING			

aegaea

water, civils and environment

FIGURE B18
TYPICAL INSPECTION CHAMBER DETAIL - TYPE D (FLEXIBLE MATERIAL DETAIL)

MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE
IN AREAS SUBJECT TO VEHICLE LOADING 2M, NON-ENTRY

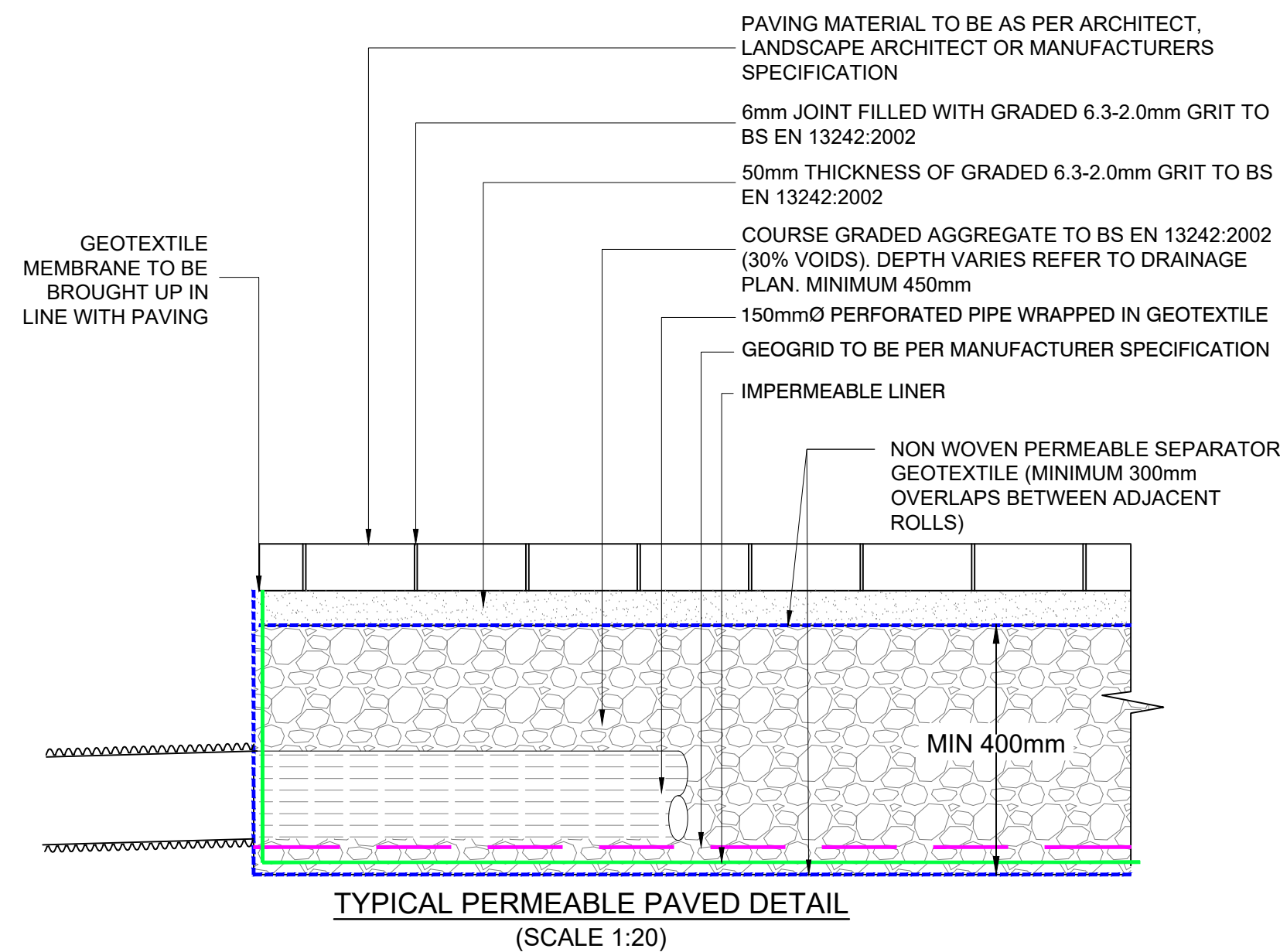
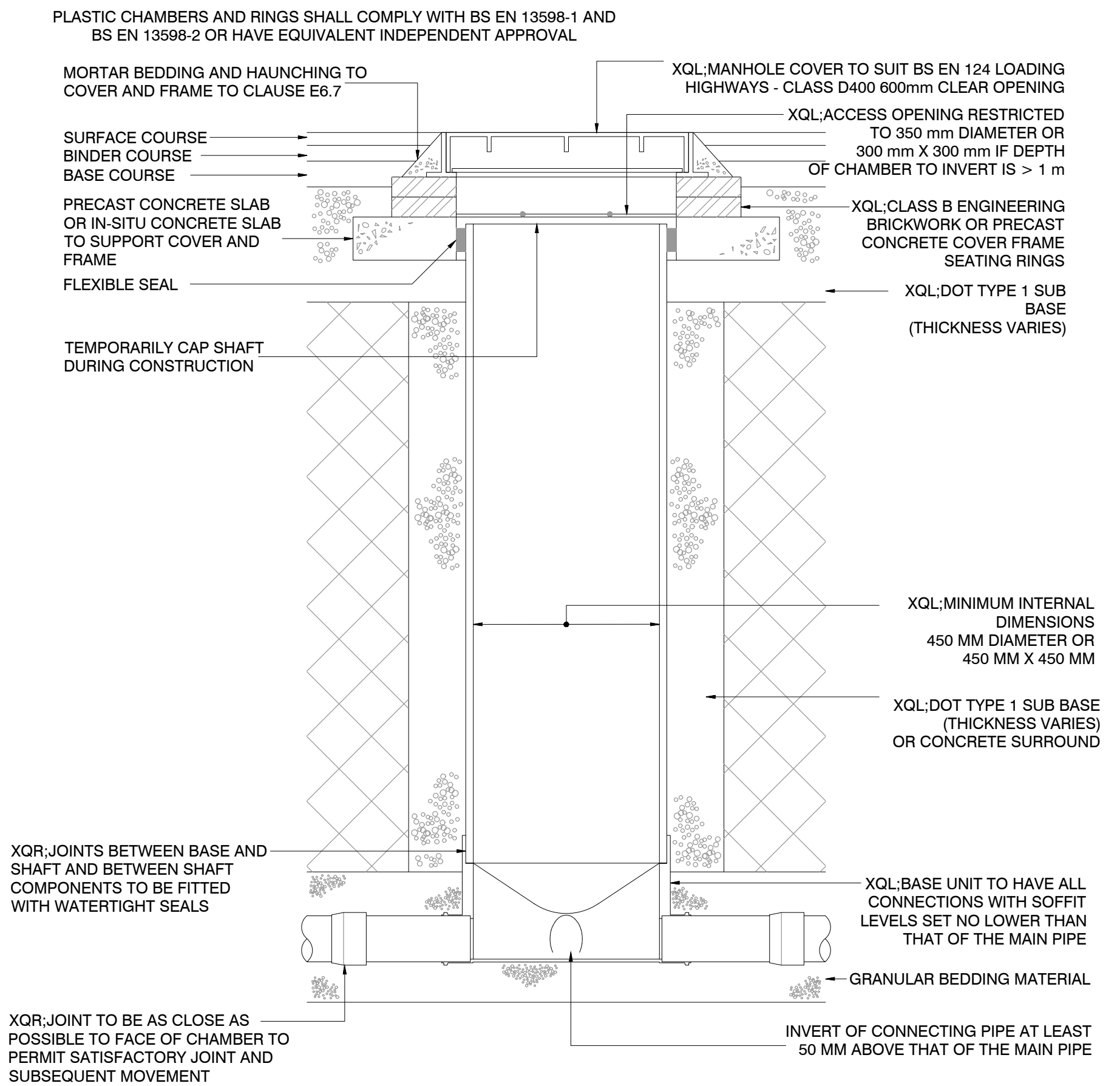
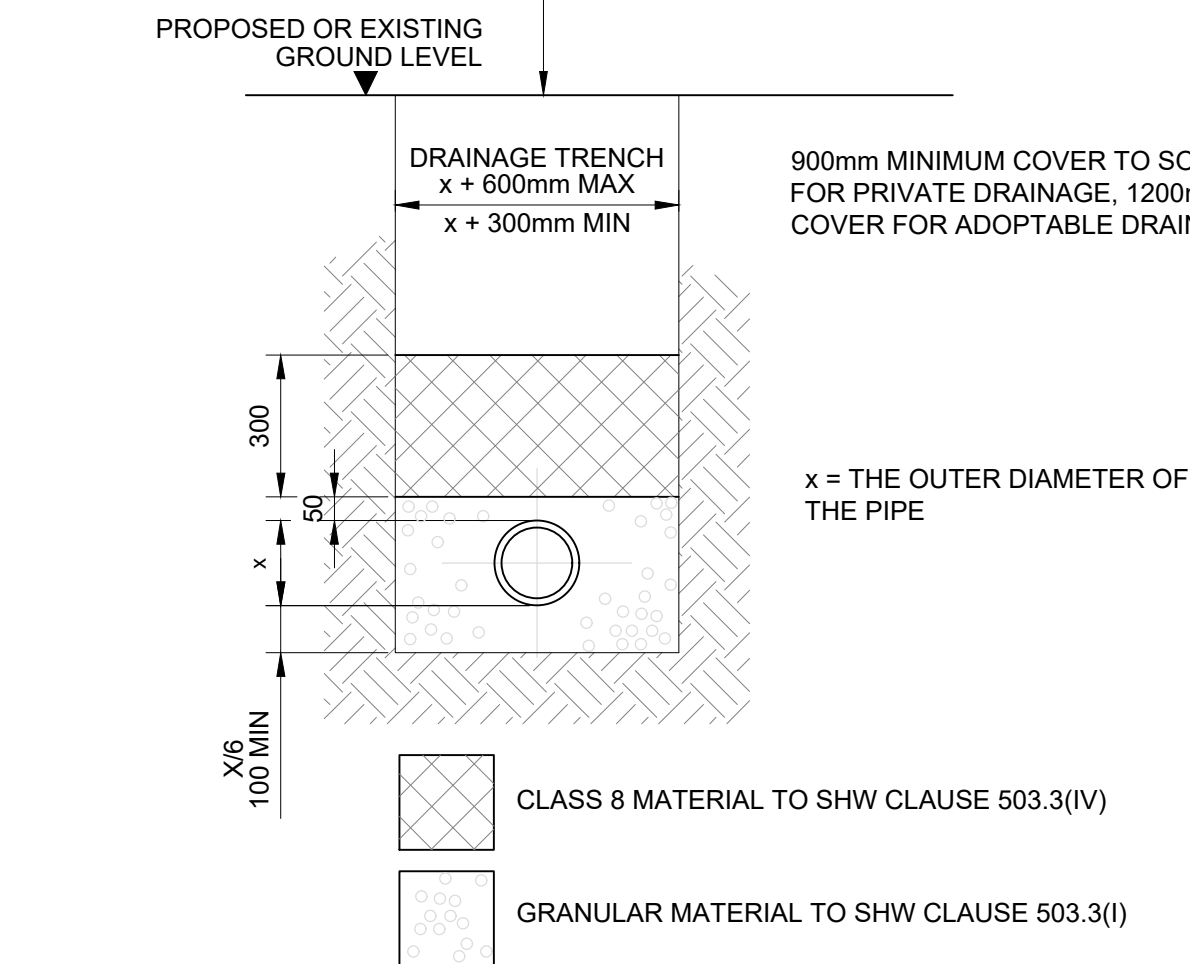
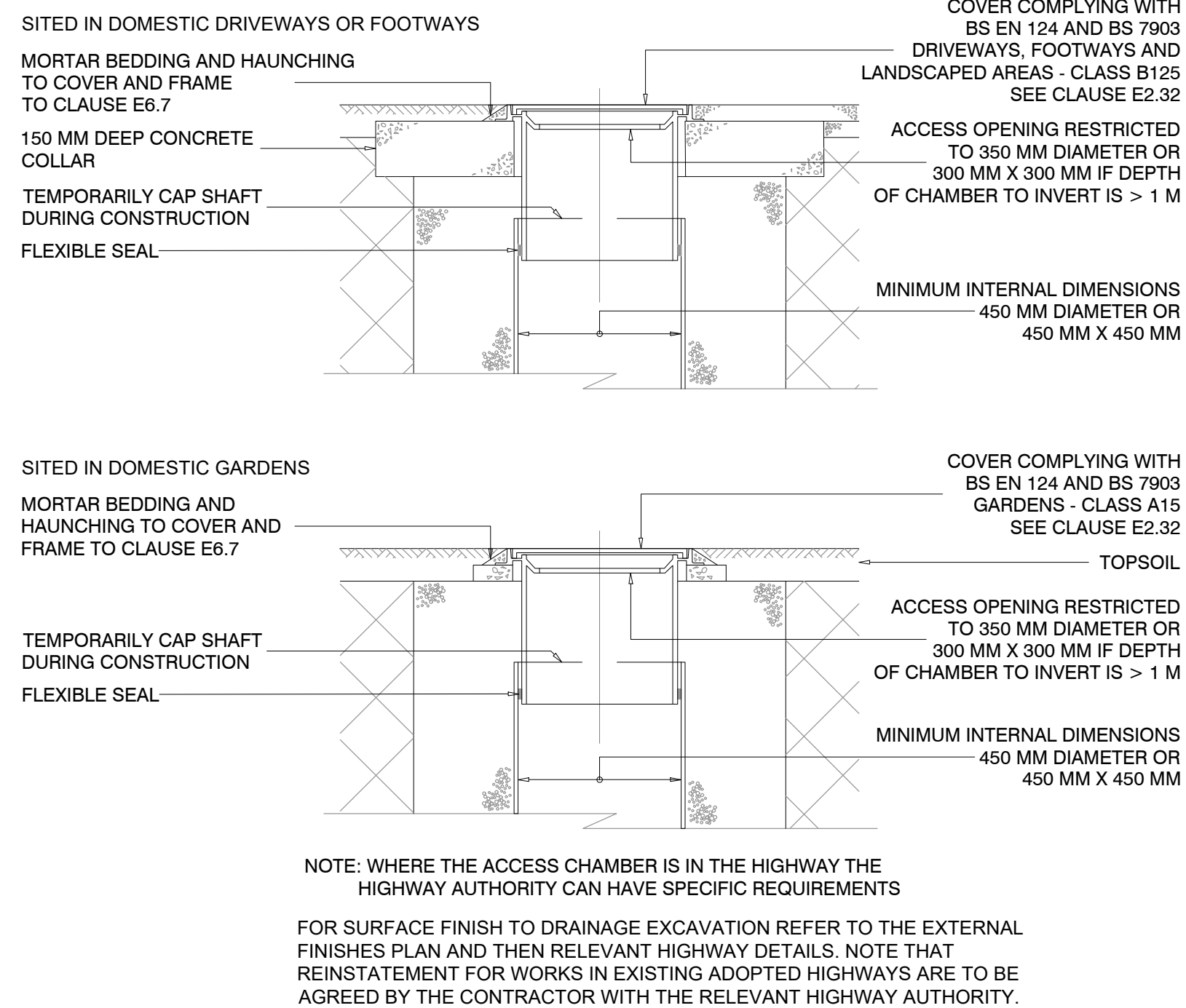


FIGURE B19
ALTERNATIVE TOP DETAILS FOR LIGHT VEHICLE LOADING
AND LANDSCAPED AREAS - TYPE D

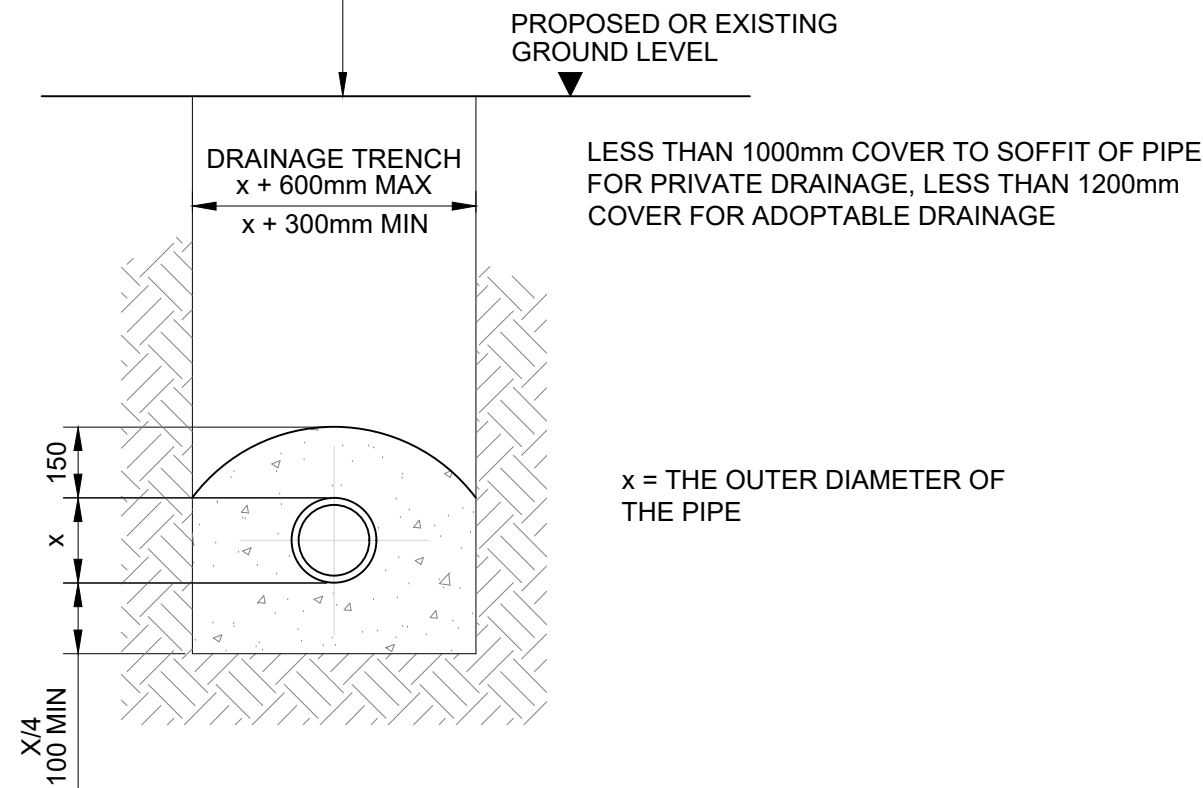
PLASTIC CHAMBERS AND RINGS SHALL COMPLY WITH BS EN 13598-1 AND BS EN 13598-2 OR HAVE EQUIVALENT INDEPENDENT APPROVAL



NOTE: CLASS 'S' BEDDING FOR USE WITH ALL ADOPTABLE DRAINAGE WITH COVER TO SOFFIT OF PIPE GREATER THAN 1200MM. PRIVATE DRAINAGE WITHIN LANDSCAPED AND OTHER NON-TRAFFICKED AREAS WITH COVER GREATER THAN 1000MM TO THE PIPE SOFFIT MAY USE PIPE BEDDING CLASS 'T' REFER TO DRAWING F1 (SHW) HIGHWAY CONSTRUCTION DETAILS.

CLASS 'S' PIPE BEDDING

FOR SURFACE FINISH TO DRAINAGE EXCAVATION REFER TO THE EXTERNAL FINISHES PLAN AND THEN RELEVANT HIGHWAY DETAILS. NOTE THAT REINSTATEMENT FOR WORKS IN EXISTING ADOPTED HIGHWAYS ARE TO BE AGREED BY THE CONTRACTOR WITH THE RELEVANT HIGHWAY AUTHORITY.

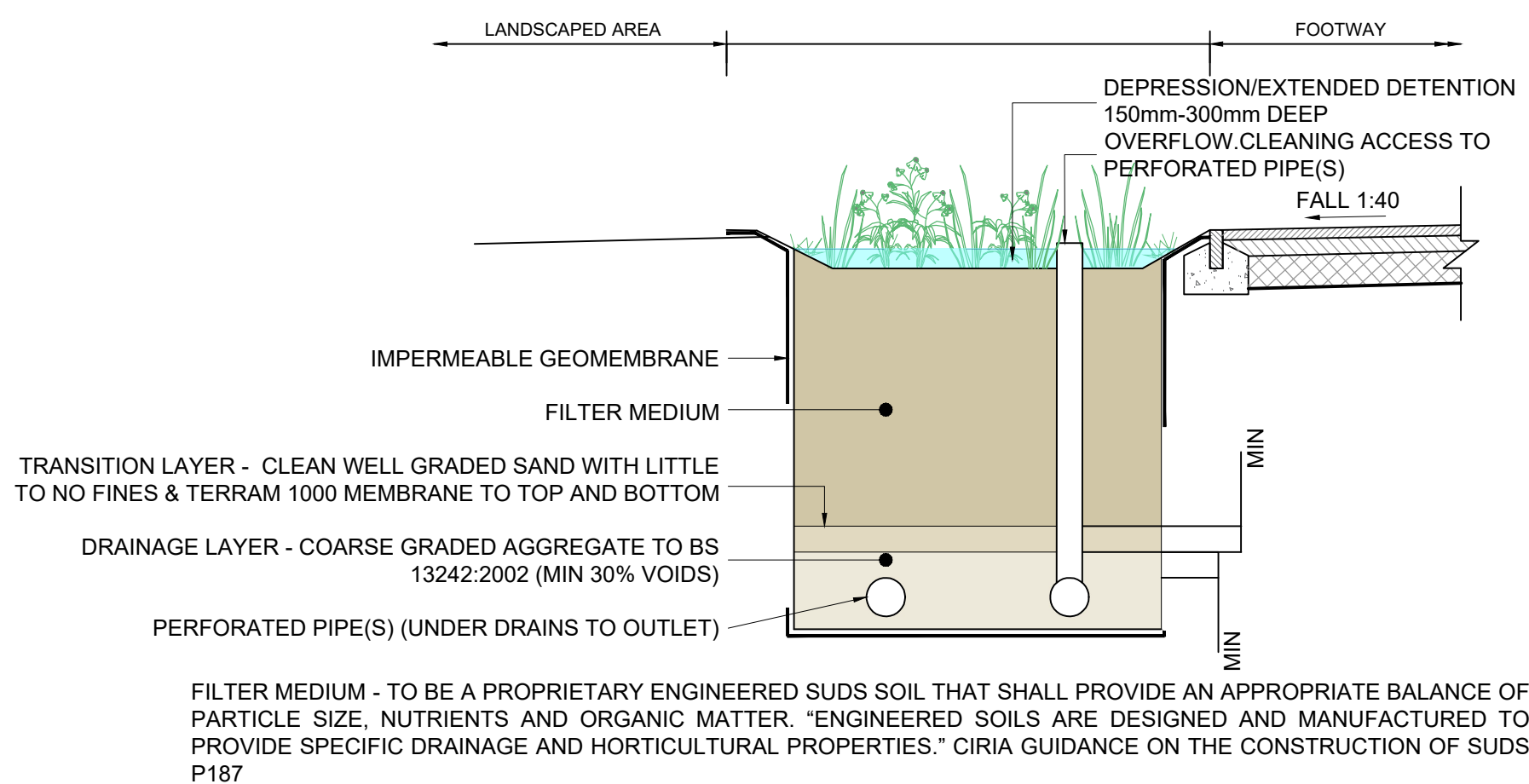
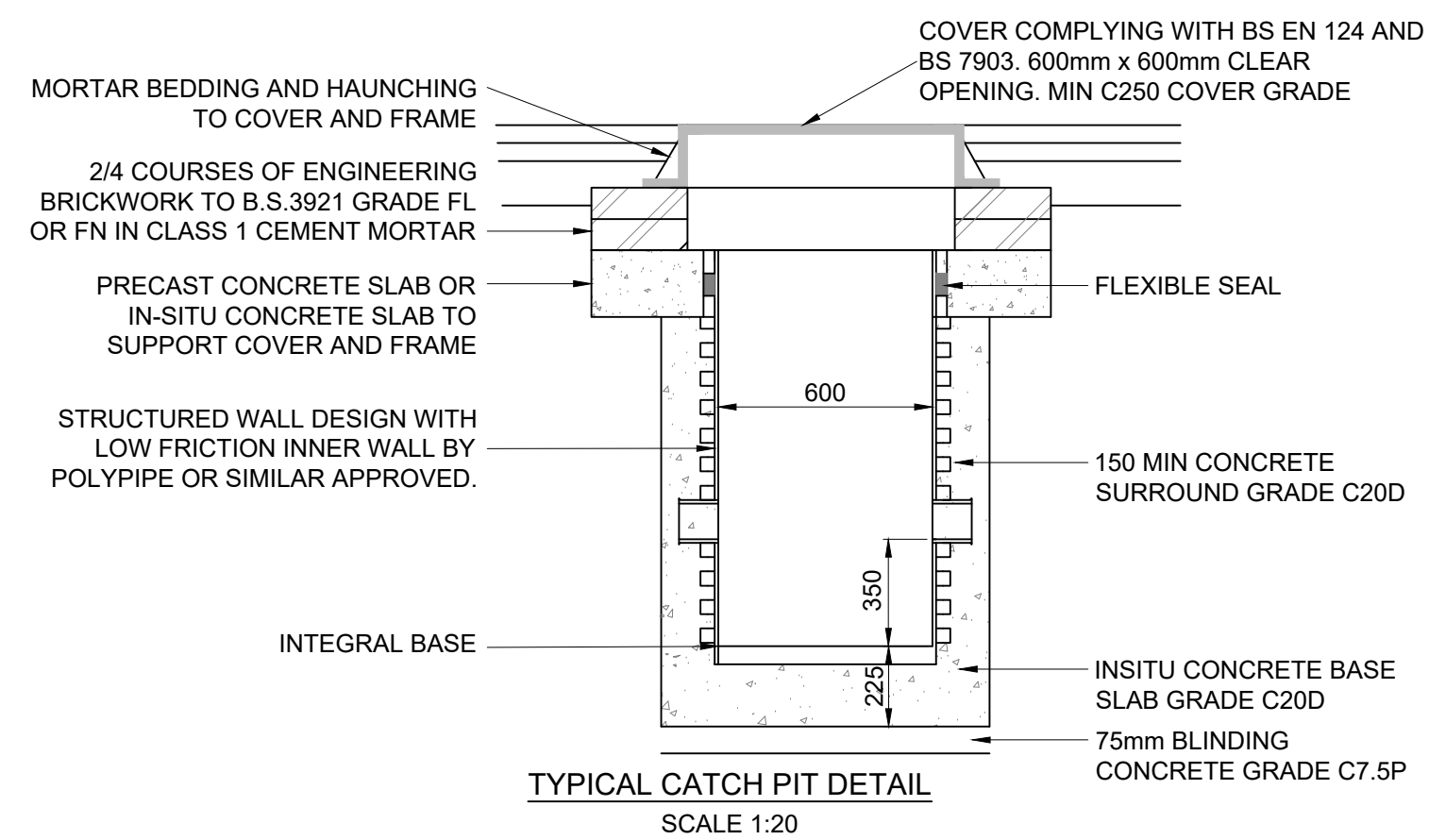
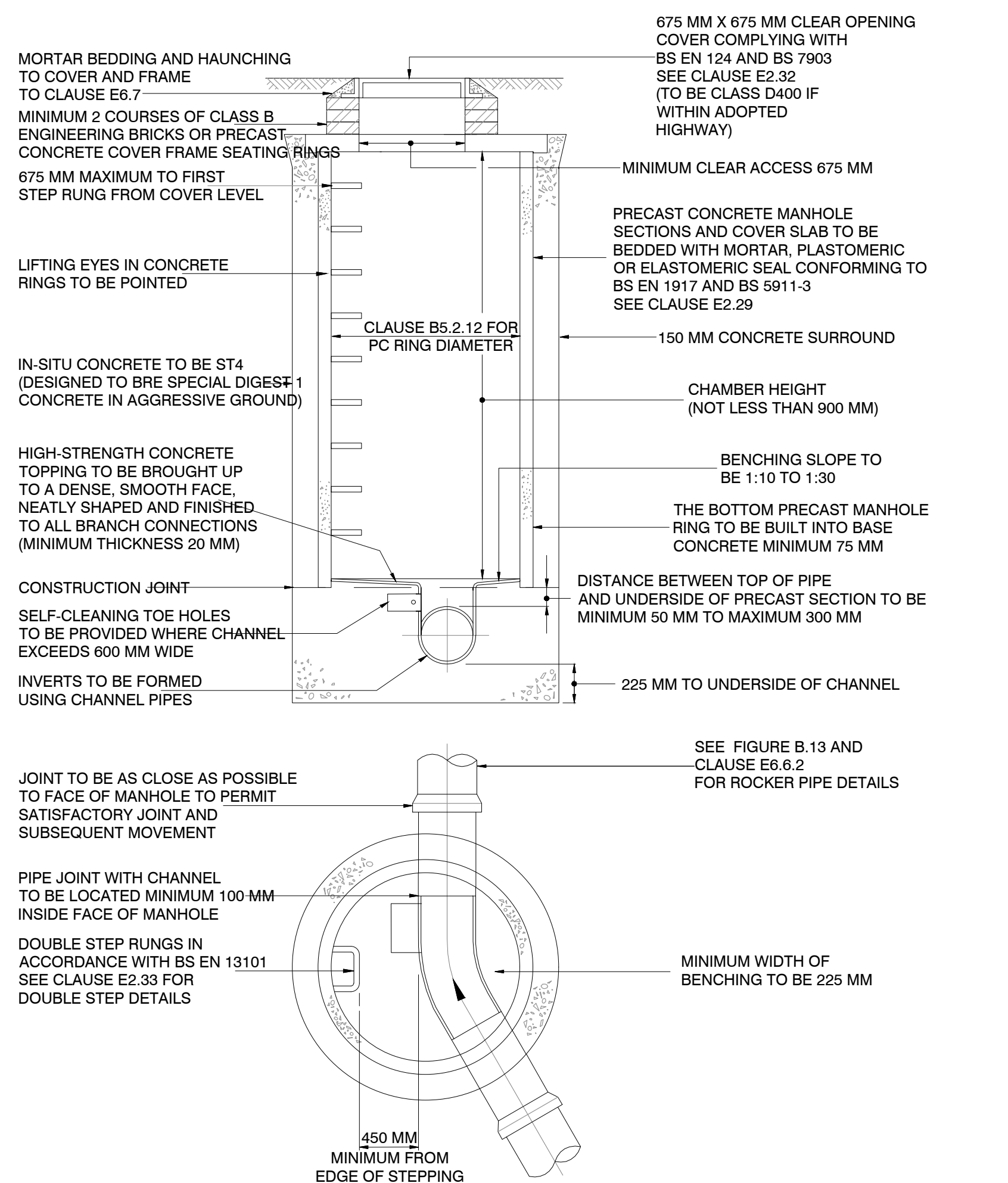


CONCRETE TO S.H.W CLAUSE 503.3 (II).
ST2 CONCRETE WITH COMPRESSIBLE FILLER BOARD AT 3m MAXIMUM CENTRES AND ALL PIPE JOINTS. FILLER BOARD SHALL CONSIST OF BITUMEN IMPREGNATED INSULATION BOARD TO B.S. EN 622, AND B.S. EN 317. THICKNESS OF COMPRESSIBLE BOARD AS TABLE ABOVE.

NOTE: CLASS 'Z' BEDDING FOR USE WITH ALL ADOPTABLE DRAINAGE WITH COVER TO SOFFIT OF PIPE LESS THAN 1200mm.

CLASS 'Z' PIPE BEDDING

FIGURE B 9
TYPICAL MANHOLE DETAIL - TYPE B
DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 1.5M TO 3.0 M



TYPICAL SECTION THROUGH BIORETENTION AREA
(SCALE 1:25)

DO NOT SCALE THIS DRAWING. USE FIGURED DIMENSIONS ONLY. THE CONTRACTOR MUST CHECK & VERIFY ALL DIMENSIONS ON SITE. ANY DISCREPANCIES MUST BE REPORTED IMMEDIATELY TO THE ENGINEER FOR CLARIFICATION BEFORE PROCEEDING. THIS DRAWING IS COPYRIGHT AND OWNED BY AEGAEA.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION REFER TO THE RELEVANT CONSTRUCTION (DESIGN AND MANAGEMENT) DOCUMENTATION WHERE APPLICABLE. IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WORKING WHERE APPROPRIATE TO AN APPROVED METHOD STATEMENT.

GENERAL NOTES

1. THE CONTRACTOR IS TO CHECK AND VERIFY ALL SITE DIMENSIONS AND LEVELS, INCLUDING EXISTING SEWER INVERT LEVELS AND UTILITIES, PRIOR TO START ON SITE.
2. POSITIONS OF EXISTING SERVICES ADJACENT TO OR CROSSING PROPOSED EXCAVATIONS ARE TO BE CONFIRMED PRIOR TO START ON SITE.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH AND CHECKED AGAINST ALL ENGINEERING DETAILS, SPECIFICATIONS, GEOTECHNICAL AND OTHER RELEVANT DOCUMENTATION PROVIDED.
4. POSITIONS OF PIPE RUNS AND MANHOLES MAY VARY ON SITE DUE TO ONGOING STATUTORY UNDERTAKER COMMENTS/SITE CONDITIONS.
5. ANY ANOMALY OR CONTRADICTIONS BETWEEN ANY OF THE ABOVE IS TO BE REPORTED IMMEDIATELY.
6. THE CONTRACTOR IS TO COMPLY IN ALL ASPECTS WITH THE CURRENT BRITISH STANDARDS, BUILDING REGULATIONS AND BUILDING LEGISLATION ETC.
7. WE RECOMMEND INFILTRATION TESTING IS UNDERTAKEN TO THE BASE OF THE INFILTRATION BASIN ONCE CONSTRUCTED TO CONFIRM THE RATE.

THIS DRAWING IS FOR DISCHARGE OF CONDITION ONLY AND NOT FOR CONSTRUCTION SUBJECT TO RELEVANT APPROVALS.

A01	16.09.26	FIRST ISSUE	CM
Rev	Date	Description	By

Client
ALL CARS REPAIRED LTD

Project
2-4 QUEENS ROAD, HINCKLEY

Title
PROPOSED SURFACE WATER DRAINAGE DETAILS

Project No.	Drawing No.	Revision
AEG11398	CIV-002	A01
Drawn	Checked	Approved
CM	DB	JM
Date	Scale @ A1	
SEPT 2026	AS SHOWN	

Drawing Status
PLANNING

aegaea
water, civils and environment

Appendix F - Proposed Surface Water Drainage Calculations

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	1.000	Drain Down Time (mins)	240	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0	Check Discharge Volume	x
Summer CV	1.000	Skip Steady State	x	Starting Level (m)			

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 %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	100	40	0	0
35	0	0	0				

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.600
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
1	0.019	5.00	129.300	1200	443149.072	293835.852	1.050	128.250
2	0.031	5.00	129.600	1200	443138.846	293843.729	1.567	128.033
3	0.027	5.00	130.250	1200	443127.656	293855.999	2.383	127.867
4			130.500	1200	443119.277	293862.163	2.880	127.620
EX1801			130.620	1200	443108.672	293855.628	3.030	127.590
EX1803		5.00	130.090	1200	443146.177	293878.741	2.390	127.700

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)
2.000	EX1803	4	31.598	0.600	127.700	127.620	0.080	395.0	300	5.67	49.3
1.003	4	EX1801	12.457	0.600	127.620	127.590	0.030	415.2	300	5.94	47.4
1.000	1	2	12.908	0.600	128.250	128.033	0.217	59.5	225	5.13	50.0
1.001	2	3	16.606	0.600	128.033	127.867	0.166	100.0	225	5.34	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)
2.000	0.785	55.5	0.0	2.090	2.580	0.000	0.0	0	0.000
1.003	0.765	54.1	13.2	2.580	2.730	0.077	0.0	100	0.634
1.000	1.699	67.5	3.4	0.825	1.342	0.019	0.0	35	0.903
1.001	1.307	52.0	9.0	1.342	2.158	0.050	0.0	63	0.982

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)
1.002	3	4	10.402	0.600	127.867	127.695	0.172	60.5	225	5.44	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)
1.002	1.684	67.0	13.9	2.158	2.580	0.077	0.0	69	1.332

Node 3 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	127.867	Product Number	CTL-SHE-0043-1000-1450-1000
Design Depth (m)	1.450	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.0	Min Node Diameter (mm)	1200

Node 3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	127.867
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	36.0	36.0	1.200	36.0	61.5	1.201	0.0	61.5

Node 1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	6.000	Depth (m)	0.350
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	128.900	Length (m)	5.200	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	152	Slope (1:X)	100.0		

Node 2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.200	Depth (m)	0.350
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	129.200	Length (m)	15.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	0	Slope (1:X)	100.0		

Node 3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.200	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	129.850	Length (m)	7.500	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	100.0		

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 summer	1	10	128.278	0.028	2.2	0.0412	0.0000	OK
15 minute summer	2	10	128.086	0.053	5.8	0.0810	0.0000	OK
360 minute summer	3	240	128.077	0.210	2.8	7.4770	0.0000	OK
180 minute summer	4	128	127.645	0.025	0.7	0.0280	0.0000	OK
180 minute summer	EX1801	128	127.608	0.018	0.7	0.0000	0.0000	OK
15 minute summer	EX1803	1	127.700	0.000	0.0	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 summer	1	1.000	2	2.2	0.461	0.032	0.0639	
15 minute summer	2	1.001	3	5.8	1.025	0.112	0.1482	
360 minute summer	3	1.002	4	0.7	0.538	0.010	0.0129	
180 minute summer	4	1.003	EX1801	0.7	0.301	0.012	0.0279	10.7
15 minute summer	EX1803	2.000	4	0.0	0.000	0.000	0.0403	

Results for 35 year Critical Storm Duration. Lowest mass balance: 99.65%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	1	344	128.571	0.321	1.1	0.4791	0.0000	SURCHARGED
360 minute winter	2	344	128.571	0.538	2.9	0.8214	0.0000	SURCHARGED
360 minute winter	3	344	128.571	0.704	4.2	25.0281	0.0000	SURCHARGED
360 minute winter	4	344	127.646	0.026	0.7	0.0290	0.0000	OK
360 minute winter	EX1801	344	127.609	0.019	0.7	0.0000	0.0000	OK
15 minute summer	EX1803	1	127.700	0.000	0.0	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)
360 minute winter	1	1.000	2	1.1	0.362	0.016	0.5134	
360 minute winter	2	1.001	3	2.6	0.539	0.050	0.6604	
360 minute winter	3	1.002	4	0.7	0.550	0.011	0.0136	
360 minute winter	4	1.003	EX1801	0.7	0.307	0.013	0.0293	21.2
15 minute summer	EX1803	2.000	4	0.0	0.000	0.000	0.0434	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	1	344	129.232	0.982	1.9	4.3333	0.0000	FLOOD RISK
360 minute winter	2	344	129.232	1.199	4.7	1.9138	0.0000	SURCHARGED
360 minute winter	3	344	129.232	1.365	7.1	42.9108	0.0000	SURCHARGED
360 minute winter	4	352	127.649	0.029	1.0	0.0330	0.0000	OK
360 minute winter	EX1801	352	127.612	0.022	1.0	0.0000	0.0000	OK
15 minute summer	EX1803	1	127.700	0.000	0.0	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)
360 minute winter	1	1.000	2	1.6	0.343	0.024	0.5134	
360 minute winter	2	1.001	3	4.5	0.618	0.086	0.6604	
360 minute winter	3	1.002	4	1.0	0.603	0.014	0.0167	
360 minute winter	4	1.003	EX1801	1.0	0.333	0.018	0.0366	27.5
15 minute summer	EX1803	2.000	4	0.0	0.000	0.000	0.0438	