MANUFACTURING FACILITY

SAMLESBURY AERODOME

PROPOSED DEVELOPMENT

SURFACE WATER DRAINAGE STRATEGY

REVISION P02

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Project 7274

Table of Contents

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1.0 INTRODUCTION

1.1 Project Background

TRP Consulting was commissioned by Wilson Mason on behalf of the Client to prepare a surface water drainage strategy for the proposed construction of a new Industrial unit manufacturing facility on land at Samlesbury Aerodrome, Lancashire. The proposed development site covers an area of approximately 0.210 hectares.

The site is currently 100% impermeable hardstanding and comprises car parking for the existing warehouses/ units surrounding.

1.2 Proposed Development

A layout of the proposed development is shown in Fig 1.1 below. The site consists mainly of the proposed building with a perimeter footpath adjoining a raised plant area that'll house transformers and mechanical plantroom.

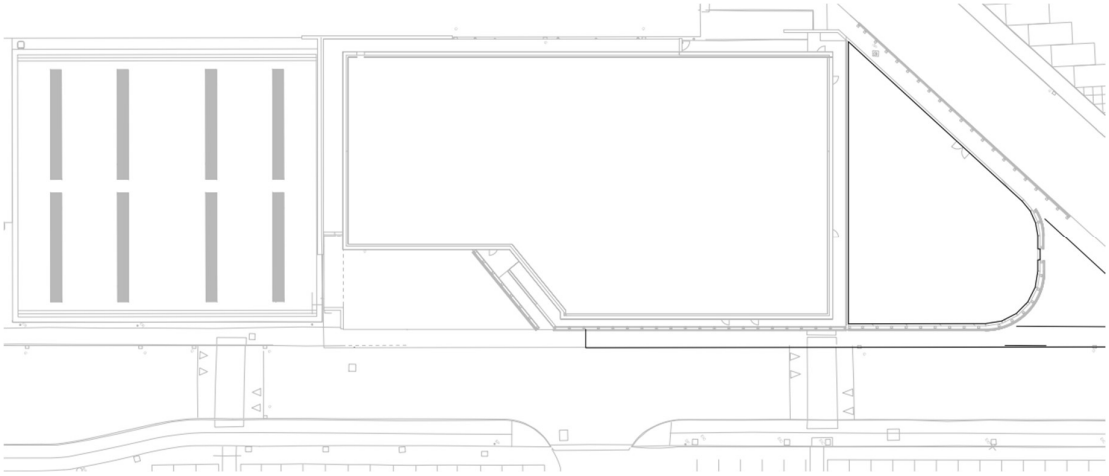


Figure 1.1 Proposed Development

1.3 Report and Objectives

The objective of this report is primarily to document the strategy for control and disposal of surface water run off resulting from the proposed development on the site.

The report is to consider the hierarchy of options available for disposal of surface water and the implementation of Sustainable Drainages Systems (SuDs). Details of the plans for the operation and maintenance of SuDs features are also to be considered.

This report also looks to address the planning conditions outlined by Lancashire Coun ty Council. The conditions, namely condition 7 to SW strategy, are as follows:

a) *Sustainable drainage calculations for peak flow control and volume control for the:*

i. *100% (1 in 1-year) annual exceedance probability event;*

ii. *3.3% (1 in 30-year) annual exceedance probability event + 40% climate change allowance, with an allowance for urban creep;*

iii. *1% (1 in 100-year) annual exceedance probability event + 50% climate change allowance, with an allowance for urban creep*

Calculations must be provided for the whole site, including all existing and proposed surface water drainage systems.

b) *Final sustainable drainage plans appropriately labelled to include, as a minimum:*

i. *Site plan showing all permeable and impermeable areas that contribute to the drainage network either directly or indirectly, including surface water flows from outside the curtilage as necessary;*

ii. *Sustainable drainage system layout showing all pipe and structure references, dimensions and design levels; to include all existing and proposed surface water drainage systems up to and including the final outfall;*

iii. *Details of all sustainable drainage components, including landscape drawings showing topography and slope gradient as appropriate;*

iv. *Drainage plan showing flood water exceedance routes in accordance with Defra Technical Standards for Sustainable Drainage Systems;*

v. *Finished Floor Levels (FFL) in AOD with adjacent ground levels for all sides of each building and connecting cover levels to confirm minimum 150 mm+ difference for FFL;*

vi. *Details of proposals to collect and mitigate surface water runoff from the development boundary;*

vii. *Measures taken to manage the quality of the surface water runoff to prevent pollution, protect groundwater and surface waters, and deliver suitably clean water to sustainable drainage components;*

c) *Evidence of an assessment of the existing on-site surface water drainage to be used, to confirm that these systems are in sufficient condition and have sufficient capacity to accept surface water runoff generated from the development.*

d) *Evidence that a free-flowing outfall can be achieved. If this is not possible, evidence of a surcharged outfall applied to the sustainable drainage calculations will be required.*

The sustainable drainage strategy shall be implemented in accordance with the approved details.

2.0 THE SITE

2.1 Site Location and Description

The site is located in Balderston, Blackburn. It is located between Myerscough Smithy Road (A59) to the north and Preston New Road (A677) to the south. The area of Mellor Brook lies just over 1km to the east, Turner Green lies approximately 1.5km to the west and Samlesbury town centre is located almost 4km to the west.

Figure 2.1: Site location

The site was undeveloped open farmland prior to World War 2 when it was developed as an airfield. Following the war, the former airfield was subsequently developed for aircraft component manufacture and assembly.

The facility is now occupied by several manufacturing, office and storage buildings, site roads, disused runways and grassed areas. The surrounding rural area comprises agricultural land and associated farm buildings.

2.2 Topography

The topographical survey confirms that the site generally falls from East to West where levels range from 73.50m to 72.45m AOD.

3.0 DESK STUDY, CONSULTATION AND INVESTIGATION

3.1 Hydrology

Ordnance Survey mapping and on-site inspection confirm that the closest watercourse is Huntley Brook (flowing North to South) located approximately 230m west of the site. A second watercourse, Mellor Brook is located approximately 800m north of the site and flows westwards.

3.2 Ground Investigation

A ground investigation was undertaken in May 2025. The potential for use of infiltration was considered during the investigation. The superficial strata across the site were confirmed to be hard paving overlying 0.5-1.8m of made ground overlying soft to very stiff boulder clay to depths of over 25m. The made ground consisted of mainly brown ashy stone, brick and clinker. The presence of ashy made ground and a considerable thickness of low permeability clays soil confirmed that infiltration would not provide a suitable means of disposal for surface water run off generated by the development.

3.3 United Utilities Sewer Records & Existing Drainage

The site does not have any UU assets in or around the site. A 150mm diameter surface drain runs parallel to the external wall of the adjacent building and picking up discharge from gullies along the edge of the car park, a gully along the pedestrian crossing of the access road and roof drainage the building to the north. This leads into a manhole with two other pipe inflows; from surveys these look to be carrying surface water flows from the roof of the north building. A 450mm surface water drain then turns to run parallel to the gable wall of the garage to the western building before connecting to a main sewer in the access road. The 450mm diameter surface water sewer which crosses the car park under the proposed extension runs at a depth of approximately 1.5m below the FFL of the western building. This existing drainage can be seen below in Fig 3.3

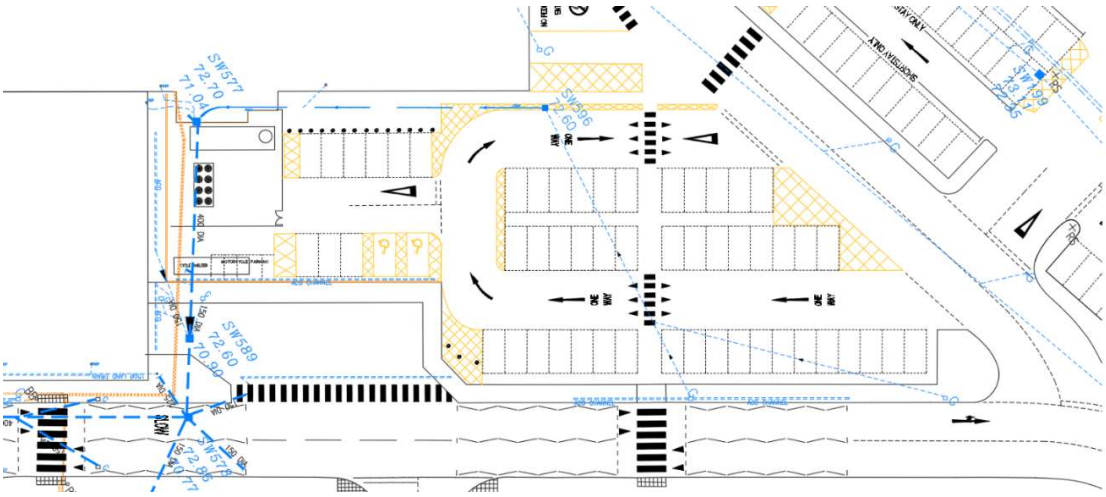


Figure 3.3: Existing site drainage

3.4 Flood risk

Environment Agency Flood Mapping indicates the site is located within EA Flood Zone 1. EA Flood Zone 1 land has been assessed as having a minimal 0.1% (1 in 1000 year) chance of flooding from rivers or the sea in any given year.

The probability of flooding from the various sources is summarised in the table below

Source of Flooding	Probability of Flooding
Fluvial and Tidal	Low Probability (less than 1 in 1000 annual probability)
Reservoirs and Canals	Low Probability - Unlikely
Groundwater	Low Probability – Limited Potential
Sewers	Low Probability
Surface Water run-off and Overland Flow	Low Probability

Preliminary assessment of the site and surrounding area has and confirmed a low probability of flooding from all sources.

3.5 Existing rates of run-off generated by the site

The site of the extension is currently hard paved with 100% of the site being impermeable and surface water run off being collected by a series of gullies adjacent to Building [redacted] which connect into the main site drainage system.

The site of the extension is currently hard paved with surface water run off being collected by a series of gullies adjacent to the western building which connect into the main site drainage system.

The construction of the manufacturing facility represents a redevelopment of a brownfield site, and it is proposed that the rate of surface water discharge from the site should achieve a 30% reduction on the predevelopment run off rate.

The development site has an area of approximately 2100m2 which would generate a predevelopment run off rate of 29.5 l/s based on a 1 in 2-year storm.

3.6 Surface water disposal options

The proposed development of the site will replace existing hard paved car park services with buildings, external plant compounds and new external paving. There will be no increase in the impermeable area and surface water runoff will be restricted to 70% of the predevelopment run off rate. The pre and post development impermeable areas will effectively be the same such that there will be no significant change to run-off volumes. The

use of SUDs techniques to discharge the additional surface water will be evaluated in following section of the report.

The storm water drainage system for the proposed development will be designed in accordance with the DCG, which requires that any surface water drainage system, should not surcharge during the 1 in 2-year storm event, and should not flood during a 1 in 30-year storm event (i.e., all run-off contained wholly within the sewerage system during the 1 in 30-year event).

Whilst the DCG requires there be no surface flooding during the 1 in 30-year storm event. It is generally accepted that a degree of surface flooding can be permitted during extreme storm events i.e., 1 in 100 year + climate change. This will be subject to specific areas being designated as flood susceptible and subject to flooding of these areas posing little or no risk to human life and damage to property. Examples of surface areas which might be permitted to flood in such events are:

- Agricultural land
- Recreational land (playing fields etc.)
- Landscaped areas
- Highways
- Car parks
- Other non-inhabited, designated areas

In all cases where surface flooding might be permitted or designed into a scheme, due diligence needs to be given to the NPPF and the need to make potential users of such areas aware of their functionality and purpose, and the requirement to maintain safe egress and access at all times.

Due to the sensitivity of the proposed development, it is proposed that the full 1 in 100 year run off + climate change will be contained withing the below ground network without surface storage.

The hierarchy of potential methods for surface water disposal from the site is as follows:

- A rainwater harvesting system.
- A soakaway: or where that is not practicable.
- A watercourse or river; or where that is not practicable,
- A sewer

4.0 DETAILED DEVELOPMENT PROPOSALS

The proposed redevelopment comprises the design and construction of a new manufacturing building on an existing car park.

The general scope of the project comprises:

- Clearance of existing site and grading to proposed platform levels
- Construction of the main manufacturing building and transformer area
- Construction of external works including footpaths, ramps and retaining walls
- Drainage and infrastructure associated with the building and external areas.

The building covers a large portion of the impermeable area of the site. The building is to be drained with symphonic roof drainage which will be directed into the SW network.

The development will be provided with separate foul and surface water drainage systems.

The footpaths surrounding the building are to be drained into ACO's that then connect into the proposed SW network. The same applies to the transformer and mechanical plantroom area.

4.1 Climate Change

The Environment Agency have provided guidance on the increase in peak rainfall intensity that should be applied in flood risk assessments and drainage design to make allowance for the effects of climate change. The EA have provided a range of allowances to be applied to the 1:100 year peak rainfall intensity as shown in the table below.

Allowance Category	Total potential change to 2050	Total potential change to 2070
Upper End	40%	50%
Central	25%	35%

Flood risk assessments should generally assess both the central and upper end allowances to understand the range of impact.

The development is generally assessed as having a minimum 50-year lifetime.

The surface water drainage system to the new development will be designed to account of storms up to and including 1 in 100-year return period and will include 50% increase in peak rainfall intensity to allow for climate change. Climate change should therefore not pose an undue risk to the proposed development

4.2 Flood Risk Management Measures

To protect the site and surrounding area from flooding the new below ground drainage systems for the proposed development will be designed for a 1 in 100-year event including a

50% increase in peak rainfall intensity to account for the effects of climate change. All flows will be accommodated below ground or within designed attenuation features. This will protect the development and adjacent sites from the risk of surface water flooding and overland flow.

Additionally, the finished floor level is set 150mm above the external level along the perimeter of the building other than entrances.

4.3 Off Site Impacts

The proposed drainage strategy is based on containing all run off in the below ground network and storage features without surface flooding or overland flow. The proposed development will not increase flood risk on or off site.

4.4 Residual Risks

A residual risk will remain from surface water run-off caused by extreme storm events with annual probabilities of less than 1% (1 in 100 year) and in the event of blockages in the site drainage systems.

The maintenance of the on-site drainage systems is the responsibility of the site owners. A drainage maintenance plan to cover the safe operation and maintenance of all drainage systems and SUDS is included in Section 6.0 of this report.

Reference should also be made to British Standard BS 8582:2013: Code of practice for surface water management for development sites regarding the maintenance requirements and programming for maintenance to surface water drainage systems.

4.5 Flood Risk Assessment Summary

The site is located in Flood Zone 1. Flood Zone 1 is land assessed as having a minimal risk of flooding from rivers and the sea, less than 1 in 1,000 in any year.

As assessment of all potential sources of flooding on the site has been undertaken. The overall risk of flooding to the site has been assessed as low.

5.0 PROPOSED SURFACE WATER DRAINAGE STRATEGY

5.1 Existing drainage arrangements

The development site is served by separate foul and surface water drainage systems that form part of the private site drainage system. Surface water from the entire private site discharges to both Huntly Brook in the west and Mellor Brook in the north.

5.2 Existing Run Off Rates

The total area of the development site is in the region of 0.21 hectares. Due to no soft landscaping, the total impermeable area contributing to surface run off is 100%, therefore runoff area is 0.21 hectares.

The existing surface water drainage network has been modelled using Infodrainage software and the predevelopment surface water run-off from has been calculated as 29.5 /s for a one in two-year storm.

5.3 Proposed Development

Details of the proposed development are set out in Section 4 and summarised below. The proposed site areas have been assessed as follows:

Assessment of proposed site areas			
Hard surfaces conventionally drained		m^2	
Building Roofs		1508	
Footpath		137	
Plant area		461	
	Total impermeable		2106 m^2
Total drained surfaces			**2106** m^2
Soft landscaped areas		0	
	Total soft landscaping		**0** m^2
Total Site Area			**2106** m^2

The total site of 2106 m2 of site will be drained to the surface water sewer system of which 71.6% is brown roofs and the remaining 28.4% are conventional drainage surfaces.

The required reduction in run off rate for the proposed extension has been assessed as follows:

Area of proposed extension site	=	2100 m^2
1 in 2 year run off rate for extension	=	29.5 l/s
Required 30% reduction in run off rate	=	**8.85 l/s**

This discharge rate to be controlled by a vortex flow control device, and to ease the effect on downstream sewers, the proposed surface water flows from the development site is limited to 20.65l/s for a 1 in 100-year storm + 50% climate change.

5.4 Ground Investigations

In May of 2025, Sub Surface completed a ground investigation report, reference 8115 GI Report 13.05.25, which entailed 4No. cable percussive boreholes and 3No. mini boreholes with subsequent in-situ testing, geotechnical laboratory testing, contamination analysis and waste classification.

The site investigation revealed a surface covering of silty very sandy topsoil to a depth of between 0.25m and 0.5m. The top surface was underlain by mainly made ground to a depth 0f 1.8m. This consisted of mainly brown ashy stone. Brick and clinker. Underlaying the made ground was brown slightly gravelly firm to very stiff clay with lenses of silty sand.

The ground investigation undertaken by Sub Surface North West Ltd comprised a series of boreholes and mini boreholes and trail pits. The borehole and trial pit locations are shown in Fig 5.4 below.

Fig 5.4 Borehole and trial pit location plan

The following ground conditions were outlined in the report.

Strata	Depth to base (m)	Thickness (m)
MADE GROUND – Bituminous surfacing and brown ashy stone brick and clinker	0.5-1.8	0.5-1.8
Soft Becoming Firm/Stiff/Very Stiff CLAY – brown slightly gravelly clay with lenses of silty sand	25m and over	Over 22m

Contamination testing was undertaken as part of the ground investigation. The results of testing confirmed elevated levels of contamination in the upper layer of made ground.

Some perched groundwater and seepage was noted in the made ground sitting above the low permeability natural clay soils.

5.5 Surface Water Drainage Options

Current guidance recommends that surface water run-off should be controlled as near as possible to its source. The Planning Practice Guidance suggests that the following hierarchy of drainage solutions should be considered:

- To rainwater harvesting systems
- To the ground via infiltration
- To a surface water body
- To a surface water sewer
- To a combined sewer

These options are considered below.

Rainwater harvesting systems

A rainwater harvesting tank has been avoided in this case as the need for non-potable water on site is very low. Proposed plans show a low-pitched roof for PV panels, a single w/c and no soft landscaping; with the area being in a non-water stressed region, the need for a rain harvesting system is not necessary.

Infiltration

Ground conditions on the site comprise made ground overlaying a consistent band of low permeability clay soils to depths in excess of 25m. Infiltration drainage systems have been discounted for disposal of surface water due to the presence of a consistent thick layer of low permeability clay soils beneath the site.

Discharge to a surface water body

The nearest watercourse, Huntley Brook, is located 230m away from the development site. This option was not deemed viable due to the distance and the fact that the site wide private surface water network already discharges to the Brook.

Discharge to a surface water sewer

The car park area currently on the development site drains to the existing site wide surface water drainage system with a connection at manhole S8 adjacent to the entrance to the western building. The proposed development is able to make use of the existing surface water connection which falls within the overall development site. The current strategy is to limit the surface water run off to generate a 30% reduction in the predevelopment run off rate. A connection to a surface water sewer would provide a viable option for disposal of surface water run-off from the development and would provide betterment on the current site drainage arrangements.

Preferred surface water disposal option

The site is not considered to be suitable for use of infiltration drainage systems due to the low permeability soil.

Discharge of surface water to the open watercourse has been ruled out due to the distance the watercourse is from site.

The preferred means of disposal for surface water run-off from the proposed development is discharge to the existing site wide surface water drainage network.

The rate of discharge from the site will provide a 30% reduction in the 1 in 2-year predevelopment run of rate. The development site will discharge into SW manhole S8 limited to a flow rate of 20.65l/s for all storm duration up to 1 in 100 year + 50% climate change. This has been designed to prevent flooding and as such no flood exceedance routes are required.

Additionally, the outfall has been modelled as surcharged to the soffit of the existing 450 mm diameter pipe to represent worst-case conditions across the site-wide network. To prevent any backflow of water into the development site, a non-return valve is installed at the outfall. Refer to Appendix B and G for the drainage GA and the impermeable areas that contribute to the surface water network.

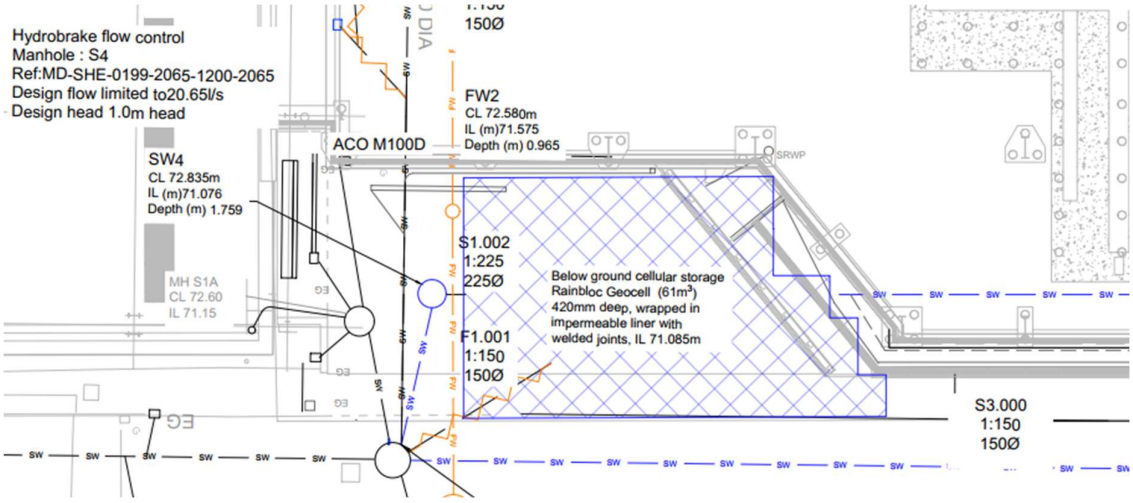


Fig 5.5 Proposed surface water connection to existing sewer

5.6 SuDS Selection

SuDS are made up of one or more structures built to manage surface water run-off. They are used in conjunction with good management of the site, to prevent flooding and pollution. There are five general methods of control:

- Prevention
- Filter strips and swales

- Permeable surfaces and filter drains
- Infiltration devices
- Basins and ponds

The assessment of the site has identified some restrictions on the selection of suitable SuDS techniques:

- Ground investigations have confirmed the presence of low permeability soil across site and discounted infiltration as a means of surface water disposal from the site.

The review and selection of suitable SuDS techniques is summarized in the following table

SuDS Techniques		Adopted in Design	Reasons
Source Control	Green/Brown Roofs	No	The development is an industrial shallow pitched shed designed for full PV cover and access walkways. The combination of extensive PV installation with a green roof was not considered to be viable
	Rainwater Harvesting	No	Ther is only one WC and wash basin within the development and no planting requiring irrigation. Rainwater harvesting was not considered to be viable for the project
	Permeable Pavements	No	The buildings, external plant and plantroom provide nearly 100% site coverage. Ther are only small areas of paving providing access around the main building, The site is not suitable for infiltration so permeable areas would been to be lined system drainage the below ground network. Permeable paving is not considered to be viable for the project
Filtration	Filter Drains	No	Site area not available. Not considered to be viable for the project
	Swales	No	Site area not available. Not considered to be viable for the project
	Dry Swales	No	Site area not available. Not considered to be viable for the project
Infiltration	Infiltration Basin	No	Ground conditions not suitable to support infiltration
	Soakaways	No	Ground conditions not suitable to support infiltration
	Permeable Pavements	No	Ground conditions not suitable to support infiltration
	Infiltration Trench	No	Ground conditions not suitable to support infiltration
Wetland	Infiltration Basin	No	Ground conditions not suitable to support infiltration
Pre-treatment	Swales	No	Not considered to be viable for the project
	Filter Drains	No	Not considered to be viable for the project
Detention	Detention Pond	No	Not considered to be viable for the project
	Below Ground Cellular Storage	Yes	Provides reliable attenuation

The SUDS features incorporated in the design are:

Detention - Below ground cellular storage under the access road area. This system attenuates peak runoff flows and is wrapped with an impermeable geomembrane to avoid infiltration, as the ground conditions are not suitable for this surface water disposal.

The attenuation tank has a storage volume of 44m^3 and acts as the primary storage for impermeable areas of the site.

5.7 Surface Water Drainage Design Proposals

The site will be provided with new foul and surface water drainage networks discharging to the sewers along the Northern boundary of the site.

SuDS features incorporated area in the form below ground cellular storage. This has included in the InfoDrainage model and play a key role in attenuation and delay of the peak rainfall intensity.

The site surface water drainage system will discharge to the 450mm diameter site water sewer. The rate of surface water discharge from the site will be limited to 20.65l/s by use of a hydrobrake.

Attenuation storage will be provided beneath the concrete hardstanding and will provide 44m3 of cellular storage wrapped in an impermeable liner with welded joints.

5.8 Surface Water Drainage Design Criteria

The following criteria are to be adopted for design of the new surface water drainage system.

- The surface water drainage network to be checked for a 1 in 1-year return period storm without surcharge
- The surface water drainage network to be checked for a 1 in 30-year return period storm + 40% climate change allowance; with surcharging of pipes permitted
- The surface water drainage network to be checked for a 1 in 100-year return period storm + 50% climate change allowance with all run off accommodated below ground without overland flow.

5.9 Surface Water Drainage Design

A Micro Drainage model has been developed to for the surface water drainage network to the development site.

The new drainage system has been checked for a range of storm durations and return periods up to a 1 in 100-year storm including allowance for a 50% increase in peak rainfall intensity to accommodate climate change. Due to the lack of green space in this site there is no requirement for urban creep.

Calculations for the proposed drainage network and simulations for all storms up to 1 in 100-year return period are included in Appendix C1 for reference. The calculations confirm details of the attenuation structures and flow control devices.

The output of the design is shown in schematic layout of the proposed surface water drainage systems is shown on drawing 7274-TRP-ZZ-DR-D-4000-P07 included in Appendix B.

As the development site is predominantly composed of roofed areas and footpaths, it generates a low pollutant mitigation index as seen in the CIRIA guidelines—specifically, 0.3 for TSS, 0.2 for metals, and 0.05 for hydrocarbons. Consequently, no additional treatment of the runoff is considered necessary

5.10 Design for Exceedance

The current drainage system does not flood during a 1-in-100-year storm event, including a 50% climate change allowance and 10% urban creep. However, consideration has been given to the effects of extreme storm events generating surface runoff in excess of system capacity, or in the case of system failure, which could potentially cause local flooding and surface flows.

Generally, floor levels in the development are a minimum of 150 mm above the surrounding surface, except at thresholds where level access is required. This allows for some freeboard to protect the building from flood exceedance events. Details of the proposed floor levels and perimeter external ground levels are shown on drawing 7274-TRP-ZZ-DR-C-5100-P02, included in Appendix F.

The proposed internal and external levels are shown in Fig 5.5 below

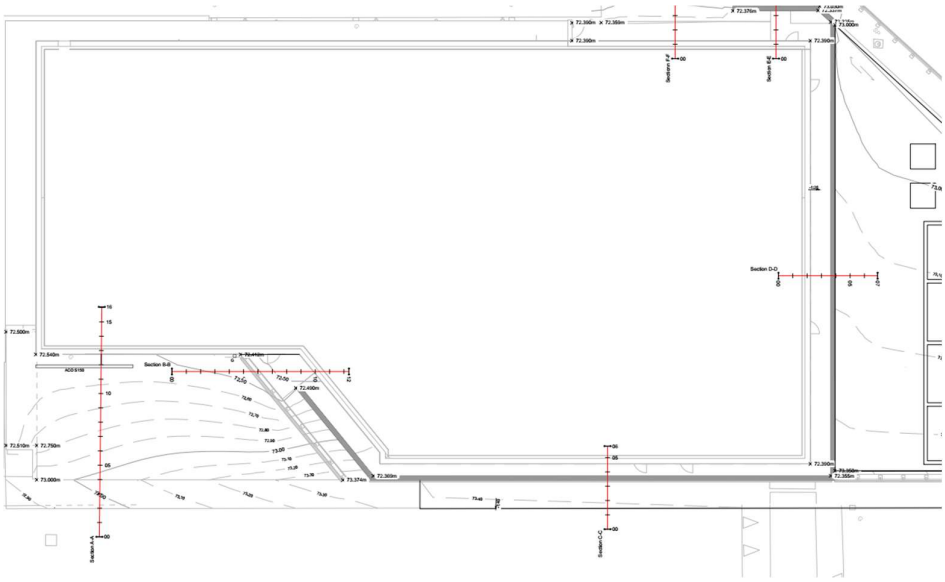


Fig 5.10 Proposed Internal and External Levels at eastern commercial units

The surrounding footpath is drained away from the building and into an ACO that will carry the SW into the proposed network further downstream.

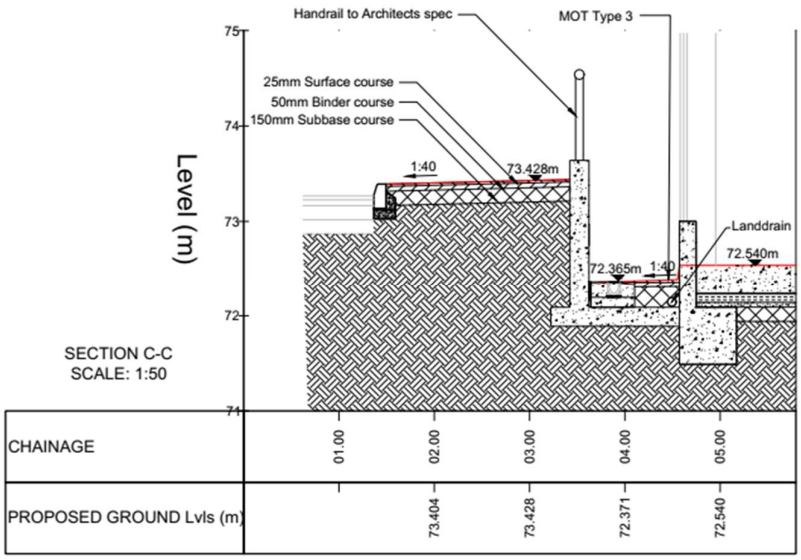


Fig 5.11 Proposed section through building footpath and external access road

6.0 SUDS MAINTENANCE AND MANAGEMENT

6.1 Introduction

This section sets out the plan for inspection and maintenance of the surface water drainage systems and SuDS (Sustainable Urban Drainage Systems) serving the manufacturing facility.

The maintenance of all SuDs and drainage systems on the site will be the responsibility of Clients site facilities management team.

EMCOR currently provide the FM services on behalf of the Client and will employ suitable trained personnel of suitable experienced specialist subcontractors to undertake the maintenance works

The process will be managed through the implementation of regular monthly inspection combined with regular maintenance, occasional maintenance, and remedial maintenance as appropriate.

The monthly inspections will be based on a specified checklist. Additional inspections will be undertaken after major rainfall events, to check for obstructions/damage and to remove debris and silt.

Details of the drainage systems, inspections and maintenance actions are set out in the following sections

6.2 SuDs Components

The following SuDs and conventional drainage features have been incorporated in the surface water drainage design.

The **attenuation storage tank** is used to provide space for temporary below ground storage of surface water run off prior to its controlled release to the main drainage system. In this case the storage tank will be constructed of cellular crate storage units typically 1000 x 500 x 400mm high stacked to create a tank void. The units will be wrapped in an impermeable liner with welded joints to provide a watertight structure designed to keep run off in and ground water out.

Silt pits are inspection chambers designed to intercept silt flowing through the surface water drainage system. Silt can result from windblown, and rain borne fine debris accumulating on paved surfaces and being washed into the drainage system. Silt accumulates within the base of the inspection chambers and periodically needs to be removed.

Inspection Chambers and rodding eyes are used on bends or where pipes come together. They allow access to the below ground drainage system for cleaning if necessary.

Inlet Structures such as rainwater down pipes and associated gullies. They allow access and cleaning of the system if necessary.

Drainage channels and gullies provide a means of interception and collection of surface water runoff from roofs and paved areas. Gullies generally appear as small rectangular or

circular gratings in the roof or paved areas and incorporate silt traps or trash buckets to collect silt washed into the system. Drainage channels are generally visible as a linear perforated gratings in paved areas. Water is collected in a channel beneath the grating and discharged to the main below ground drainage system by outlet boxes at intervals along the length of the channel. The outlet boxes and generally marked at the surface by short lengths of removable grating and incorporate a silt box to intercept debris washed into the channel. Silt traps to channels and gullies will require to be emptied periodically

Below ground drainage pipes collect and convey surface water run-off from the SUDS and collection systems. In this case a network of below ground drainage is provided passing through a below ground cellular storage structure and finally providing a connection to the private sewer network for the attenuated discharge of surface water.

SuDS flow control system in this case will take the form of a hydrobrake in the final manhole prior to discharge to the private sewer network. Upstream of this manhole, the flow from the manhole is restricted at the inlet by a Hydro-Brake, limiting the rate to 20.65 L/s. The hydrobrake is designed to limit flows from the site to the private drainage network.

6.3 SuDs Design details

Details of the SuDs features incorporated in the design are shown on the below ground drainage drawing 7274-TRP-ZZ-DR-D-4000 included in Appendix B for reference.

Details of the below ground cellular attenuation tank are shown on drawing 7274-TRP-ZZ-DR-D-4014.

6.4 SuDs Locations and details

Below Ground Cellular Storage

The location of the below ground attenuation storage system is highlighted in blue in Fig 6.4 below.

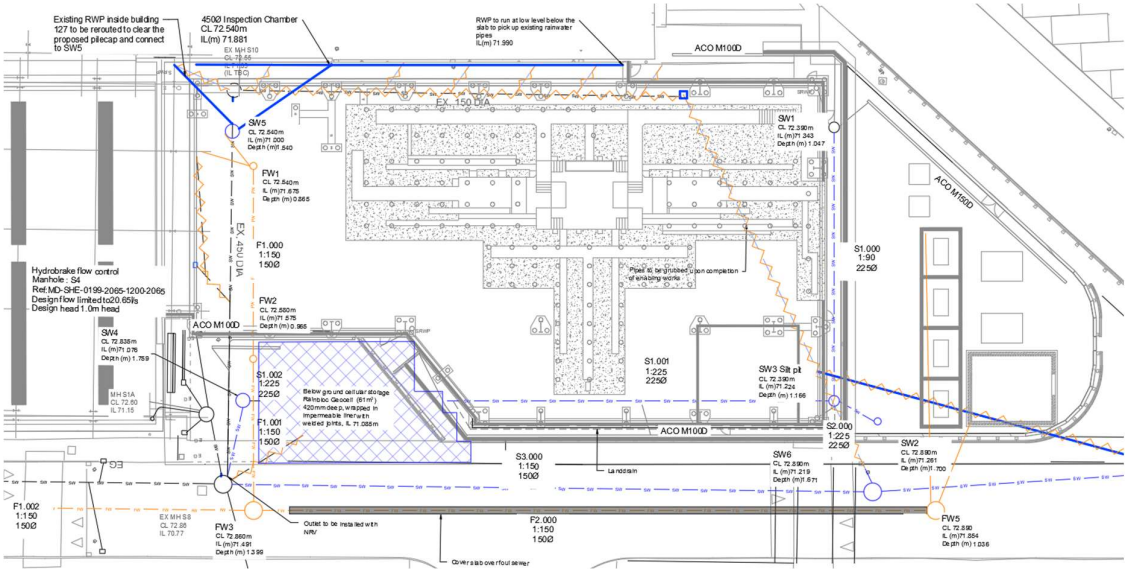


Fig 6.4 Location of below ground attenuation tank

The storage will be provided in the form of below ground cellular storage units wrapped in an impermeable membrane with heat welded joints.

Typical details for the cellular storage are shown in Appendix D

6.5 Design Intent

The site will be provided with new below ground foul and surface water drainage networks discharging to the private sewers in the south of the site.

Run off from rainfall on roofs and paved areas will be collected and channelled into the below ground drainage system. The SW will be collected using ACO's and gullies, attenuated and discharged using a hydrobrake into an existing SW network.

The hydrobrake will be provided in the final site manhole to restrict flows to the existing network. The restriction in the discharge will cause surface run off to back up in the below ground drainage system. In order to accommodate the build-up of surface water below ground it will be necessary to provide storage in the drainage system.

Storage will be provided beneath the concrete hardstanding in the form of below ground cellular storage wrapped in an impermeable liner with welded joints, offering an attenuation volume of 44m3.

7.0 OPERATION AND MAINTENANCE ACTIVITY CATEGORIES

Maintenance activities can be broadly defined as:

1. regular maintenance and inspection
2. occasional maintenance
3. remedial maintenance

Regular maintenance consists of inspections and maintenance carried out to an agreed frequent schedule, including inspections/monitoring, silt or oil removal if required more frequently than once per year, vegetation management, sweeping of surfaces and litter and debris removal. In the first-year regular inspections and maintenance shall be carried out monthly or after any heavy rainfall event. At the end of the first year the frequency of inspections can be review and possible extended to 3 monthly intervals and there may also be initial one-off requirements sometimes referred to as "establishment maintenance", particularly for planting

Occasional maintenance comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the regular tasks Section 6.6 summarises the likely maintenance activities required for each SuDS component.

Remedial maintenance describes the intermittent tasks that may be required to rectify faults or longer-term deterioration of the SuDS system, although the likelihood of deterioration can be reduced through the implementation of regular maintenance activities. Where remedial work is found to be necessary, it is likely to be due. The likely scope of regular, occasional and remedial maintenance activities are set out in the following table for the main drainage components.

Operation and maintenance activity					
	Gullies and channels	Manholes	Silt Pits	Flow Control Devices	Cellular Storage
Inspection	■	■	■	■	■
Litter and debris removal	■	■	■	■	■
Grass cutting					■
Weed and invasive plant control	□	□			□
Sediment management'	■	■	■	□	■
Vegetation replacement					
Vacuum sweeping and brushing					
Structure rehabilitation /repair				□	□
Infiltration surface reconditioning					□

Key

■ will be required □ may be required

7.1 Inspection Checklist

The following checklist has been provided as a guide to the scope of regular inspections to be undertaken

INSPECTION CHECKLIST – GENERAL			
Item	**Y/N**	**Details**	**Action**
General inspection			
Ponding or water logging during periods of heavy rainfall			Indicative of potential silting of the drainage system or obstructions within the below ground drainage system Occasional or Remedial maintenance may be required
Fuel spillage or evidence of contamination			Notify supervisor of any hazardous conditions or materials found during inspection.
Have any health and safety risks been identified to either the public or maintenance operatives?			
Is there any deterioration in the surface of permeable or porous surfaces (e.g. rutting, spreading of blocks or signs of ponding water)?			
Balding spots within grass/plant cover or evidence of invasive species of weeds which might affect the performance of brown/green roofs			.
Erosion or scour of the grass or landscaped surface or slopes due to localised run off from paved areas			
Damage or displacement of manhole covers and gully gratings			Report any damage, repair or replace covers
Silt/sediment accumulation			
Does permeable or porous surfacing require sweeping to remove silt?			
Accumulation of silt in gullies and drainage channel outlet boxes			Occasional or Remedial maintenance may be required. Jet channels and remove silt from

INSPECTION CHECKLIST – GENERAL			
Item	**Y/N**	**Details**	**Action**
			outlets as part of occasional maintenance
Accumulation of silt in silt trap manholes			Occasional or Remedial maintenance may be required. Jet channels and remove silt from outlets as part of occasional maintenance
Accumulation of silt in manholes and hyrobrake manhole			
System Blockages			
Is there any evidence of any clogging or blockage of outlets or drainage paths?			
Is there evidence of standing water in gullies and drainage channels or surface flows from manhole covers			
Vegetation			
Is the vegetation condition satisfactory (density, weed growth, coverage etc)? (Check against approved planting regime.)			
Does any part of the system require weeding, pruning or mowing? (Check against maintenance frequency stated in approved design.)			Mow amenity grass access paths and verges to 35-50 mm minimum or as specified in the landscape management plan.
Is there any evidence of invasive species becoming established? If yes, state action required			
Infrastructure			
Is there evidence of any accidental damage to the system			
Is there any evidence of cross connections or other unauthorised inflows?			

INSPECTION CHECKLIST – GENERAL			
Item	**Y/N**	**Details**	**Action**
Is there any evidence of tampering with the flow controls			
Are there any other matters that could affect the performance of the system in relation to the design objectives for hydraulic, water quality, biodiversity, and visual aspects? (Specify.)			
Other Observations			
Suitability of Current maintenance regime			
Continue as current Increase maintenance Decrease maintenance			
Next Inspection			
Proposed Date			

In addition to the regular inspections based on the checklist, specific maintenance plans for the drainage components are set out in Section 7.2 below

7.2 Operation and maintenance Plan

7.2.1 Attenuation storage tank

Regular inspection and maintenance is required to ensure the effective long-term operation of the below ground cellular storage systems.

ATTENUATION STORAGE TANKS		
Maintenance Schedule	**Required Actions**	**Typical Frequency**
Regular maintenance	Inspect and identify any areas that are not operating correctly.	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where itmay cause risks to performance)	Monthly
	Remove sediment from silt pit upstream of tank	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflowsto ensure that they are in good	Annually

ATTENUATION STORAGE TANKS		
Maintenance Schedule	**Required Actions**	**Typical Frequency**
	condition and operating as designed	
	Survey inside of tank for sediment build-up andremove if necessary	Every 5 years or as required

7.2.2 SuDS flow control system

MANHOLES SILT PITS AND BELOW GROUND DRAINAGE PIPES		
Maintenance Schedule	**Required Actions**	**Typical Frequency**
Regular maintenance	Inspect and check that the hydrobrake & orifice plate is operating correctly If required, take remedial action	Monthly
	Remove sediment from silt pit upstream of the hydrobrake & orifice plate	As required
Remedial actions	Repair physical damage if necessary	As required

7.2.3 Spillage Emergency Actions

Most spillages are likely to be compounds that do not pose a serious risk to the environment if they enter the drainage in a slow and controlled manner with time available for natural breakdown in a treatment system. Small spillages of oil, milk or other known organic substances should be removed where possible using soak mats as recommended by the Environment Agency. Residual elements of spillage can be removed manually from traps of gullies and drainage outlet and silt pits.

In the event of a serious spillage, either by volume or of unknown or toxic compounds, then isolate the spillage with soil, turf or fabric and block outlet pipes from chamber(s) downstream of the spillage with a bung. A bung for blocking pipes may be made by wrapping soil or turf in a plastic sheet or closely woven fabric.

8.0 CONCLUSIONS

The site at Samlesbury Aerodrome has an area is around 0.210 hectares.

The site is currently occupied by ground level car parking. There are existing surface water sewers crossing the site, which are private drainage assets for the Client.

The proposed development works involve the construction of a new Industrial unit.

The site is located in Flood Zone 1. The overall risk of flooding to the site has been assessed as low.

Having reviewed the hierarchy of drainage options for surface water disposal, it is concluded that the site is not suitable for infiltration drainage systems. Discharging surface water to the open watercourse is avoided as the watercourse is greater than 200m away from site.

The development site has existing connections to the site wide private surface water sewer network. It is therefore proposed to make use of the existing connection to the site SW drainage network for disposal of surface water from the development but to reduce the peak rate of run off to provide a 30% reduction in the predevelopment run off rate.

Foul water discharges are proposed into the 150mm foul sewer and discharged into a private pumped sewer that is situated south of the site, on the opposite side of the western building.

A surface water drainage strategy has been prepared for the development site. It is proposed that surface water discharge is limited to 70% of the existing runoff rates. Discharge to the existing sewer will be limited to 20.65l/s by use of a hydrobrake in the final manhole.

Below-ground cellular storage will be installed beneath the concrete hardstanding to attenuate runoff volumes during critical storms.

The design has been done in accordance with the planning conditions as follows:

a) Simulations have been undertaken to check the proposed surface water drainage system for a range of storm durations and return periods including, 1 in 1-year storm, 1 in 30-year and 1 in 100-year storms with allowance for a 40% and 50% increase in peak rainfall intensity from climate change for 30 year and 100 year periods respectively. Urban creep has not been applied as the entire development footprint is already hardstanding, and no future increase in impermeable area is anticipated. Calculations have been carried out for the whole development site to demonstrate compliance with both peak flow control and volume control requirements.

b) The drainage strategy is supported by the following drawings and details, provided in the associated appendices:

i. A site-wide impermeable area plan identifying all contributing areas. No external inflows contribute to the development site.

ii. A drainage GA of the sustainable drainage network, showing all pipe references, dimensions, design levels, and both existing and proposed drainage features up to the final outfall.

iii. Detailed drawings and specifications of the attenuation crate system, together with proposed site levels.

iv. An exceedance routing plan demonstrating the above-ground flow paths have been shown in Appendix H. Flows will be contained on site during events exceeding the system design capacity and simultaneously flow away from the building.

v. Finished floor levels, with adjacent ground levels provided on all sides of each building. A minimum 150 mm step down to external level is maintained other than areas required for vehicular access. Refer to Appendix E.

vi. External levels have been manipulated to contain all surface water within the site.

vii. Water quality has been considered in accordance with CIRIA SuDS Manual (C753). The site is classified as low risk and does not require additional treatment components.

c) Existing surface water runoff rates for the development site has been provided in Appendix C2

d) The drainage network has been designed with a surcharged outfall, discharging at the soffit level of the existing 450 mm diameter outfall pipe.

It is considered that the proposed surface water drainage system will not increase the risk of flooding on the site or in the surrounding area.

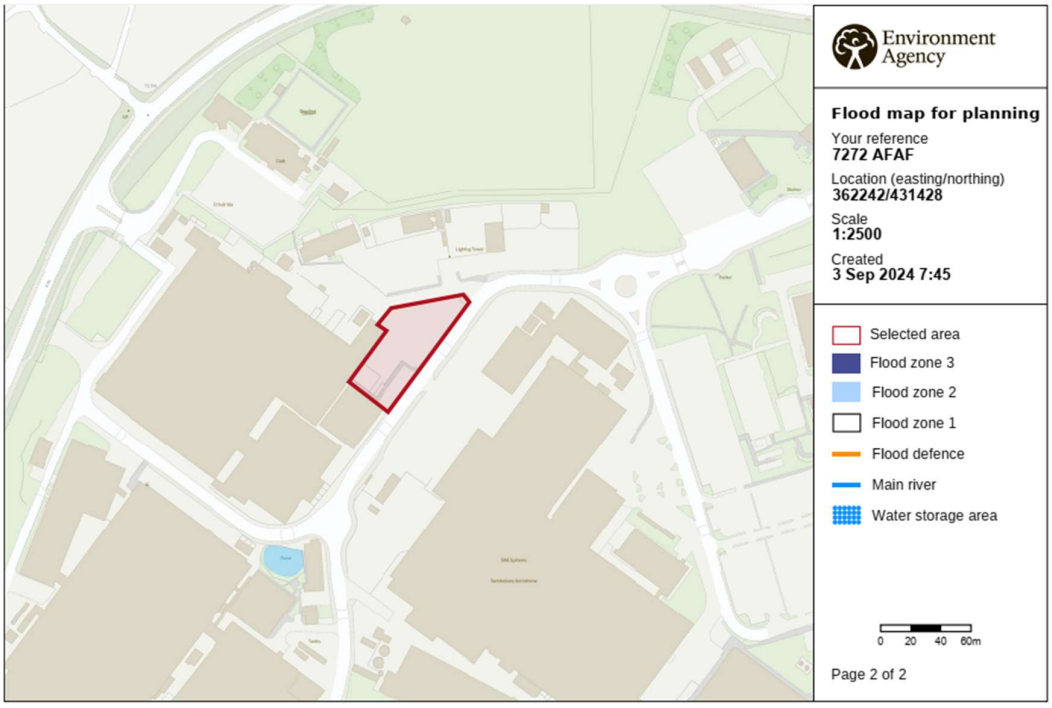
Management of the on-site SuDS/drainage will be the responsibility of the site FM management team and details of proposed inspection and maintenance arrangement have been provided in Section 7.0 of this report

APPENDIX A

A1 Environment Agency Flood Map

A2 Environment Agency Surface Water Flood Mapping

A1 Environment Agency Flood Map



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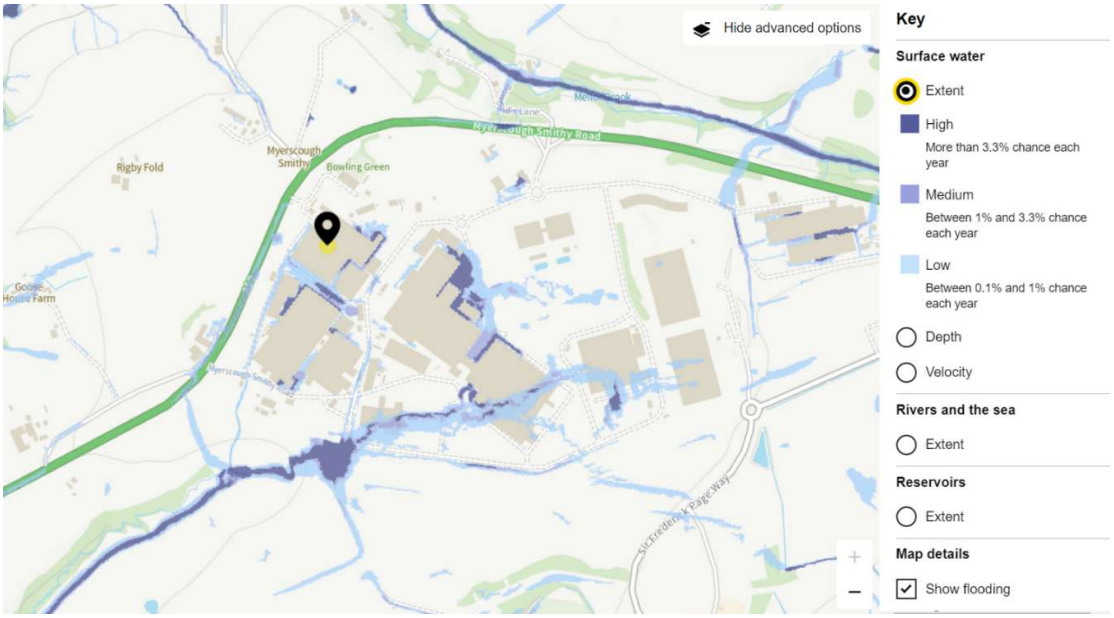
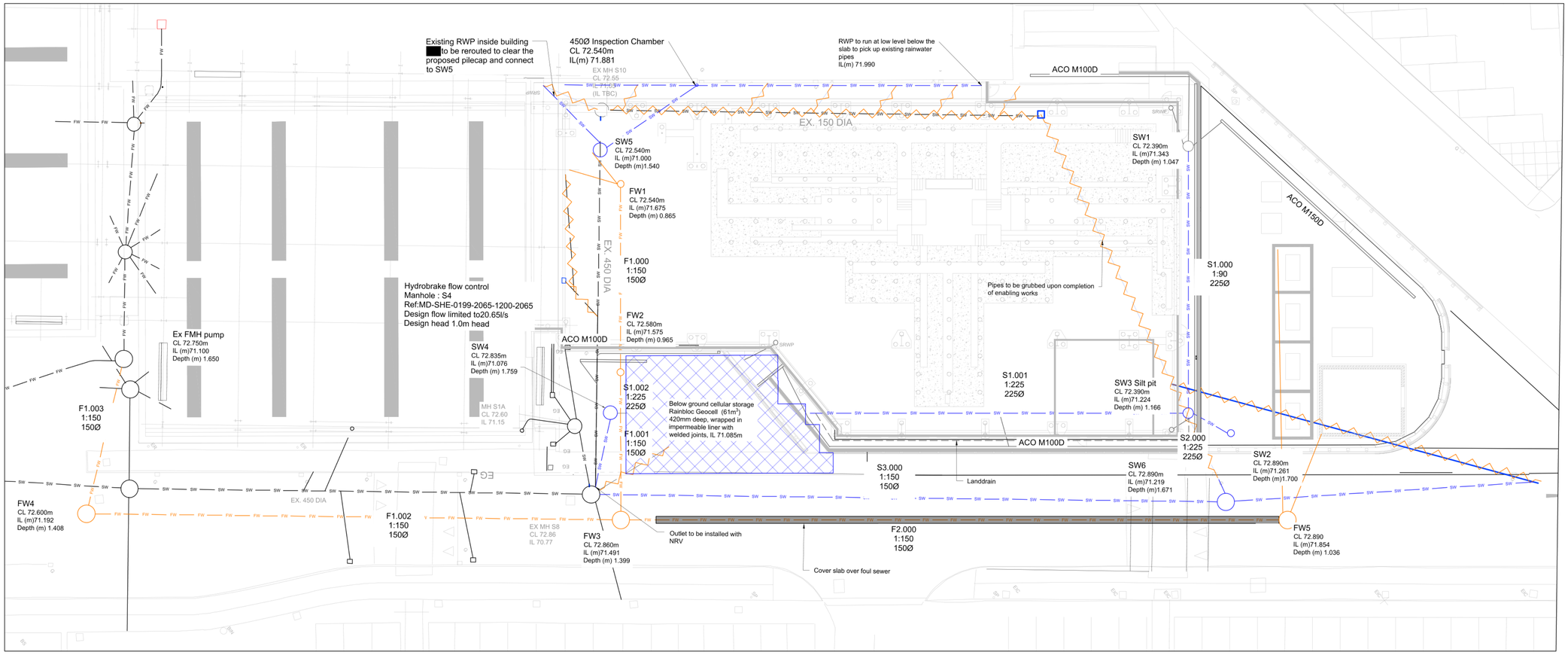
A2 Environment Agency Surface Water Flood Mapping



APPENDIX B

B1 Proposed Development – Surface and Foul Water GA

7274-TRP-ZZ-XX-DR-D-4000 P05



Manhole Name	Cover Level (m)	MH Depth (m)	Manhole Connection	Manhole Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Pipes In Backdrop (mm)
SW1	72.390	1.047	Open Manhole	900	S1.000	71.343	225				
SW3	72.390	1.166	Open Manhole	900	S1.001	71.224	225	S1.000	71.224	225	
SW4	72.835	1.881	Open Manhole	1200	S1.002	71.076	225	S1.002	70.954	225	
Ex MHS8	72.860	2.010	Existing Manhole		OUTFALL	70.770		S1.005	70.995	225	
SW5	72.570	1.570	Open Manhole	1200	Ex 450dia	71.000	450				
SW6	72.890	1.671	Open Manhole	1200	S3.000	71.219	150				

Manhole Name	Cover Level (m)	MH Depth (m)	Manhole Connection	Manhole Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Pipes In Backdrop (mm)
FW1	72.540	1.028	Open Manhole	1050	F1.000	71.512	150				
FW2	72.540	1.122	Open Manhole	1050	F1.001	71.418	150	F1.000	71.418		
FW3	72.860	1.352	Open Manhole	1200	F1.002	71.508	150	F1.001	71.508	150	
								F2.000	71.508	150	
FW4	72.600	1.408	Open Manhole	1200	F1.003	71.192	150	F1.002	71.192	150	
FW5	72.890	1.036	Open Manhole	1200	F2.000	71.854	150				
Ex FMH	72.750	1.650	Existing Manhole	1200	OUTFALL	71.100	150	F1.003	71.100	150	

LEGEND

- SW — DENOTES PROPOSED SURFACE WATER DRAIN
- FW — DENOTES PROPOSED FOUL WATER DRAIN
- SW — DENOTES EXISTING SURFACE WATER DRAIN
- FW — DENOTES EXISTING FOUL WATER DRAIN
- DENOTES SERVICES TO BE ABANDONED
- RWP — RAINWATER PIPE
- SRWP — SYPHONIC RAINWATER PIPE
- EG — EXISTING GULLY

Manholes

1. All manholes to be precast concrete to BS 5911-3.
2. Manhole covers in roads and hard paved areas to be Grade D400 double triangle.
3. All internal manhole covers to be double sealed, lockable and recessed to accept floor finishes where applicable.
4. Internal diameters of manholes to be 1050mm dia.where depth to pipe soffit is less than 1.5m, and 1200mm dia. elsewhere unless noted otherwise. IC - denotes polypropylene inspection chamber by Hepworth or similar approved installed in accordance with the manufacturers recommendations.

Manhole Covers

5. Carriageways General - EN124 Class D400.
6. Carriageways within 0.5m of kerb. - EN124 Class C250.
7. Slow Moving HGV (38t) - EN124 Class B125, Slowing moving GLV (10t) - EN123 Class B125, Slow moving private cars - EN124 class B125.
8. Internal - Jones of Oswestry - Suprasteel double sealed with neoprene gasket and cover grease or similar approved.
9. Refer to architects drawing for details of any manhole covers which require inset panels.

Notes

1. This Drawing is to be read in conjunction with all relevant Engineer, Architects, Service Engineers and Subcontractor drawings.
2. Review all drawings and report any discrepancies to Engineer prior to commencement.
3. Do not scale from this drawing. All dimensions and levels including any abutment to existing structures to be checked on site prior to commencement.
4. Work from figured dimensions only.
5. No deviation from details shown on this drawing is allowed without TRP Consulting's prior permission in writing.
6. All work is to be carried out in accordance with the relevant specifications issued by Engineer, British Standard Codes of Practice, Statutory requirements and the Contract Documents.

Drainage Notes

7. All drainage to be installed in accordance with the requirements set out in BS 8301, BS 8005 and the Building Regulations UNO.
8. This drawing is to be read in accordance with Engineers drainage detail drawings 67242-D410, D411 & D412.
9. For details of materials and workmanship refer to the specification (R12).
10. The manhole cover levels shown on the drawing are approximate. Final cover levels are to be adjusted to suit finished paving levels and are to be confirmed with architect prior to construction.
11. The contractor is responsible for checking invert levels and positions of all existing drains, sewers, inspection chambers and manholes shown on this drawing immediately on site establishment. Any discrepancies must be reported immediately.
12. Where the new site drainage is to connect into the existing manholes in carriageways and/or existing adopted sewers, the contractor is responsible for all liaison with the relevant statutory undertaker and local authority with regard to road closures, traffic management, permits to work, submission of contractors method statement and risk assessment and other documentation and correspondence associated with the site stage (part 2) element of the works.
13. Rocker pipes to be provided at all concrete cased interfaces.
14. Maintain adequate protection to drains by providing a minimum cover during the construction period.
15. The falls shown on pipe runs are indicative and pipes are to be installed to the invert levels shown on the manhole schedule.
16. All pipes are to be laid with soffits level unless noted otherwise
17. All pipework to be installed with soffit level (e.g. at changes in pipe size) UNO.
18. Surface channel drains to be aco multidrain or similar approved.
19. Pipe gradients are indicative minimums.
20. All sump units to linear drainage channels to be fitted with foul air traps.
21. All surface water gullies to be trapped.
22. All surface water connections to be 150mm diameter at min falls of 1:100 UNO.
23. All foul water connections to be min 100mm diameter at min falls of 1:40 UNO.
24. All drains to be set out to give a minimum clearance of 1.0m to kerb lines
25. All pipes from 100-300mm diameter to be Hepworth SuperSleeve or equivalent.
26. All pipes above 300mm diameter to be precast concrete to BS 5911-1 Class 120.
27. All covers and rodding access points to be sealed and screwed tight.
28. All gullies to be precast concrete to BS 5911-230.
29. Setting out of all internal gully/plumbing connections to be co-ordinated between the service engineers and the architect.
30. All internal gullies, plumbing connections, soil stacks, SVPS and all other connections of foul and surface water drains to below ground to be fitted with accessible rodding points above slab level.
31. Gully gratings to be Grade D400.
32. Drainage channels in car parks to be fitted with Heelguard ductile iron gratings Grade C250.
33. Upon completion of drainage works, the new drainage system is to be thoroughly cleaned and a CCTV survey performed to confirm no construction debris or blockages remain.
34. All private drainage is to comply with BS EN 752 and Building Regulations Part H.

Rev.			
P07	Attenuation tank inc & inverts revised	11-12-25	AP
P06	FW5 Added	11-08-25	AP
	Description	Date	By

Project: Building

Client:

Drawing Title: Drainage GA

Ref.	Project No.	Drawn By	Checked	Date	Scale	Sheet
	7274	AP	TR	02/25	1:200	A1

Drawing	Status	Description	Revision
	D2	Issue for Tender	P07

Number: 7274-TRP-ZZ-XX-DR-D-4000

APPENDIX C

C1 TRP Surface Water Drainage Calculations

C1 Proposed Network SW Calcs

Project:	Date:		
Proposed SW Drainage	11/12/2025		
	Designed by:	Checked by:	Approved By:
	AP		
Report Details:	Company Address:		
Type: Inflows Storm Phase: Phase			

Catchment Area

Type : Catchment Area

Area (ha)	0.017

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (2)

Type : Catchment Area

Area (ha)	0.089

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (3)

Type : Catchment Area

Area (ha)	0.067

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (4)

Type : Catchment Area

Area (ha)	0.02

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project:	Date:		
Proposed SW Drainage	11/12/2025		
	Designed by:	Checked by:	Approved By:
	AP		
Report Details:	Company Address:		
Type: Inflows Storm Phase: Phase			

Catchment Area (5)

Type : Catchment Area

Area (ha)	0.004

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (6)

Type : Catchment Area

Area (ha)	0.002

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project:	Date:		
Proposed SW Drainage	11/12/2025		
	Designed by:	Checked by:	Approved By:
	AP		
Report Details:	Company Address:		
Type: Junctions Storm Phase: Phase			

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
SW2	Manhole	498.038	414.469	72.800	1.539	71.261	Circular	0.300
SW6	Manhole	553.665	414.236	72.550	1.474	71.076	Circular	1.200
MH S8	Manhole	553.771	421.658	72.860	1.865	70.995	Circular	1.200
SW1	Manhole	502.803	390.834	72.390	1.047	71.343	Circular	0.600
SW3	Manhole	502.802	414.051	72.390	1.150	71.240	Circular	0.600
NRV	Manhole	553.611	417.316	72.711	1.677	71.034	Circular	0.450

Name	Lock
SW2	None
SW6	None
MH S8	None
SW1	None
SW3	None
NRV	None

Project:	Date:		
Proposed SW Drainage	11/12/2025		
	Designed by:	Checked by:	Approved By:
	AP		
Report Details:	Company Address:		
Type: Stormwater Controls Storm Phase: Phase			

Cellular Storage

Type : Cellular Storage

Dimensions

Exceedance Level (m)	72.500
Depth (m)	0.400
Base Level (m)	71.085
Number of Crates Long	32
Number of Crates Wide	10
Number of Crates High	1
Porosity (%)	95
Crate Length (m)	0.5
Crate Width (m)	1
Crate Height (m)	0.4
Total Volume (m³)	61.815

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (2)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (1)
Outlet Type	Free Discharge

Project: Proposed SW Drainage	Date: 11/12/2025		
	Designed by: AP	Checked by:	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase	Company Address:		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW2	72.800 71.261	Diameter / Length: 0.300					Manhole
E:498.038 N:414.469	1.539		{a} 2.000	Pipe	71.261	Diam/Width:225	Not Applicable
SW6	72.550 71.076	Diameter / Length: 1.200	{1} Pipe (1)	Pipe	71.076	Diam/Width:225	Manhole
E:553.665 N:414.236	1.474		{a} 1.003	Pipe	71.076	Diam/Width:225	Not Applicable
MH S8	72.860 70.995	Diameter / Length: 1.200	{1} 1.003 (1)	Pipe	70.995	Diam/Width:225	Manhole
E:553.771 N:421.658	1.865						Not Applicable
SW1	72.390 71.343	Diameter / Length: 0.600					Manhole
E:502.803 N:390.834	1.047		{a} 1.000	Pipe	71.343	Diam/Width:225	Not Applicable
SW3	72.390 71.240	Diameter / Length: 0.600	{1} 2.000 {2} 1.000	Pipe Pipe	71.240 71.240	Diam/Width:225 Diam/Width:225	Manhole
E:502.802 N:414.051	1.150		{a} Pipe	Pipe	71.240	Diam/Width:225	Not Applicable
NRV	72.711 71.034	Diameter / Length: 0.450	{1} 1.003	Pipe	71.034	Diam/Width:225	Manhole
E:553.611 N:417.316	1.677		{a} 1.003 (1)	Pipe	71.034	Diam/Width:225	Not Applicable

Project:	Date:		
Proposed SW Drainage	11/12/2025		
	Designed by:	Checked by:	Approved By:
	AP		
Report Details:	Company Address:		
Type: Inflow Summary Storm Phase: Phase			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	SW2		Time of Concentration	0.017	100	0	100	0.017
Catchment Area (2)	Cellular Storage		Time of Concentration	0.089	100	0	100	0.089
Catchment Area (3)	SW1		Time of Concentration	0.067	100	0	100	0.067
Catchment Area (4)	SW1		Time of Concentration	0.020	100	0	100	0.020
Catchment Area (5)	SW3		Time of Concentration	0.004	100	0	100	0.004
Catchment Area (6)	SW1		Time of Concentration	0.002	100	0	100	0.002
TOTAL		**0.0**		**0.199**				**0.199**

Project:	Date:		
Proposed SW Drainage	11/12/2025		
	Designed by:	Checked by:	Approved By:
	AP		
Report Details:	Company Address:		
Type: Network Design Criteria Storm Phase: Phase			

Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Options	Minimise Excavation
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:X)	500.00
Max. Slope (1:X)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Manhole Options

Apply Offset	☐

Project:	Date:		
Proposed SW Drainage	11/12/2025		
	Designed by:	Checked by:	Approved By:
	AP		
Report Details:	Company Address:		
Type: Outfall Details Storm Phase: Phase			

Outfalls

Outfall	Outfall Type	Gated	Fixed Surcharged Level (m)	Level Curve
MH S8	Fixed Surcharged Level	☐	71.220	
FSR : 1 years: +0 %: 15 mins: Summer			71.220	
FSR : 1 years: +0 %: 15 mins: Winter			71.220	
FSR : 2 years: +0 %: 15 mins: Summer			71.220	
FSR : 2 years: +0 %: 15 mins: Winter			71.220	
FSR : 30 years: +40 %: 15 mins: Summer			71.220	
FSR : 30 years: +40 %: 15 mins: Winter			71.220	
FSR : 100 years: +50 %: 15 mins: Summer			71.220	
FSR : 100 years: +50 %: 15 mins: Winter			71.220	
FSR : 1 years: +0 %: 30 mins: Summer			71.220	
FSR : 1 years: +0 %: 30 mins: Winter			71.220	
FSR : 2 years: +0 %: 30 mins: Summer			71.220	
FSR : 2 years: +0 %: 30 mins: Winter			71.220	
FSR : 30 years: +40 %: 30 mins: Summer			71.220	
FSR : 30 years: +40 %: 30 mins: Winter			71.220	
FSR : 100 years: +50 %: 30 mins: Summer			71.220	
FSR : 100 years: +50 %: 30 mins: Winter			71.220	
FSR : 1 years: +0 %: 60 mins: Summer			71.220	
FSR : 1 years: +0 %: 60 mins: Winter			71.220	
FSR : 2 years: +0 %: 60 mins: Summer			71.220	
FSR : 2 years: +0 %: 60 mins: Winter			71.220	
FSR : 30 years: +40 %: 60 mins: Summer			71.220	
FSR : 30 years: +40 %: 60 mins: Winter			71.220	
FSR : 100 years: +50 %: 60 mins: Summer			71.220	
FSR : 100 years: +50 %: 60 mins: Winter			71.220	
FSR : 1 years: +0 %: 120 mins: Summer			71.220	
FSR : 1 years: +0 %: 120 mins: Winter			71.220	
FSR : 2 years: +0 %: 120 mins: Summer			71.220	
FSR : 2 years: +0 %: 120 mins: Winter			71.220	
FSR : 30 years: +40 %: 120 mins: Summer			71.220	
FSR : 30 years: +40 %: 120 mins: Winter			71.220	
FSR : 100 years: +50 %: 120 mins: Summer			71.220	
FSR : 100 years: +50 %: 120 mins: Winter			71.220	

FSR : 1 years: +0 %: 240 mins: Summer			71.220	
FSR : 1 years: +0 %: 240 mins: Winter			71.220	
FSR : 2 years: +0 %: 240 mins: Summer			71.220	
FSR : 2 years: +0 %: 240 mins: Winter			71.220	
FSR : 30 years: +40 %: 240 mins: Summer			71.220	
FSR : 30 years: +40 %: 240 mins: Winter			71.220	
FSR : 100 years: +50 %: 240 mins: Summer			71.220	
FSR : 100 years: +50 %: 240 mins: Winter			71.220	
FSR : 1 years: +0 %: 360 mins: Summer			71.220	
FSR : 1 years: +0 %: 360 mins: Winter			71.220	
FSR : 2 years: +0 %: 360 mins: Summer			71.220	
FSR : 2 years: +0 %: 360 mins: Winter			71.220	
FSR : 30 years: +40 %: 360 mins: Summer			71.220	
FSR : 30 years: +40 %: 360 mins: Winter			71.220	
FSR : 100 years: +50 %: 360 mins: Summer			71.220	
FSR : 100 years: +50 %: 360 mins: Winter			71.220	
FSR : 1 years: +0 %: 480 mins: Summer			71.220	
FSR : 1 years: +0 %: 480 mins: Winter			71.220	
FSR : 2 years: +0 %: 480 mins: Summer			71.220	
FSR : 2 years: +0 %: 480 mins: Winter			71.220	
FSR : 30 years: +40 %: 480 mins: Summer			71.220	
FSR : 30 years: +40 %: 480 mins: Winter			71.220	
FSR : 100 years: +50 %: 480 mins: Summer			71.220	
FSR : 100 years: +50 %: 480 mins: Winter			71.220	
FSR : 1 years: +0 %: 960 mins: Summer			71.220	
FSR : 1 years: +0 %: 960 mins: Winter			71.220	
FSR : 2 years: +0 %: 960 mins: Summer			71.220	
FSR : 2 years: +0 %: 960 mins: Winter			71.220	
FSR : 30 years: +40 %: 960 mins: Summer			71.220	
FSR : 30 years: +40 %: 960 mins: Winter			71.220	
FSR : 100 years: +50 %: 960 mins: Summer			71.220	
FSR : 100 years: +50 %: 960 mins: Winter			71.220	
FSR : 1 years: +0 %: 1440 mins: Summer			71.220	
FSR : 1 years: +0 %: 1440 mins: Winter			71.220	
FSR : 2 years: +0 %: 1440 mins: Summer			71.220	

FSR : 2 years: +0 %: 1440 mins: Winter			71.220	
FSR : 30 years: +40 %: 1440 mins: Summer			71.220	
FSR : 30 years: +40 %: 1440 mins: Winter			71.220	
FSR : 100 years: +50 %: 1440 mins: Summer			71.220	
FSR : 100 years: +50 %: 1440 mins: Winter			71.220	

Project:	Date:		
Proposed SW Drainage	11/12/2025		
	Designed by:	Checked by:	Approved By:
	AP		
Report Title:	Company Address:		
Rainfall Analysis Criteria			

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Reduced
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Project: Proposed SW Drainage	Date: 11/12/2025		
	Designed by: AP	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address:		

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FSR: 1 years: +0 %: 15 mins: Winter	0.02	1.8	0.854
Catchment Area (2)	FSR: 1 years: +0 %: 15 mins: Winter	0.09	10.0	4.627
Catchment Area (3)	FSR: 1 years: +0 %: 15 mins: Winter	0.07	7.5	3.473
Catchment Area (4)	FSR: 1 years: +0 %: 15 mins: Winter	0.02	2.3	1.046
Catchment Area (5)	FSR: 1 years: +0 %: 15 mins: Summer	0.00	0.5	0.198
Catchment Area (6)	FSR: 1 years: +0 %: 15 mins: Summer	0.00	0.2	0.081

Project: Proposed SW Drainage	Date: 11/12/2025		
	Designed by: AP	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address:		

FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FSR: 30 years: +40 %: 15 mins: Winter	0.02	6.3	2.915
Catchment Area (2)	FSR: 30 years: +40 %: 15 mins: Winter	0.09	34.2	15.819
Catchment Area (3)	FSR: 30 years: +40 %: 15 mins: Winter	0.07	25.6	11.852
Catchment Area (4)	FSR: 30 years: +40 %: 15 mins: Winter	0.02	7.7	3.574
Catchment Area (5)	FSR: 30 years: +40 %: 15 mins: Summer	0.00	1.6	0.680
Catchment Area (6)	FSR: 30 years: +40 %: 15 mins: Summer	0.00	0.7	0.288

Project: Proposed SW Drainage	Date: 11/12/2025		
	Designed by: AP	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address:		

FSR: 100 years: Increase Rainfall (%): +50: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area	FSR: 100 years: +50 %: 15 mins: Winter	0.02	8.7	4.026
Catchment Area (2)	FSR: 100 years: +50 %: 15 mins: Winter	0.09	47.2	21.824
Catchment Area (3)	FSR: 100 years: +50 %: 15 mins: Winter	0.07	35.4	16.357
Catchment Area (4)	FSR: 100 years: +50 %: 15 mins: Winter	0.02	10.6	4.928
Catchment Area (5)	FSR: 100 years: +50 %: 15 mins: Summer	0.00	2.2	0.938
Catchment Area (6)	FSR: 100 years: +50 %: 15 mins: Summer	0.00	0.9	0.396

Project:	Date:		
Proposed SW Drainage	11/12/2025		
	Designed by:	Checked by:	Approved By:
	AP		
Report Details:	Company Address:		
Type: Junctions Summary Storm Phase: Phase			

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW2	FSR: 1 years: +0 %: 15 mins: Winter	72.800	71.261	71.337	0.076	1.8	0.005	0.000	1.7	0.852	OK
SW6	FSR: 1 years: +0 %: 960 mins: Summer	72.550	71.076	71.278	0.202	2.5	0.228	0.000	2.5	35.075	OK
MH S8	FSR: 1 years: +0 %: 15 mins: Summer	72.860	70.995	71.220	0.225	0.0	0.000	0.000	0.0	0.631	OK
SW1	FSR: 1 years: +0 %: 15 mins: Winter	72.390	71.343	71.427	0.084	9.9	0.024	0.000	9.6	4.607	OK
SW3	FSR: 1 years: +0 %: 15 mins: Winter	72.390	71.240	71.335	0.095	11.7	0.027	0.000	10.8	5.684	OK
NRV	FSR: 1 years: +0 %: 1440 mins: Summer	72.711	71.034	71.220	0.186	2.5	0.030	0.000	5.1	48.213	OK

Project: Proposed SW Drainage	Date: 11/12/2025		
	Designed by: AP	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address:		

FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW2	FSR: 30 years: +40 %: 15 mins: Winter	72.800	71.261	71.442	0.181	6.3	0.013	0.000	5.7	2.903	OK
SW6	FSR: 30 years: +40 %: 120 mins: Winter	72.550	71.076	71.409	0.333	15.9	0.376	0.000	15.9	62.749	Surcharged
MH S8	FSR: 30 years: +40 %: 15 mins: Summer	72.860	70.995	71.220	0.225	2.5	0.000	0.000	2.5	2.613	OK
SW1	FSR: 30 years: +40 %: 15 mins: Winter	72.390	71.343	71.543	0.200	34.0	0.057	0.000	32.7	15.725	OK
SW3	FSR: 30 years: +40 %: 15 mins: Winter	72.390	71.240	71.441	0.201	39.9	0.057	0.000	37.1	19.207	OK
NRV	FSR: 30 years: +40 %: 120 mins: Winter	72.711	71.034	71.237	0.203	15.9	0.032	0.000	15.9	62.744	OK

Project: Proposed SW Drainage	Date: 11/12/2025		
	Designed by: AP	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address:		

FSR: 100 years: Increase Rainfall (%): +50: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW2	FSR: 100 years: +50 %: 120 mins: Winter	72.800	71.261	72.318	1.057	3.5	0.075	0.000	3.3	10.224	Surcharged
SW6	FSR: 100 years: +50 %: 120 mins: Winter	72.550	71.076	72.285	1.209	24.2	1.367	0.000	22.5	97.833	Flood Risk
MH S8	FSR: 100 years: +50 %: 15 mins: Summer	72.860	70.995	71.220	0.225	8.2	0.000	0.000	8.2	8.096	OK
SW1	FSR: 100 years: +50 %: 120 mins: Winter	72.390	71.343	72.328	0.985	18.7	0.279	0.000	18.5	54.778	Flood Risk
SW3	FSR: 100 years: +50 %: 120 mins: Winter	72.390	71.240	72.318	1.078	22.6	0.305	0.000	22.4	67.348	Flood Risk
NRV	FSR: 100 years: +50 %: 120 mins: Winter	72.711	71.034	71.254	0.220	22.5	0.035	0.000	22.5	97.873	OK

Project: Proposed SW Drainage	Date: 11/12/2025		
	Designed by: AP	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:		

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Cellular Storage	FSR: 1 years: +0 %: 960 mins: Summer	71.278	71.278	0.193	0.193	3.8	29.363	0.000	0.000	2.5	35.284	52.499	OK

Project: Proposed SW Drainage	Date: 11/12/2025		
	Designed by: AP	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:		

FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Cellular Storage	FSR: 30 years: +40 %: 120 mins: Winter	71.414	71.414	0.329	0.329	28.8	50.080	0.000	0.000	15.9	62.970	18.984	OK

Project: Proposed SW Drainage	Date: 11/12/2025		
	Designed by: AP	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:		

FSR: 100 years: Increase Rainfall (%): +50: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Cellular Storage	FSR: 100 years: +50 %: 120 mins: Winter	72.296	72.296	1.211	1.211	41.2	61.624	0.000	0.000	24.2	98.058	0.309	OK

Project: Proposed SW Drainage	Date: 11/12/2025		
	Designed by: AP	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:		

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
2.000	FSR: 1 years: +0 %: 15 mins: Winter	Pipe	SW2	SW3	72.800	71.337	0.085	0.852	0.1	0.05	1.7	OK
1.000	FSR: 1 years: +0 %: 15 mins: Winter	Pipe	SW1	SW3	72.390	71.427	0.089	4.607	0.7	0.28	9.6	OK
Pipe (1)	FSR: 1 years: +0 %: 960 mins: Summer	Pipe	Cellular Storage	SW6	72.500	71.278	0.198	35.284	0.1	0.07	2.5	OK
1.003	FSR: 1 years: +0 %: 960 mins: Summer	Pipe	SW6	NRV	72.550	71.278	0.166	35.149	0.1	0.04	2.6	OK
1.003 (1)	FSR: 1 years: +0 %: 960 mins: Summer	Pipe	NRV	MH S8	72.711	71.220	0.206	30.028	0.1	0.05	2.2	OK
Pipe	FSR: 1 years: +0 %: 15 mins: Winter	Pipe	SW3	Cellular Storage	72.390	71.335	0.062	5.684	1.2	0.32	10.8	OK

Project: Proposed SW Drainage	Date: 11/12/2025		
	Designed by: AP	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:		

FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
2.000	FSR: 30 years: +40 %: 15 mins: Winter	Pipe	SW2	SW3	72.800	71.442	0.191	2.886	0.2	0.17	5.7	OK
1.000	FSR: 30 years: +40 %: 15 mins: Winter	Pipe	SW1	SW3	72.390	71.543	0.200	15.725	0.9	0.95	32.7	OK
Pipe (1)	FSR: 30 years: +40 %: 120 mins: Winter	Pipe	Cellular Storage	SW6	72.500	71.414	0.225	62.970	0.4	0.46	15.9	Surcharged
1.003	FSR: 30 years: +40 %: 120 mins: Winter	Pipe	SW6	NRV	72.550	71.409	0.184	62.575	0.5	0.26	15.9	Surcharged
1.003 (1)	FSR: 30 years: +40 %: 120 mins: Winter	Pipe	NRV	MH S8	72.711	71.237	0.209	61.353	0.4	0.32	15.9	OK
Pipe	FSR: 30 years: +40 %: 15 mins: Winter	Pipe	SW3	Cellular Storage	72.390	71.441	0.154	19.102	1.3	1.1	37.1	OK

Project: Proposed SW Drainage	Date: 11/12/2025		
	Designed by: AP	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:		

FSR: 100 years: Increase Rainfall (%): +50: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
2.000	FSR: 100 years: +50 %: 15 mins: Summer	Pipe	SW2	SW3	72.800	71.558	0.225	3.535	0.1	0.17	5.8	Surcharged
1.000	FSR: 100 years: +50 %: 15 mins: Winter	Pipe	SW1	SW3	72.390	71.796	0.225	21.681	1.1	1.23	42.5	Surcharged
Pipe (1)	FSR: 100 years: +50 %: 120 mins: Winter	Pipe	Cellular Storage	SW6	72.500	72.296	0.225	98.058	0.6	0.7	24.2	Surcharged
1.003	FSR: 100 years: +50 %: 120 mins: Winter	Pipe	SW6	NRV	72.550	72.285	0.204	97.659	0.6	0.37	22.5	Flood Risk
1.003 (1)	FSR: 100 years: +50 %: 120 mins: Winter	Pipe	NRV	MH S8	72.711	71.254	0.213	96.380	0.6	0.46	22.5	OK
Pipe	FSR: 100 years: +50 %: 15 mins: Winter	Pipe	SW3	Cellular Storage	72.390	71.608	0.225	25.894	1.4	1.4	47.3	Surcharged

C2 Existing Network SW Calcs

Building :	Date:		
Existing SW Drainage	25/06/2025		
	Designed by:	Checked by:	Approved By:
	AP	TR	TR
Report Details:	Company Address:		
Type: Junctions Storm Phase: Phase			

Name	Junction Type	Easting (m)	Northing (m)	Sealed	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape
MH1	Manhole	232.695	228.710	☑	72.550	1.244	71.306	Circular
MH2	Manhole	271.074	228.549	☐	72.550	1.500	71.050	Circular
MH3	Manhole	272.929	255.963	☐	72.600	1.450	71.150	Circular
MH4	Manhole	271.477	262.090	☐	72.860	2.010	70.850	Circular
MH5	Manhole	313.192	261.664	☐	72.600	1.920	70.680	Circular

Name	Diameter (m)	Lock
MH1	1.200	None
MH2	1.200	None
MH3	1.200	None
MH4	1.200	None
MH5	1.200	None

Building : Existing SW Drainage	Date: 25/06/2025		
	Designed by: AP	Checked by: TR	Approved By: TR
Report Details: Type: Manhole Schedule Storm Phase: Phase	Company Address:		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
MH1	72.550 71.306	Diameter / Length: 1.200					Manhole - Sealed
E:232.695 N:228.710	1.244		{a} 1.000	Pipe	71.306	Diam/Width:150	Not Applicable
MH2	72.550 71.050	Diameter / Length: 1.200	{1} 1.000	Pipe	71.050	Diam/Width:150	Manhole
E:271.074 N:228.549	1.500		{a} 1.001	Pipe	71.050	Diam/Width:450	Not Applicable
MH3	72.600 71.150	Diameter / Length: 1.200					Manhole
E:272.929 N:255.963	1.450		{a} 2.000	Pipe	71.150	Diam/Width:225	Not Applicable
MH4	72.860 70.850	Diameter / Length: 1.200	{1} 1.001 {2} 2.000	Pipe Pipe	70.850 70.850	Diam/Width:450 Diam/Width:225	Manhole
E:271.477 N:262.090	2.010		{a} Ex pipe	Pipe	70.850	Diam/Width:450	Not Applicable
MH5	72.600 70.680	Diameter / Length: 1.200	{1} Ex pipe	Pipe	70.680	Diam/Width:450	Manhole
E:313.192 N:261.664	1.920						Not Applicable

Building :	Date:		
Existing SW Drainage	25/06/2025		
	Designed by:	Checked by:	Approved By:
	AP	TR	TR
Report Details:	Company Address:		
Type: Inflow Summary Storm Phase: Phase			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	MH1		Time of Concentration	0.162	100	0	100	0.162
Catchment Area (1)	MH2		Time of Concentration	0.032	100	0	100	0.032
Catchment Area (2)	MH4		Time of Concentration	0.039	100	0	100	0.039
Catchment Area (3)	MH4		Time of Concentration	0.034	100	0	100	0.034
TOTAL		**0.0**		**0.267**				**0.267**

Building :	Date:		
Existing SW Drainage	25/06/2025		
	Designed by:	Checked by:	Approved By:
	AP	TR	TR
Report Details:	Company Address:		
Type: Network Design Criteria Storm Phase: Phase			

Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Options	Minimise Excavation
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:X)	500.00
Max. Slope (1:X)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Manhole Options

Apply Offset	☐

Building :	Date:		
Existing SW Drainage	25/06/2025		
	Designed by:	Checked by:	Approved By:
	AP	TR	TR
Report Details:	Company Address:		
Type: Outfall Details Storm Phase: Phase			

Outfalls

Outfall	Outfall Type	Gated	Fixed Surcharged Level (m)	Level Curve
MH5	Free Discharge			

Building :	Date:		
Existing SW Drainage	25/06/2025		
	Designed by:	Checked by:	Approved By:
	AP	TR	TR
Report Title:	Company Address:		
Rainfall Analysis Criteria			

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall

FSR

Type: FSR

Region	England And Wales
M5-60 (mm)	18.5
Ratio R	0.256
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
1.0	0.000
2.0	0.000
30.0	40.000
100.0	50.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
240	480
360	720
480	960
960	1920
1440	2880

Building :	Date:		
Existing SW Drainage	25/06/2025		
	Designed by:	Checked by:	Approved By:
	AP	TR	TR
Report Details:	Company Address:		
Type: Inflows Summary Storm Phase: Phase			

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FSR: 1 years: +0 %: 15 mins: Winter	0.16	17.7	8.403
Catchment Area (1)	FSR: 1 years: +0 %: 15 mins: Winter	0.03	3.5	1.648
Catchment Area (2)	FSR: 1 years: +0 %: 15 mins: Summer	0.04	4.0	1.789
Catchment Area (3)	FSR: 1 years: +0 %: 15 mins: Summer	0.03	3.5	1.555

Building :	Date:		
Existing SW Drainage	25/06/2025		
	Designed by:	Checked by:	Approved By:
	AP	TR	TR
Report Details:	Company Address:		
Type: Inflows Summary Storm Phase: Phase			

FSR: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FSR: 2 years: +0 %: 15 mins: Winter	0.16	22.7	10.899
Catchment Area (1)	FSR: 2 years: +0 %: 15 mins: Winter	0.03	4.5	2.142
Catchment Area (2)	FSR: 2 years: +0 %: 15 mins: Summer	0.04	5.1	2.319
Catchment Area (3)	FSR: 2 years: +0 %: 15 mins: Summer	0.03	4.5	2.010

Building :	Date:		
Existing SW Drainage	25/06/2025		
	Designed by:	Checked by:	Approved By:
	AP	TR	TR
Report Details:	Company Address:		
Type: Inflows Summary Storm Phase: Phase			

FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FSR: 30 years: +40 %: 15 mins: Winter	0.16	60.5	28.727
Catchment Area (1)	FSR: 30 years: +40 %: 15 mins: Winter	0.03	11.9	5.648
Catchment Area (2)	FSR: 30 years: +40 %: 15 mins: Summer	0.04	13.7	6.103
Catchment Area (3)	FSR: 30 years: +40 %: 15 mins: Summer	0.03	11.9	5.303

Building :	Date:		
Existing SW Drainage	25/06/2025		
	Designed by:	Checked by:	Approved By:
	AP	TR	TR
Report Details:	Company Address:		
Type: Inflows Summary Storm Phase: Phase			

FSR: 100 years: Increase Rainfall (%): +50: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FSR: 100 years: +50 %: 15 mins: Winter	0.16	83.6	39.581
Catchment Area (1)	FSR: 100 years: +50 %: 15 mins: Winter	0.03	16.4	7.782
Catchment Area (2)	FSR: 100 years: +50 %: 15 mins: Summer	0.04	18.9	8.416
Catchment Area (3)	FSR: 100 years: +50 %: 15 mins: Summer	0.03	16.4	7.308

Building :	Date:		
Existing SW Drainage	25/06/2025		
	Designed by:	Checked by:	Approved By:
	AP	TR	TR
Report Details:	Company Address:		
Type: Junctions Summary Storm Phase: Phase			

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH1	FSR: 1 years: +0 %: 15 mins: Winter	72.550	71.306	71.468	0.162	17.7	0.184	0.000	15.2	8.403	Surcharged
MH2	FSR: 1 years: +0 %: 15 mins: Winter	72.550	71.050	71.132	0.082	18.6	0.093	0.000	18.1	10.025	OK
MH3	FSR: 1 years: +0 %: 15 mins: Summer	72.600	71.150	71.150	0.000	0.0	0.000	0.000	0.0	0.000	OK
MH4	FSR: 1 years: +0 %: 15 mins: Winter	72.860	70.850	70.955	0.105	25.1	0.119	0.000	22.8	13.318	OK
MH5	FSR: 1 years: +0 %: 15 mins: Winter	72.600	70.680	70.781	0.101	22.8	0.000	0.000	23.2	13.318	OK

Building :	Date:		
Existing SW Drainage	25/06/2025		
	Designed by:	Checked by:	Approved By:
	AP	TR	TR
Report Details:	Company Address:		
Type: Junctions Summary Storm Phase: Phase			

FSR: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH1	FSR: 2 years: +0 %: 15 mins: Winter	72.550	71.306	71.653	0.347	22.7	0.393	0.000	19.2	10.934	Surcharged
MH2	FSR: 2 years: +0 %: 15 mins: Winter	72.550	71.050	71.142	0.092	23.7	0.104	0.000	22.6	13.049	OK
MH3	FSR: 2 years: +0 %: 15 mins: Summer	72.600	71.150	71.150	0.000	0.0	0.000	0.000	0.0	0.000	OK
MH4	FSR: 2 years: +0 %: 15 mins: Winter	72.860	70.850	70.969	0.119	31.6	0.134	0.000	28.7	17.332	OK
MH5	FSR: 2 years: +0 %: 15 mins: Winter	72.600	70.680	70.793	0.113	28.7	0.000	0.000	29.6	17.332	OK

Building :	Date:		
Existing SW Drainage	25/06/2025		
	Designed by:	Checked by:	Approved By:
	AP	TR	TR
Report Details:	Company Address:		
Type: Junctions Summary Storm Phase: Phase			

FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH1	FSR: 30 years: +40 %: 15 mins: Summer	72.550	71.306	72.550	1.244	57.4	1.407	0.000	44.3	25.682	Surcharged
MH2	FSR: 30 years: +40 %: 15 mins: Winter	72.550	71.050	71.204	0.154	59.7	0.174	0.000	57.0	34.383	OK
MH3	FSR: 30 years: +40 %: 15 mins: Summer	72.600	71.150	71.150	0.000	0.0	0.000	0.000	0.0	0.000	OK
MH4	FSR: 30 years: +40 %: 15 mins: Winter	72.860	70.850	71.051	0.201	81.0	0.227	0.000	74.5	45.718	OK
MH5	FSR: 30 years: +40 %: 15 mins: Winter	72.600	70.680	70.866	0.186	74.5	0.000	0.000	76.6	45.718	OK

Building :	Date:		
Existing SW Drainage	25/06/2025		
	Designed by:	Checked by:	Approved By:
	AP	TR	TR
Report Details:	Company Address:		
Type: Junctions Summary Storm Phase: Phase			

FSR: 100 years: Increase Rainfall (%): +50: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH1	FSR: 100 years: +50 %: 15 mins: Summer	72.550	71.306	72.550	1.244	79.4	1.407	0.000	59.8	35.360	Surcharged
MH2	FSR: 100 years: +50 %: 15 mins: Winter	72.550	71.050	71.234	0.184	80.1	0.208	0.000	77.3	47.334	OK
MH3	FSR: 100 years: +50 %: 15 mins: Summer	72.600	71.150	71.150	0.000	0.0	0.000	0.000	0.0	0.000	OK
MH4	FSR: 100 years: +50 %: 15 mins: Winter	72.860	70.850	71.093	0.243	110.5	0.275	0.000	102.3	62.948	OK
MH5	FSR: 100 years: +50 %: 15 mins: Winter	72.600	70.680	70.903	0.223	102.3	0.000	0.000	104.5	62.948	OK

Building :	Date:		
Existing SW Drainage	25/06/2025		
	Designed by:	Checked by:	Approved By:
	AP	TR	TR
Report Details:	Company Address:		
Type: Connections Summary Storm Phase: Phase			

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
1.000	FSR: 1 years: +0 %: 15 mins: Winter	Pipe	MH1	MH2	72.550	71.468	0.122	8.403	1.0	1.05	15.2	Surcharged
1.001	FSR: 1 years: +0 %: 15 mins: Winter	Pipe	MH2	MH4	72.550	71.132	0.094	10.025	0.8	0.07	18.1	OK
2.000	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	MH3	MH4	72.600	71.150	0.052	0.000	0.0	0	0.0	OK
Ex pipe	FSR: 1 years: +0 %: 15 mins: Winter	Pipe	MH4	MH5	72.860	70.955	0.103	13.318	0.8	0.11	22.8	OK

Building : Existing SW Drainage	Date: 25/06/2025		
	Designed by: AP	Checked by: TR	Approved By: TR
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:		

FSR: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
1.000	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	MH1	MH2	72.550	71.653	0.150	10.934	1.1	1.33	19.2	Surcharged
1.001	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	MH2	MH4	72.550	71.142	0.105	13.049	0.8	0.09	22.6	OK
2.000	FSR: 2 years: +0 %: 15 mins: Summer	Pipe	MH3	MH4	72.600	71.150	0.059	0.000	0.0	0	0.0	OK
Ex pipe	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	MH4	MH5	72.860	70.969	0.116	17.332	0.9	0.14	28.7	OK

Building :	Date:		
Existing SW Drainage	25/06/2025		
	Designed by:	Checked by:	Approved By:
	AP	TR	TR
Report Details:	Company Address:		
Type: Connections Summary Storm Phase: Phase			

FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
1.000	FSR: 30 years: +40 %: 15 mins: Winter	Pipe	MH1	MH2	72.550	72.550	0.150	28.769	2.7	3.31	47.8	Surcharged
1.001	FSR: 30 years: +40 %: 15 mins: Winter	Pipe	MH2	MH4	72.550	71.204	0.177	34.383	1.0	0.23	57.0	OK
2.000	FSR: 30 years: +40 %: 15 mins: Summer	Pipe	MH3	MH4	72.600	71.150	0.099	0.000	0.0	0	0.0	OK
Ex pipe	FSR: 30 years: +40 %: 15 mins: Winter	Pipe	MH4	MH5	72.860	71.051	0.193	45.718	1.1	0.36	74.5	OK

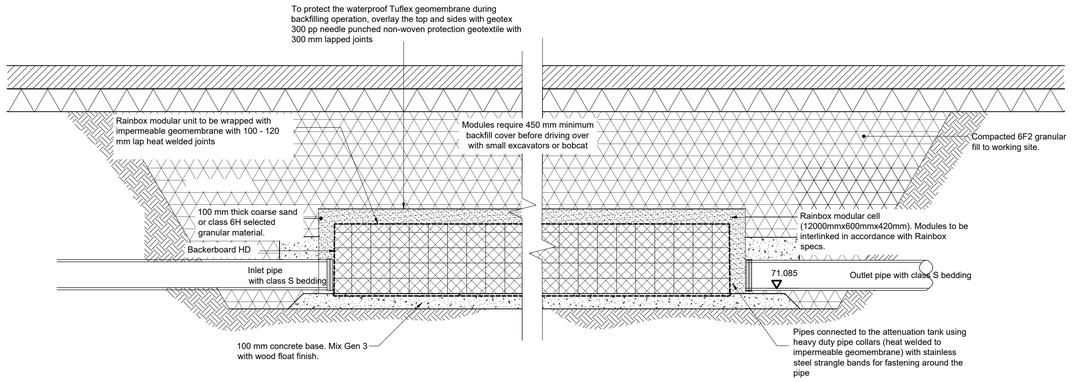
Building :	Date:		
Existing SW Drainage	25/06/2025		
	Designed by:	Checked by:	Approved By:
	AP	TR	TR
Report Details:	Company Address:		
Type: Connections Summary Storm Phase: Phase			

FSR: 100 years: Increase Rainfall (%): +50: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
1.000	FSR: 100 years: +50 %: 15 mins: Winter	Pipe	MH1	MH2	72.550	72.550	0.150	39.592	3.6	4.4	63.6	Surcharged
1.001	FSR: 100 years: +50 %: 15 mins: Winter	Pipe	MH2	MH4	72.550	71.234	0.213	47.334	1.0	0.31	77.3	OK
2.000	FSR: 100 years: +50 %: 15 mins: Summer	Pipe	MH3	MH4	72.600	71.150	0.120	0.000	0.0	0	0.0	OK
Ex pipe	FSR: 100 years: +50 %: 15 mins: Winter	Pipe	MH4	MH5	72.860	71.093	0.233	62.948	1.2	0.5	102.3	OK

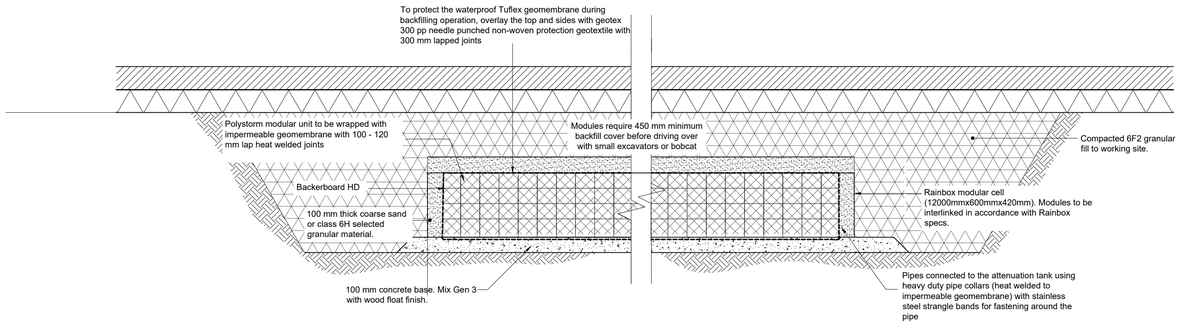
APPENDIX D

D1 TRP SuDS Detail Drawings 7287-TRP-ZZ-XX-DR-D-4014



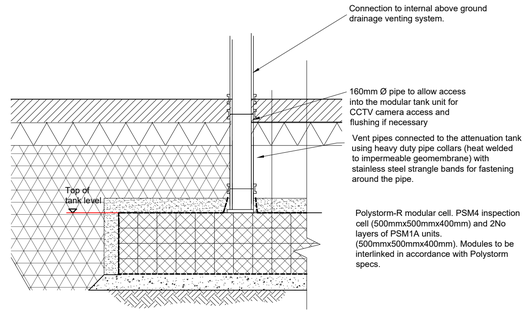
DETAIL OF ATTENUATION TANK USING POLYSTORM MODULAR UNITS

(SCALE 1:20)



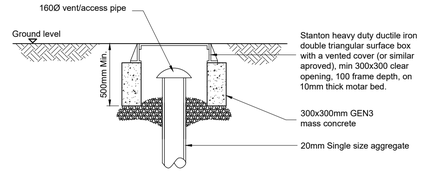
CROSS SECTION OF ATTENUATION TANK USING POLYSTORM MODULAR UNITS

(SCALE 1:20)



DETAILS OF POLYSTORM ATTENUATION WITH 160Ø VENT/ACCESS PIPE CONNECTION

(SCALE 1:20)



ALTERNATIVE VENT / ACCESS BOX DETAIL

(SCALE 1:20)

A 3 - 5% CBR HAS BEEN ASSUMED AT SUB-BASE LEVEL. SHOULD THE CBR BE TESTED AND FOUND TO BE LESS THAN 3% THEN PROVIDE 300mm 6F2 CAPPING LAYER BENEATH CONCRETE BLINDING.

THE CONTRACTOR SHALL PROHIBIT THE MOVEMENT OF CONSTRUCTION PLANT ACROSS THE STORAGE TANK AND WHERE NECESSARY PROVIDE ADDITIONAL SUPPORT AND PROTECTION TO THE STRUCTURE. PARTICULARLY POST CONSTRUCTION. TEMPORARY FENCING CAN BE USED TO PROHIBIT TRADE STOCKS, PILLING MATERIALS, HEAVY PLANTS ETC.

TYPICAL Polypipe NOTES

1. all storage tank drainage works shall be carried out in accordance with the specifications, method statements and recommendations of Polypipe.

2. the location, size and depth of all existing drains / sewers and services shall be established by the contractor prior to the commencement of works on site. any discrepancies from the information indicated on these drawings shall immediately be brought to the attention of the engineer.

3. the contractor shall allow for the protection, temporary and permanent support and diversion works as necessary, to all existing services to the satisfaction of the public utilities.

4. the contractor shall allow for dealing with surface water run-off into excavations and from groundwater by means of sumps, pumping and de-watering as appropriate, in order to keep the excavation as reasonably dry as possible during the construction of the works.

5. all levels and dimensions shall be verified on site prior to the commencement of any works. any discrepancies shall immediately be brought to the attention of the engineer.

6. the contractor shall take all necessary safety precautions in line with current legislation when working in / near confined spaces, deep excavations and machinery.

7. the contractor shall take all necessary safety to protect pedestrians and vehicles from the working areas.

8. to protect the Polystorm modular attenuation / storage tank from construction site debris, the contractor shall ensure that stoppers are securely placed in all connections immediately upstream of the tank units, only to be removed once the final cleaning of the roads / drainage has been completed.

9. upon completion of the works the contractor shall clean all drainage by jetting, removing all debris from site, no debris shall be permitted to enter the tank storage system.

10. number of vent units depends on the size of the tank and to be determined by tank supplier.

11. refer to sequence of work document for detailed installation methodology (contact Polypipe).

GENERAL NOTES

1. This Drawing is to be read in conjunction with all relevant Engineer, Architects, Service Engineers and Subcontractor drawings.
2. Review all drawings and report any discrepancies to Engineer prior to commencement.
3. Do not scale from this drawing. All dimensions and levels including any abutment to existing structures to be checked on site prior to commencement.
4. Work from figured dimensions only.
5. No deviation from details shown on this drawing is allowed without Engineers prior permission in writing.
6. All work is to be carried out in accordance with the relevant specifications issued by Engineer, British Standard Codes of Practice, Statutory requirements and the Contract Documents.

DRAINAGE

7. All drainage to be installed in accordance with the requirements set out in BS EN 752 and the Building Regulations Document H UNO.
8. This drawing is to be read in accordance with Engineer drainage details drawing no.: DR-D-4011, DR-D-4012, DR-D-4013 & DR-D-4014
9. For details of materials and workmanship refer to the specification. (R12)
10. The manhole cover levels shown on the drawing are approximate. Final cover levels are to be adjusted to suit finished paving levels and are to be confirmed with Architect prior to construction.
11. The contractor is responsible for checking invert levels and positions of all existing drains, sewers, inspection chambers and manholes shown on this drawing immediately on site establishment. Any discrepancies must be reported immediately.
12. Where the new site drainage is to connect into the existing manholes in carriageways and/or existing adopted sewers, the contractor is responsible for all liaison with the relevant statutory undertaker and local authority with regard to road closures, traffic management, permits to work, submission of contractors method statement and risk assessment and other documentation and correspondence associated with the site stage (Part 2) element of the works.
13. All below ground concrete to be sulphate resistant cement to Class 3.
14. Rocker pipes to be provided at all concrete cased interfaces.
15. Maintain adequate protection to drains by providing a minimum cover during the construction period.
16. The falls shown on pipe runs are indicative and pipes are to be installed to the invert levels shown on the manhole schedule.
17. All pipework to be installed with soffits level (e.g. at changes in pipe size) UNO.
18. Surface channel drains to be ACO MultiDrain or similar approved.
19. All sump units to linear drainage channels to be fitted with foul air traps.
20. All surface water gullies to be trapped.
21. Pipe gradients are indicative minimums.
22. All surface water branch connections to be 150mm diameter at min falls of 1:100 UNO.
23. All foul water branch connections to be 100mm diameter at min falls of 1:40 UNO.
24. All drains to be set out to give a minimum clearance of 1.0m to kerb lines
25. All pipes from 100-300mm diameter to be Hepworth SuperSleeve or equivalent.
26. All pipes above 300mm diameter to be precast concrete to BS 5911-1 Class 120.
27. All internal gullies, plumbing connections, soil, stacks, SVP's and all other connections of foul and surface water drains to below ground to be fitted with accessible rodding points above slab level
28. Rainwater downpipes that do not connect directly to an access point to be fitted with rodding access above ground level.
29. All covers and rodding access points to be sealed and screwed tight.
30. Access fittings, Inspection Chambers and Manholes to be constructed to dimensions set out in the Building regulations Document H from tables 11 & 12.
31. Setting out of all internal gully/plumbing connections to be co-ordinated between the service engineers and the Architect.
32. All gullies to be precast concrete to BS 5911-230.
33. All manholes to be precast concrete to BS 5911-3.
34. All internal manhole covers to be double sealed, lockable and recessed to accept floor finishes where applicable.
35. Refer to Architect's drawing for details of any manhole covers which require inset panels.
36. Manhole covers shall be orientated to lie parallel/square to the highway.
37. Drainage channels in car parks to be fitted with Heelguard ductile iron gratings Grade C250
38. The following classes of cover shall be used unless otherwise stated on the drawings:

    A15 - Areas which may be used by pedestrians and cyclists

    B125 - Footways, pedestrian areas and car parks

    D400 - Road gullies

    D400 - Road carriageways, hard shoulders and parking areas

    E600 - Service yard and access
39. Upon completion of drainage works, the new drainage system is to be thoroughly cleaned and a CCTV survey performed to confirm no construction debris or blockages remain.

Rev.			
P02	Issued for Tender	11-12-25	AP
P01	Issued for Tender	05-06-25	AP
	Description	Date	By

Project: Building

Client:

Drawing Title: Drainage Details Sheet 4

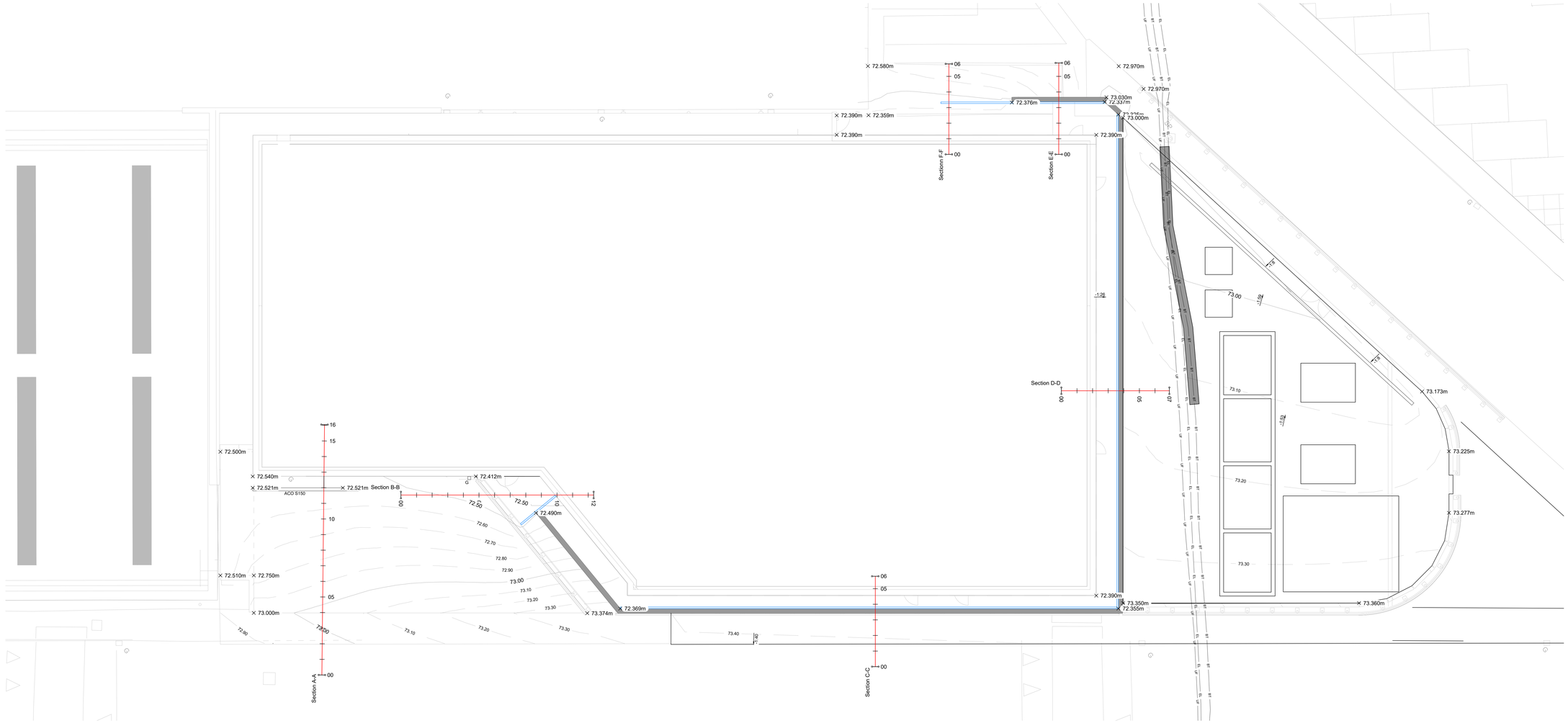
Ref.	Project No.	Drawn By	Checked	Date	Scale	Sheet
	7274	AP	TR	Jun 25	1/10	A0

Drawing	Status	Description	Revision
	D2	Issue for Tender	P02

Number: 7274-TRP-ZZ-XX-DR-D-4014

APPENDIX E

E1 TRP Proposed Levels 7274-TRP-ZZ-XX-DR-C-5100

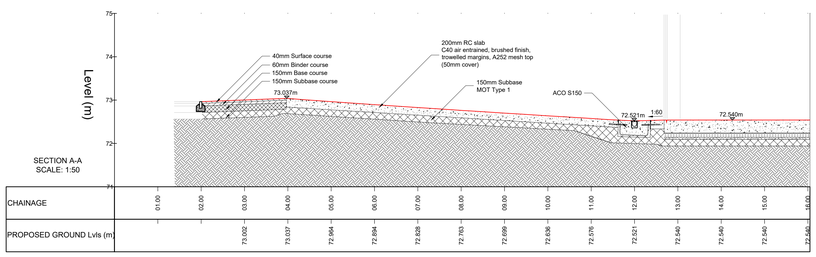


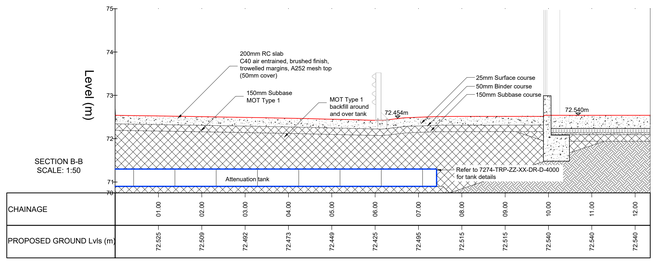
General Notes

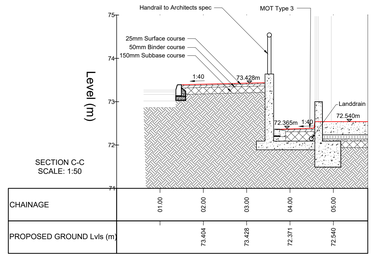
1. This Drawing is to be read in conjunction with all relevant Engineer, Architects, Service Engineers and Subcontractor drawings.
2. Review all drawings and report any discrepancies to Engineer prior to commencement.
3. Do not scale from this drawing. All dimensions and levels including any abutment to existing structures to be checked on site prior to commencement.
4. Work from figured dimensions only.
5. No deviation from details shown on this drawing is allowed without Engineer s prior permission in writing.
6. All work is to be carried out in accordance with the relevant specifications issued by Engineer , British Standard Codes of Practice, Statutory requirements and the Contract Documents.

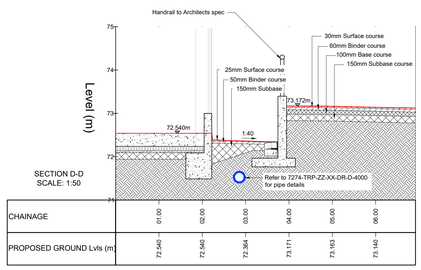
Excavation and Earthworks

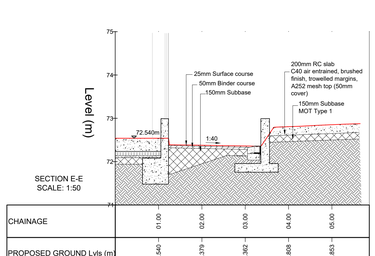
1. The preparation and treatment of the subgrade to vehicular areas to be in accordance with Highways Agency 'Specification for highway works', clauses 616 and 617.
2. The formation to all vehicle areas is to be formed in firm stable ground free from any roots and any vegetation matter.
3. Any soft areas identified within the formation are to be excavated until firm ground is found and backfilled with a 6F2 material compacted in 150mm layers in accordance with Highways Agency 'Specification for highway works' clause 802.
4. Type 2 unbound sub-base to be in accordance with Highways Agency 'Specification for highway works', clauses 801 and 804.
5. Type 1 unbound sub-base to be in accordance with Highways Agency 'Specification for highway works', clauses 801 and 803.Granular sub-base is to be spread and levelled in layers and as soon as possible thereafter compact each layer in accordance with Highways Agency 'Specification for highway works' clause 802. At drainage fittings, inspection covers, perimeters and where local excavation and backfilling has taken place: Take particular care to compact fully
6. Do not use frozen materials or place fill on frozen surfaces. Remove all material affected by frost and replace and recompact if not damaged after thawing.
7. As soon as practicable, cover subgrades and sub-bases with subsequent layers. Prevent degradation by construction traffic, construction operations and inclement weather.
8. Permissible deviation from required levels, falls and cambers (maximum):Subgrades:Roads and parking areas: +20 -30 mm. Footways and recreation areas: ± 20 mm.Sub-bases: Roads and parking areas: +/-20Footways and recreation areas: +/-12
9. All bomag rollers, whacker plates and vibrating foot plates are to be used in accordance with manufactures specification.

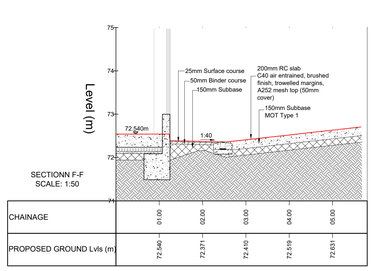












Rev:			
P03	Existing services added	23/10/25	AP
P02	Issued for Tender	13/06/25	AP
P01	Issued for Tender	05/06/25	AP
	Description	Date	By

Project: Building

Client:

Drawing Title: External Works Sections

Ref:

Project No.	Drawn By	Checked	Date	Scale	Sheet
7274	AP	TR	10/24	As noted	A0

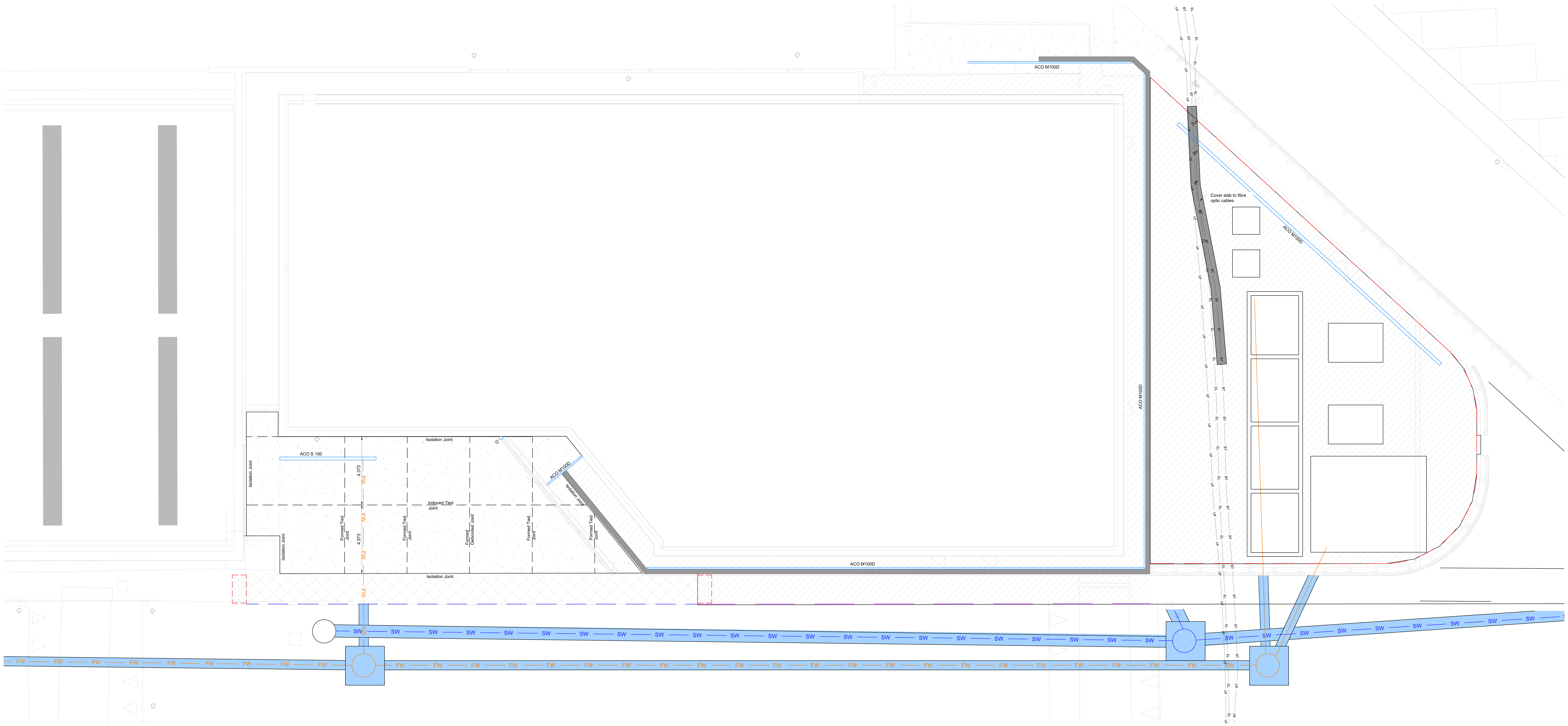
Drawing:

Status	Description	Revision
D2	Issue for Tender	P03

Number: 7274-TRP-ZZ-XX-DR-C-5100

APPENDIX F

F1 TRP Proposed External Works GA 7274-TRP-ZZ-XX-DR-C-5000



General Notes

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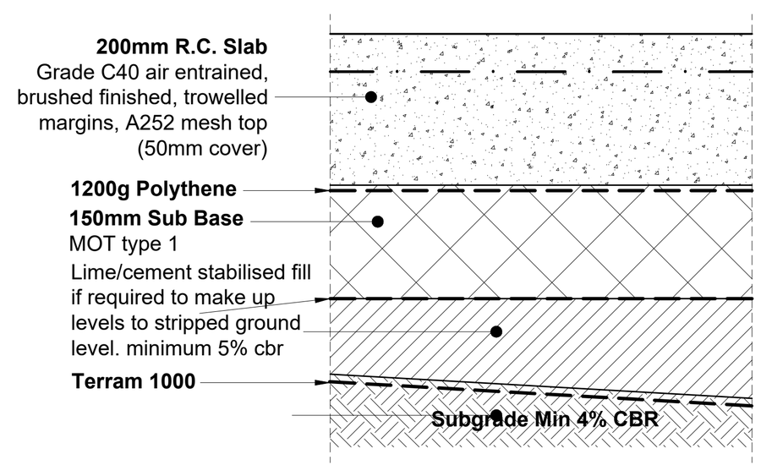
6. All work is to be carried out in accordance with the relevant specifications issued by Engineer , British Standard Codes of Practice, Statutory requirements and the Contract Documents.

Excavation and Earthworks

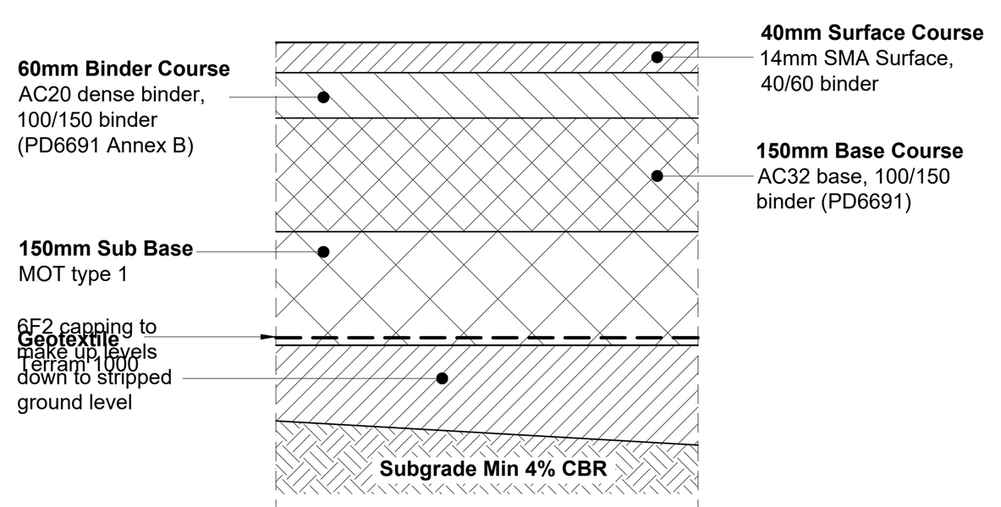
1. The preparation and treatment of the subgrade to vehicular areas to be in accordance with Highways Agency 'Specification for highway works', clauses 616 and 617.
2. The formation to all vehicle areas is to be formed in firm stable ground free from any roots and any vegetation matter.
3. Any soft areas identified within the formation are to be excavated until firm ground is found and backfilled with a 6F2 material compacted in 150mm layers in accordance with Highways Agency 'Specification for highway works' clause 802.
4. Type 2 unbound sub-base to be in accordance with Highways Agency 'Specification for highway works', clauses 801 and 804.
5. Type 1 unbound sub-base to be in accordance with Highways Agency 'Specification for highway works', clauses 801 and 803.Granular sub-base is to be spread and levelled in layers and as soon as possible thereafter compact each layer in accordance with Highways Agency 'Specification for highway works' clause 802. At drainage fittings, inspection covers, perimeters and where local excavation and backfilling has taken place: Take particular care to compact fully
6. Do not use frozen materials or place fill on frozen surfaces. Remove all material affected by frost and replace and recompact if not damaged after thawing.
7. As soon as practicable, cover subgrades and sub-bases with subsequent layers. Prevent degradation by construction traffic, construction operations and inclement weather.
8. Permissible deviation from required levels, falls and cambers (maximum):Subgrades:Roads and parking areas: +20 -30 mm. Footways and recreation areas: ± 20 mm.Sub-bases: Roads and parking areas: +/-20Footways and recreation areas: +/-12
9. All bomag rollers, whacker plates and vibrating foot plates are to be used in accordance with manufactures specification.

LEGEND

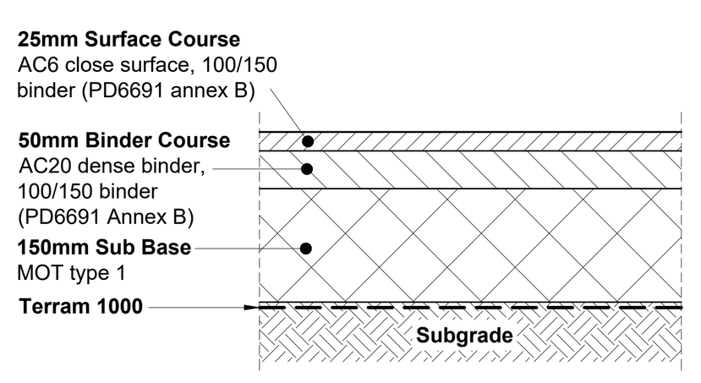
- Asphalt Footpath
- Concrete Hardstanding
- Asphalt heavy access
- Asphalt reinstatement
- KERB 1
- KERB 2
- KERB 3
- Retaining Wall



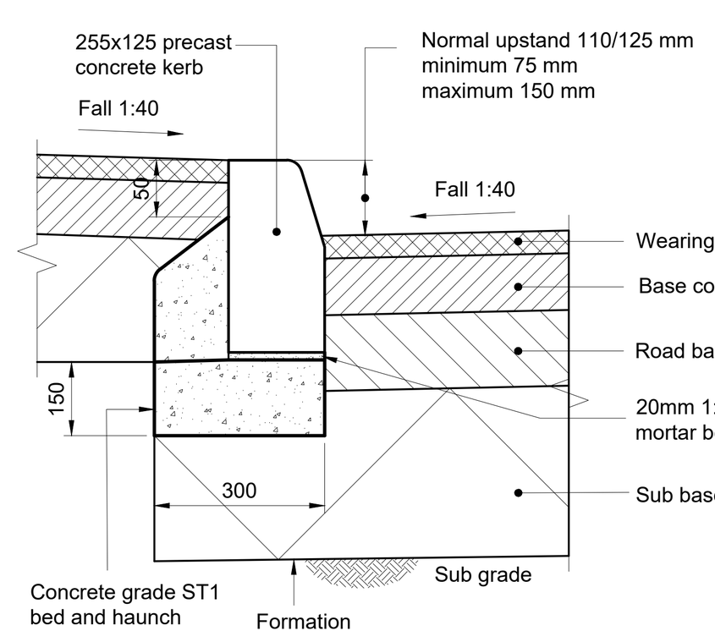
HEAVY DUTY CONCRETE SLAB
(SCALE 1:10)



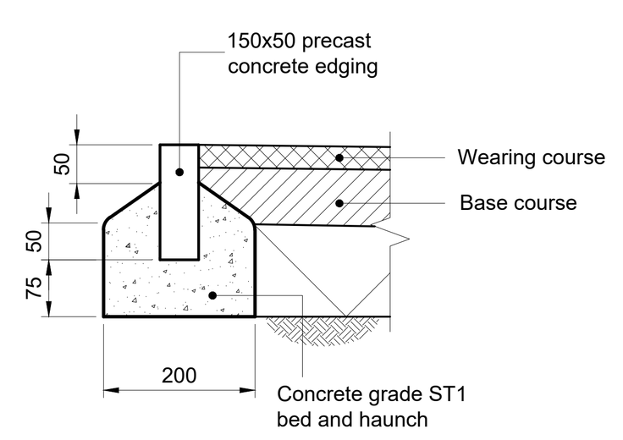
ASPHALT HEAVY ACCESS CBR>4%
(SCALE 1:10)



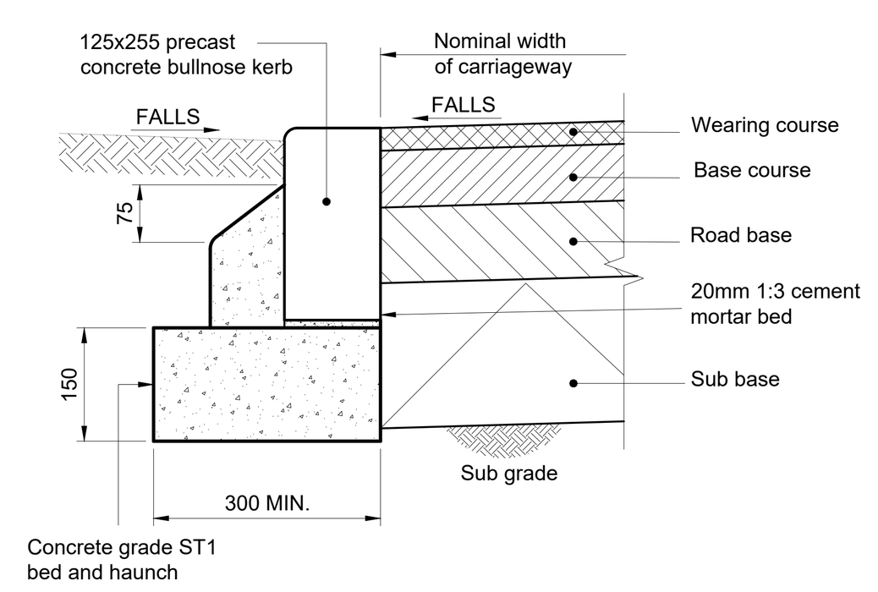
ASPHALT FOOTPATH
(SCALE 1:10)



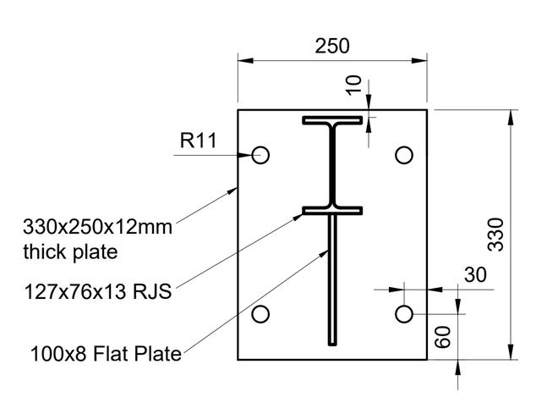
KERB TYPE 1
(SCALE 1:10)



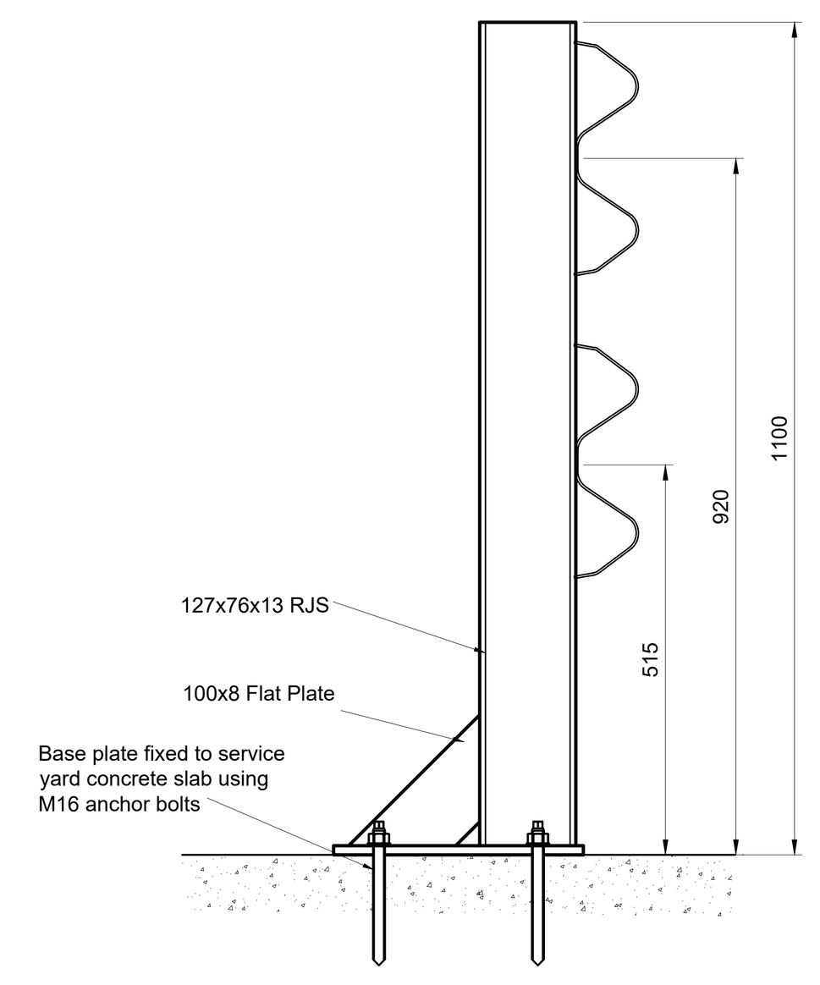
KERB TYPE 2
(SCALE 1:10)



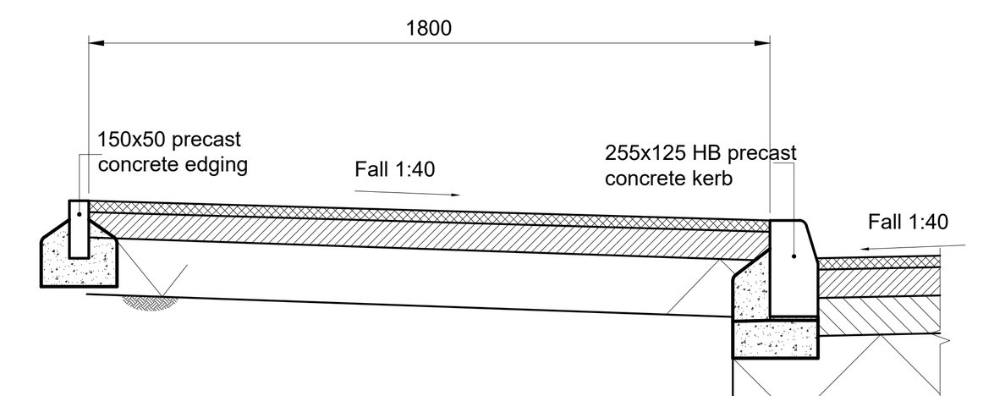
KERB TYPE 3
(SCALE 1:10)



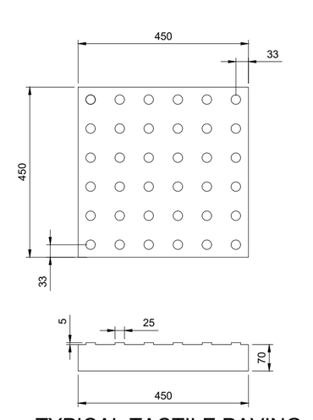
ARMCO BARRIER BASE PLATE
SCALE 1:10



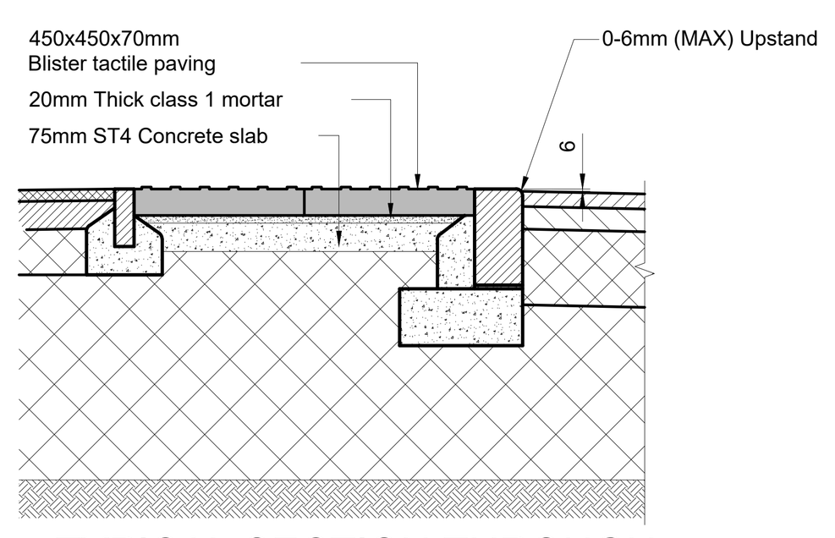
ARMCO BARRIER FIXING DETAIL
SCALE 1:10



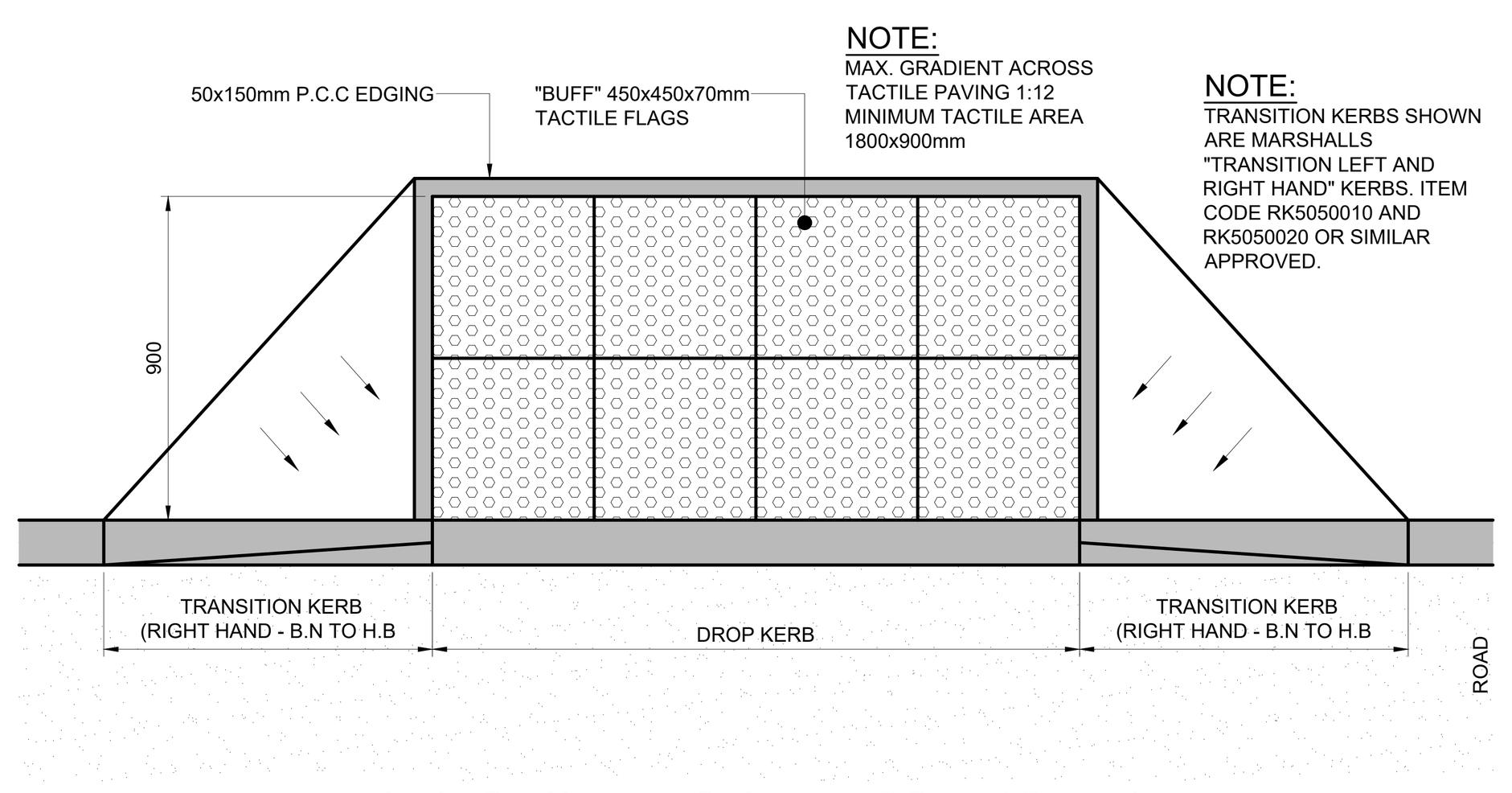
NEW FOOTPATH DETAIL
(SCALE 1:20)



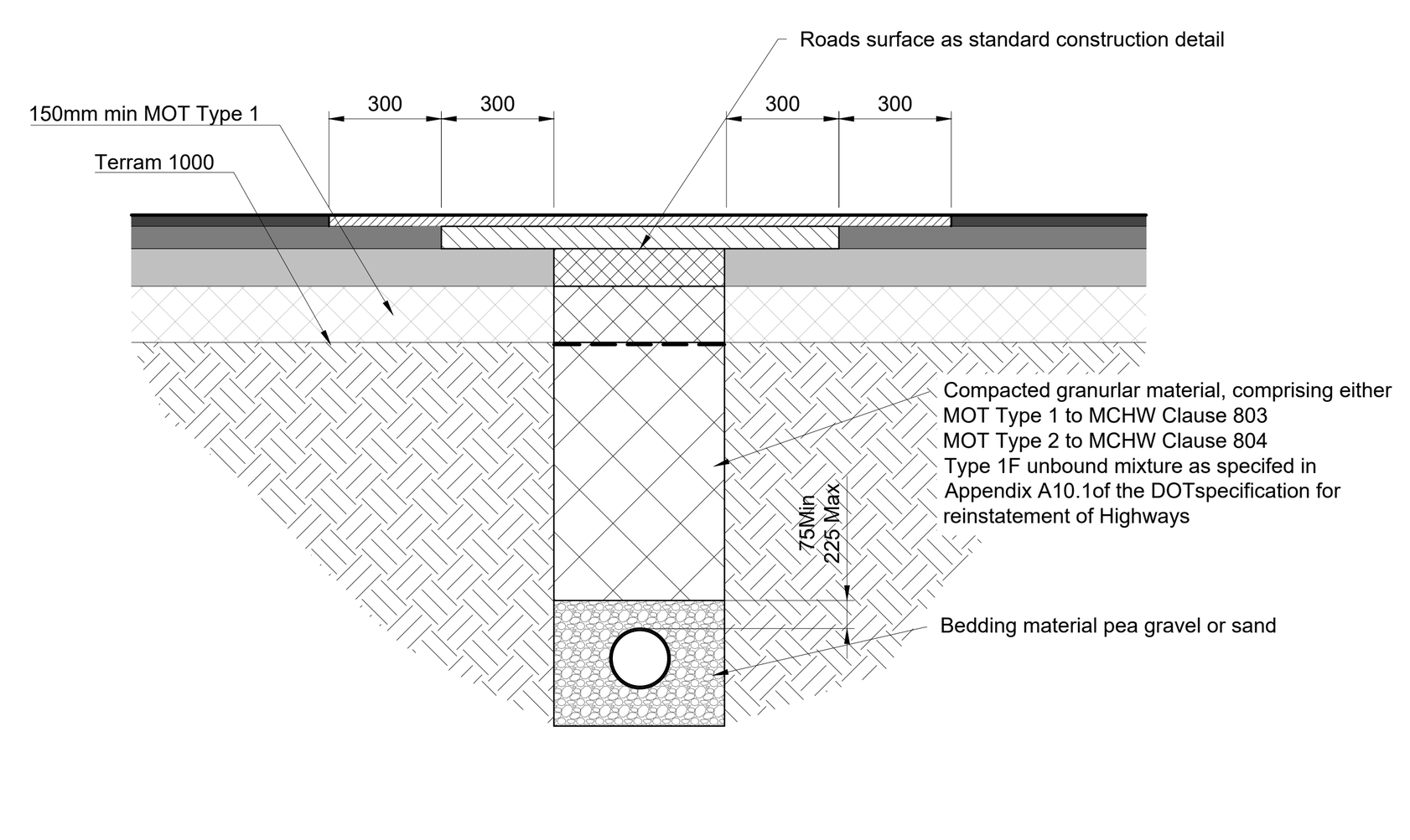
TYPICAL TACTILE PAVING SLAB
(SCALE 1:10)



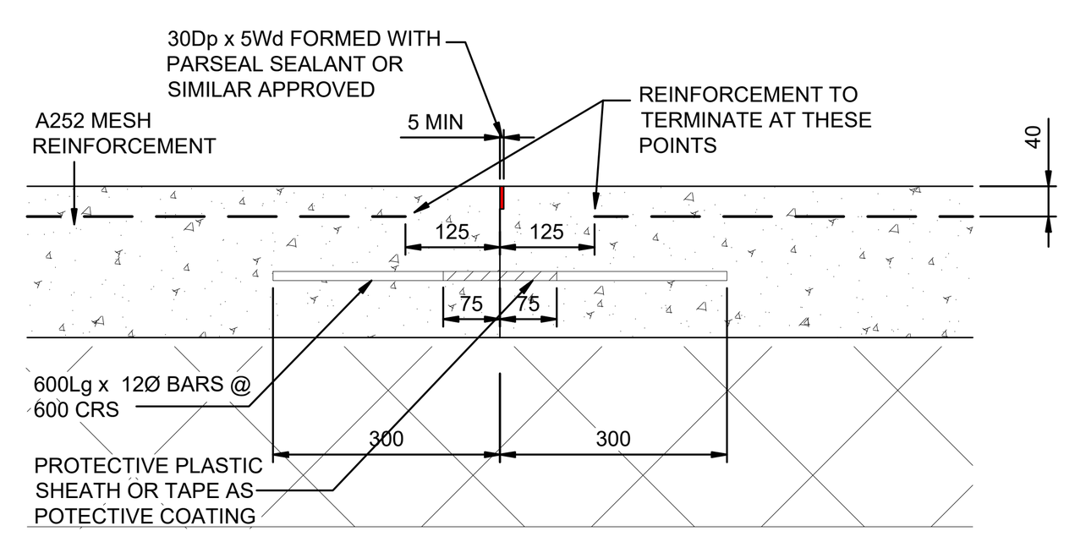
TYPICAL SECTION THROUGH PEDESTRIAN CROSSING
SCALE 1:20



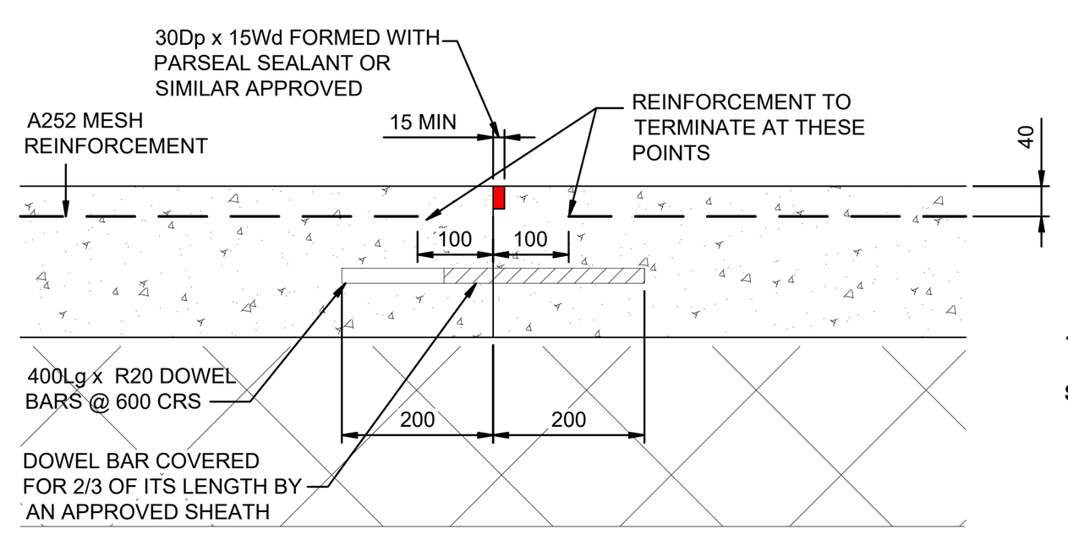
PEDESTRIAN TACTILE UNCONTROLLED CROSSING - 1.8m
SCALE 1:20



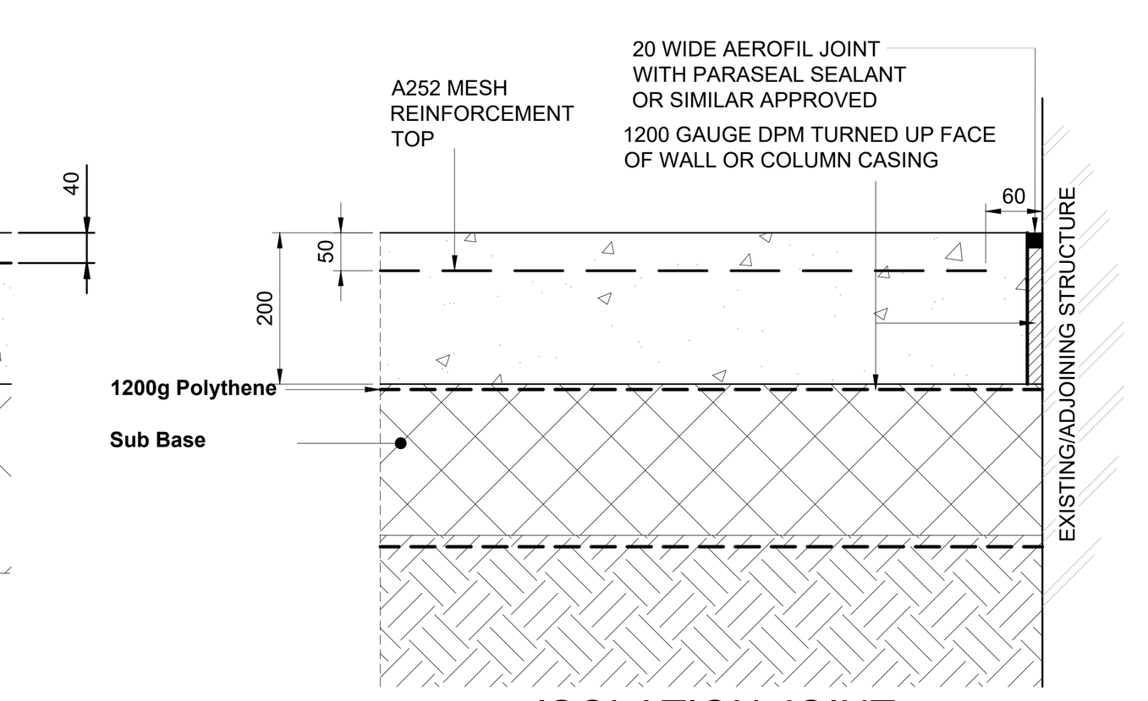
TYPICAL ASPHALT ROAD TRENCH REINSTATEMENT DETAIL
(SCALE 1:20)



TYPICAL FORMED TIED JOINT
SCALE 1:10



TYPICAL FORMED DEBONDED JOINT
SCALE 1:10



ISOLATION JOINT
SCALE 1:10

Rev.	Description	Date	By
P03	Reinstatement area for foul sewer added	11/08/25	AP
P02	Issued for Tender	13/06/25	AP
P01	Issued for Tender	05/06/25	AP

Project: Building

Client:

Drawing Title: External Works GA

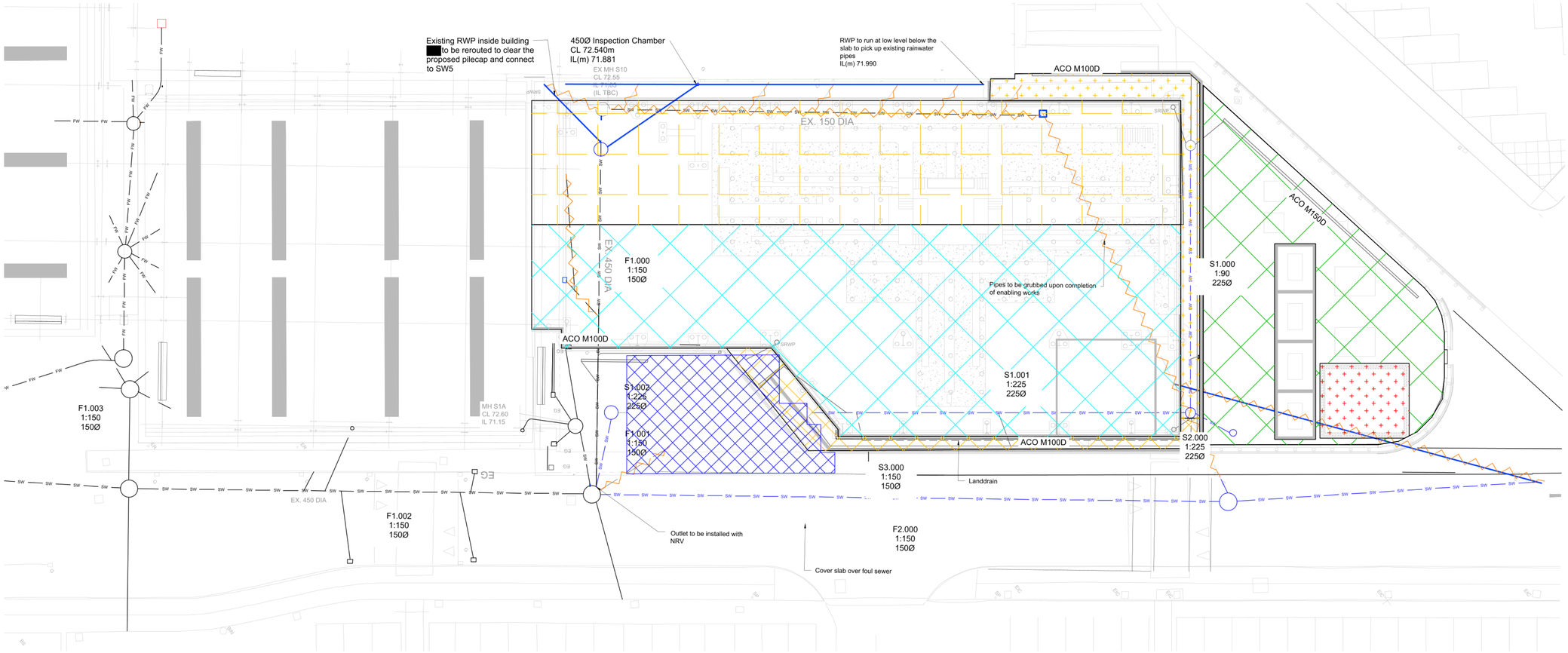
Project No.	Drawn By	Checked	Date	Scale	Sheet
7274	AP	TR	10/24	As noted	A0

Status	Description	Revision
D2	Issue for Tender	P03

Drawing Number: 7274-TRP-ZZ-XX-DR-C-5000

APPENDIX G

G1 IMPERMEABLE AREAS CATCHMENT SUMMARY 7274-TRP-ZZ-XX-DR-D-4100



Notes

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SW NETWORK CATCHMENT

- 1.000 = 332.104m²
- 1.000 = 845.055m²
- 1.001 = 603.205m²
- 1.001 = 71.358m²
- 1.002 = 84.098m²
- 2.000 = 49.605m²

LEGEND

- SW — DENOTES PROPOSED SURFACE WATER DRAIN
- SW — DENOTES EXISTING SURFACE WATER DRAIN
- DENOTES SERVICES TO BE ABANDONED
- RWP — RAINWATER PIPE
- SRWP — SYPHONIC RAINWATER PIPE
- EG — EXISTING GULLY

Rev.			
P01	Issue for information	10-12-25	AP
	Description	Date	By

Project: Building

Client:

Drawing Title: Imperemable Areas Catchment Summary

Ref.	Project No.	Drawn By	Checked	Date	Scale	Sheet
	7274	AP	TR	02/25	1:200	A1

Drawing	Status	Description	Revision
	S2	Issue for Information	P01

Number: 7274-TRP-ZZ-XX-DR-D-4100

APPENDIX H

H1 FLOOD EXCEEDANCE ROUTE 7274-TRP-ZZ-XX-DR-D-4200

General Notes

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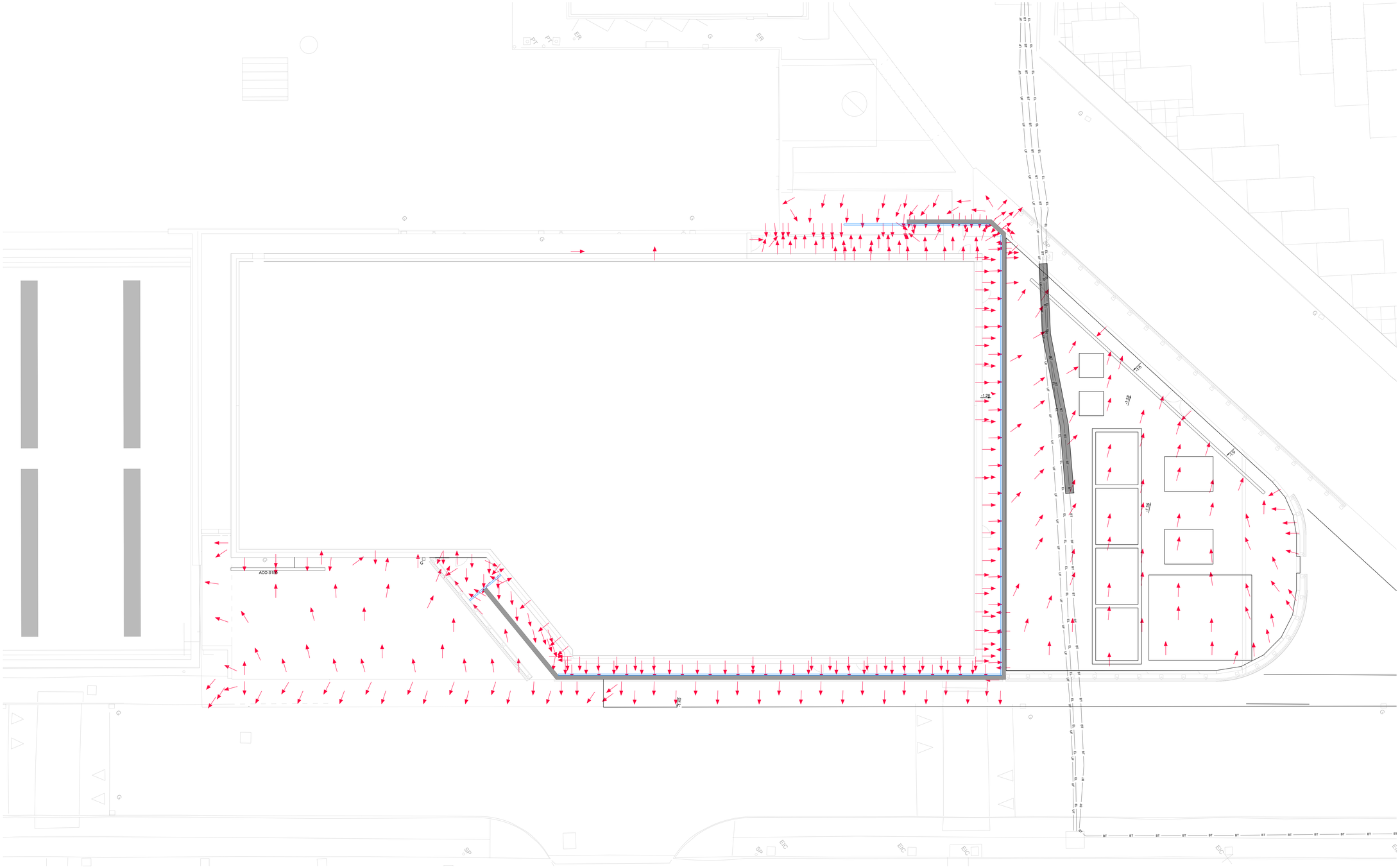

Rev.	Description	Date	By
P01	Issued for Information	11/12/25	AP

Project: Building

Client:

Drawing Title: Flood Exceedance Routes

Ref.	Project No.	Drawn By	Checked	Date	Scale	Sheet
	7274	AP	TR	10/24	As noted	A0

Drawing Number	Status	Description	Revision
7274-TRP-ZZ-XX-DR-C-4200	S2	Issue for Information	P01