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Moor Lane Garage

South Shields, NE34 6BZ

FLOOD RISK STATEMENT AND DRAINAGE STRATEGY

Final Report for:

SRJ Energy

November 2023

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Infrastructure Highways Transport

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Cora IHT

Infrastructure Highways Transport

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1.0 INTRODUCTION

1.1 *Overview*

1.1.1 Cora IHT have been instructed by SRJ Energy to prepare a Flood Risk Statement (FRS) and Drainage Strategy (DS) relating to the redevelopment of Moor Lane Garage in South Shields (NE34 6BZ).

1.1.2 This report presents the findings of a drainage strategy that has been carried out in accordance with the National Planning Policy Framework (NPPF), Technical Guidance to the NPPF, Planning Practice Guidance and the South Tyneside Level 1 SFRA.

1.1.3 As the approximate area of the proposed development red line boundary covers 0.07 hectares and includes provision for 4 no. customer parking bays and the petrol filling station.

1.1.4 Consideration must also be given to minimising the risk of pollution to controlled waters and the site conditions prior to, during and after development.

Figure 1.1: Site Location



2.0 SITE DESCRIPTION AND EXISTING CONDITIONS

2.1 Site Description

2.1.1 The site is currently occupied by the Village Car Centre and an existing petrol filling station (PFS) with an identified area of 700m2 (0.07 hectares). The site is located approximately 12km to the East of Newcastle Upon Tyne Centre and 2.5km to the south of South Shields. National Grid reference 437576 , 564914 is located at the central point of the proposed site area with the nearest postcode is identified as NE34 6BZ.

2.1.2 A proposed site layout plan produced by Jennings Design is shown in **Appendix A**.

2.1.3 The existing roof drainage collected by the car dealership appears to discharge via a number of downpipes directly onto the public highway with the petrol filling station benefiting from a direct connection via an interceptor to the existing public system located in Moor Lane.

2.1.4 The existing interceptor and offsite connection is located to the west of the proposed site see **figure 2.1** below.

Figure 2.1 Interceptor Location



2.1.5 A detailed CCTV and condition survey should be completed through the existing network to be maintained prior to detailed design commencing, to establish the exact routes and confirm condition for reuse.

2.2 Proposed Future Use

2.2.1 The proposal is for the redevelopment of Moor Lane Garage, which presently consists of a Petrol Filling Station with store , flats and car garage / workshop.

2.2.2 As part of the proposals the with the Car Garage / Workshop is to be removed.

2.2.3 The existing and proposed GFA's are as follows:

- *Existing Gross Building Area – 327.34m^2*
- *Proposed Gross Building Area – 225.87m^2*

2.2.4 The number of PFS pumps on-site will remain at 4.

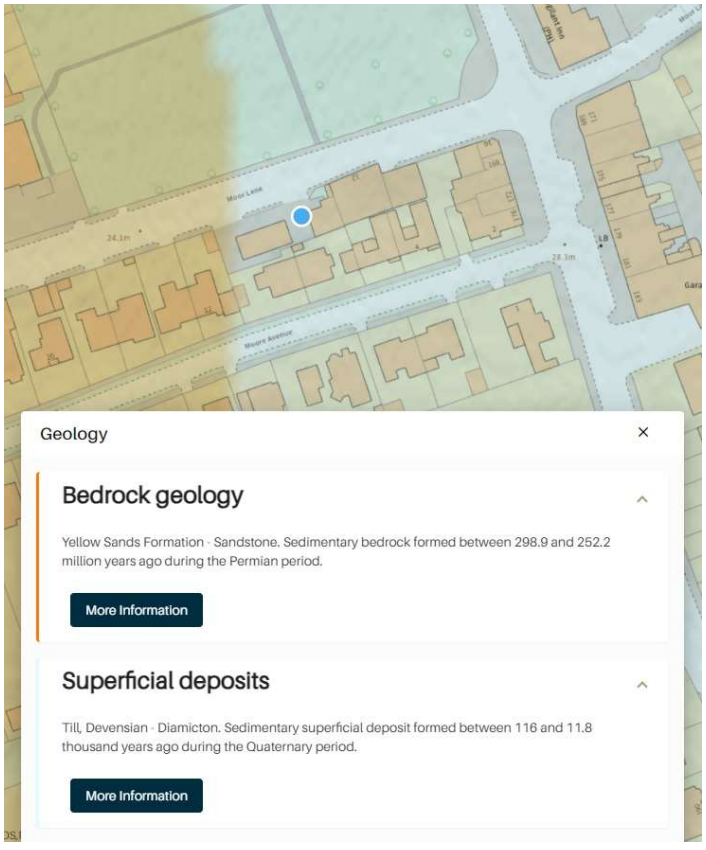
2.3 Site Levels

2.3.1 The existing site levels indicate a fall from east to west of approximately 1.7m from a level of 26.816 at the car dealership and 25.090 along the existing boundary wall.

2.4 Underlying Ground

2.4.1 Review of the British Geological Survey (BGS) geology mapping records indicate the site would be underlain by Yellow Sands Formation- sandstone with superficial deposits of Till Devensian the BGS information shown in Figure 2.2 below.

Figure 2.2: BGS Information



2.4.2 The bedrock geology includes many lithologies, often classified into three types based on origin: igneous, metamorphic and sedimentary.

- *Igneous rocks - are derived from molten magma in the Earth's crust. They may, for example, be extruded at the surface by volcanic activity to form lavas and tuffs (ash) or intruded into other rocks to form large masses of granite and gabbro at depth or minor, cross-cutting basalt dykes near the surface.*
- *Metamorphic rocks - such as schist and gneiss are those that have been changed from one rock type to another in the solid state by the recrystallisation of minerals, often at high temperatures and pressures when buried deep in the Earth's crust.*
- *Sedimentary rocks - are formed when grains and fragments of existing rocks are eroded away by ice, water and wind action, transported elsewhere and redeposited as a sediment. These sediments are often laid down in layers or strata of loose particles of gravel, sand, silt and clay. Over time they may be buried by later sediments and consolidated or cemented to form stratified or bedded rocks such as conglomerate, sandstone, siltstone and claystone. Other sedimentary rocks such as ironstone and limestone are created by chemical or biogenic (life) action.*

3.0 FLOOD RISK and FLOOD ZONES

3.1 Brief

3.1.1 Current GOV.UK guidance indicates that and FRA is not required when:

You don't need to do a flood risk assessment for a development that's less than 1 ha in flood zone 1 unless it could be affected by sources of flooding other than rivers and the sea, for example surface water drains.

3.1.2 As an FRA is not required, the purpose of this document aims to identify the preferred discharge location to the current drainage network whilst assessing the risks of all forms of flooding to and from the site and demonstrate how these flood risks will be managed, taking climate change into account. The DS also considers the management of surface water run-off and outlines the proposed drainage strategy.

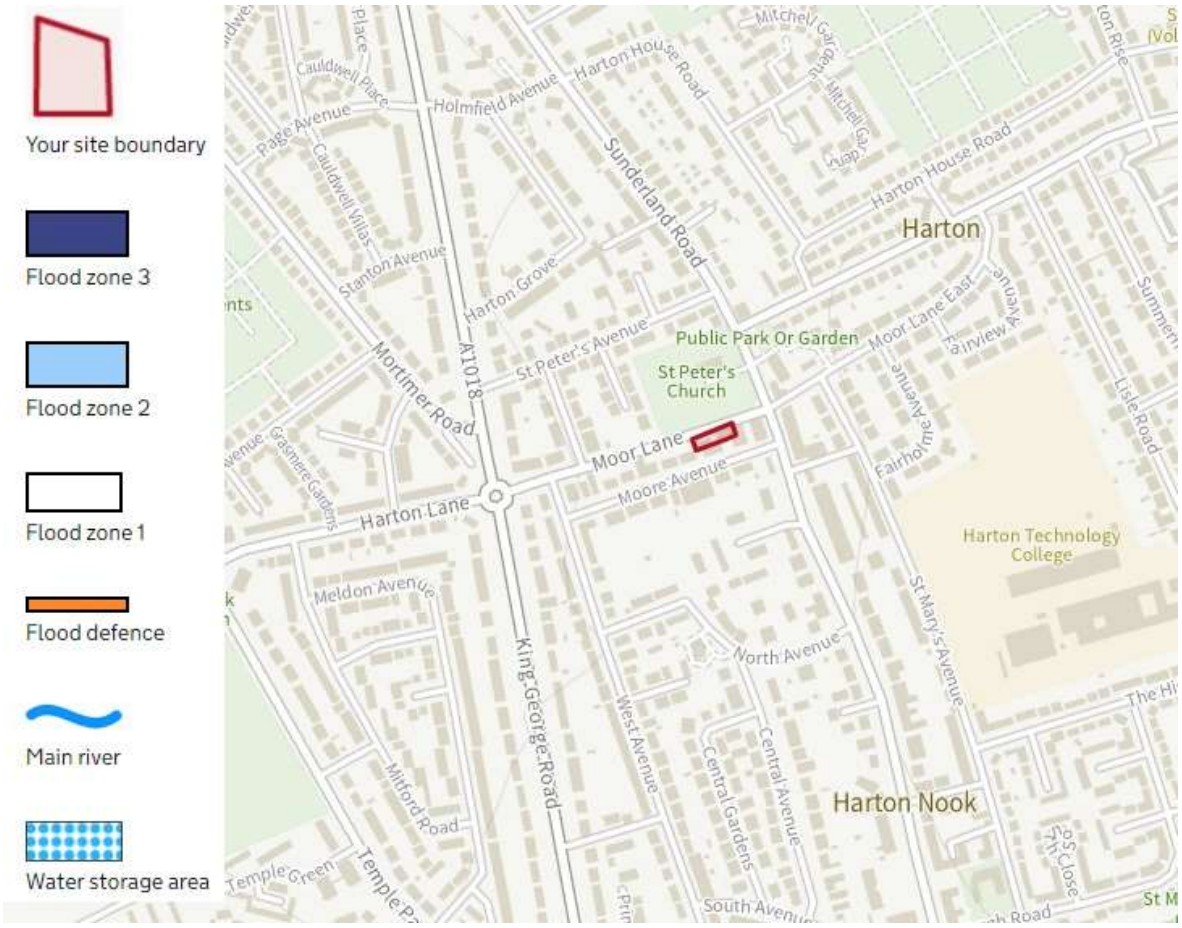
3.1.3 The vulnerability of the site to flooding from rivers, sea and other sources has been considered, along with the potential to increase flooding elsewhere and the effect on surface water run-off. Typical sources of flooding include fluvial, tidal, surface water, groundwater, sewers and anthropogenic sources; these are considered below.

3.2 Fluvial, Tidal

3.2.1 Flood maps are produced by the EA for the whole of the UK to highlight areas at particular risk of flooding by categorising them into different Zones. These maps are based on a broad assessment of areas using digital mapping techniques and extracts from the EA flood maps for the site and its surroundings are included.

3.2.2 The EA flood map for planning shows river and sea flooding data only, extract in **Figure 3.1**, below full report provided in **Appendix B**, shows that the development area and its immediate surroundings are wholly located within EA Flood Zone 1 (unshaded areas).

Figure 3.1: Flood Map for Planning Extract



3.2.3 Zone 1 areas are defined in NPPF Table 1 as "land assessed as having a less than 1 in 1000 annual probability of river or sea flooding (<0.1%)" and all uses of land are considered appropriate in Flood Zone 1 as shown in Table 2 of the NPPF shown in **Figure 3.2.**

Figure 3.2: NPPF Table 2

Table 2: Flood risk vulnerability and flood zone 'incompatibility'

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✔	✔	✔	✔	✔
Zone 2	✔	Exception Test required	✔	✔	✔
Zone 3a †	Exception Test required †	X	Exception Test required	✔	✔
Zone 3b *	Exception Test required *	X	X	X	✔ *

Key:

✔ Exception test is not required

X Development should not be permitted

3.3 Surface Water

3.3.1 The EA's surface water flood map shown in **Figures 3.3**, identifies the surface water flood risk for the proposed site. The surface water flood zone for the site has been identified as being very low with instances of low to medium flooding identified in the vicinity of the balancing pond located adjacent to Nottingham Road, and filter drain network to the rear of the existing building.

Figure 3.3 Surface Water flood Map – Extents



3.3.2 Surface water flooding occurs when rainwater does not drain away through normal drainage systems or soak into the ground but lies on or flows over the ground instead.

3.3.3 The risk of surface water flooding has been categorised as very low for the proposed site, with low instances of flooding noted along Moor Lane which could be as a consequence of the roof drainage discharge directly on the highway which is compounded by a lack of capacity and/or insufficient maintenance.

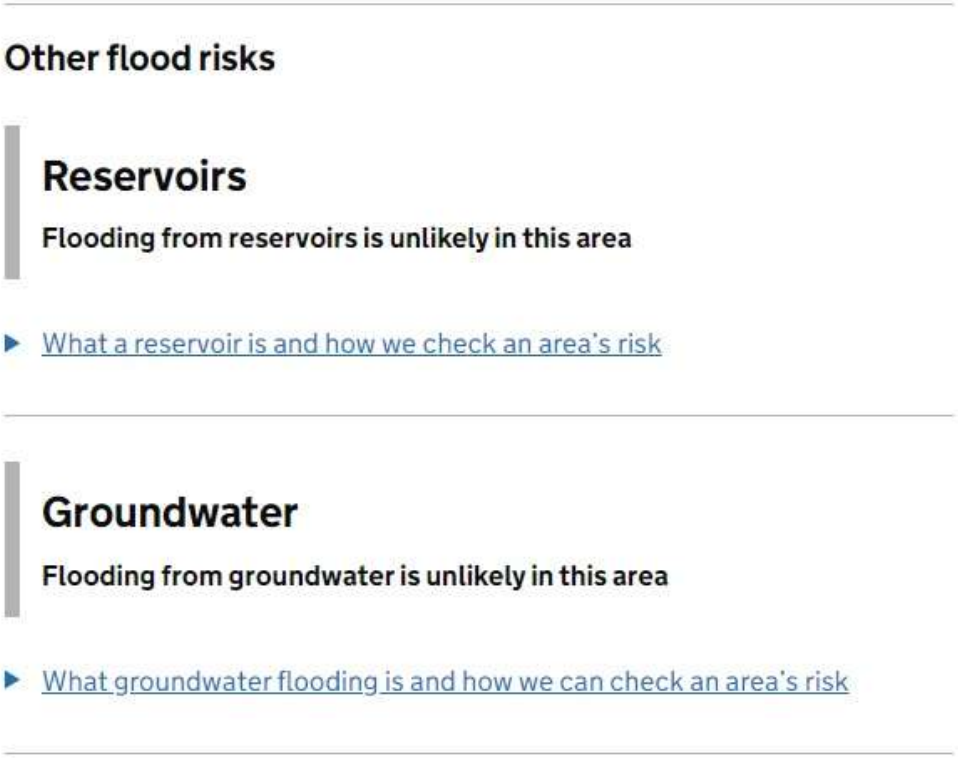
3.3.4 Post development the introduction of the proposed development will provide the opportunity for the introduction of more sustainable technologies that were not a requirement when the previous development was constructed.

3.3.5 Management of surface water is being considered as part of the development proposals and a preliminary drainage strategy is outlined within Section 6 of this strategy report.

3.4 Reservoirs and Groundwater

3.4.1 The EA's Other flood risks shown in **Figures 3.4** has identified that bot reservoir and groundwater flooding is unlikely in this area.

Figure 3.4 Other Flood Sources



3.4.2 Groundwater flooding typically results from heavy/prolonged rainfall causing the level of the groundwater table to rise, which may lead to emergence of groundwater at the surface or into underground features such as basements. Low lying areas of land with permeable underlying strata may be particularly susceptible.

4.0 SUMMARY

4.1.1 The site is considered to be at very low risk of flooding.

4.1.2 Minor instances of surface water flooding have been noted in the wider area, this is assumed to be linked to the unrestricted discharge of the previous development. As the proposed development will restrict the flows generated by the development using sustainable technologies surface water flooding should not preclude safe site development.

4.1.3 A preliminary drainage strategy is discussed in Section 6 which shows that post-development flood risks will not be increased due to the development plans.

4.1.4 Considering the above, overall flood risks to and from the site are considered to be low.

5.0 MANAGING SURFACE WATER

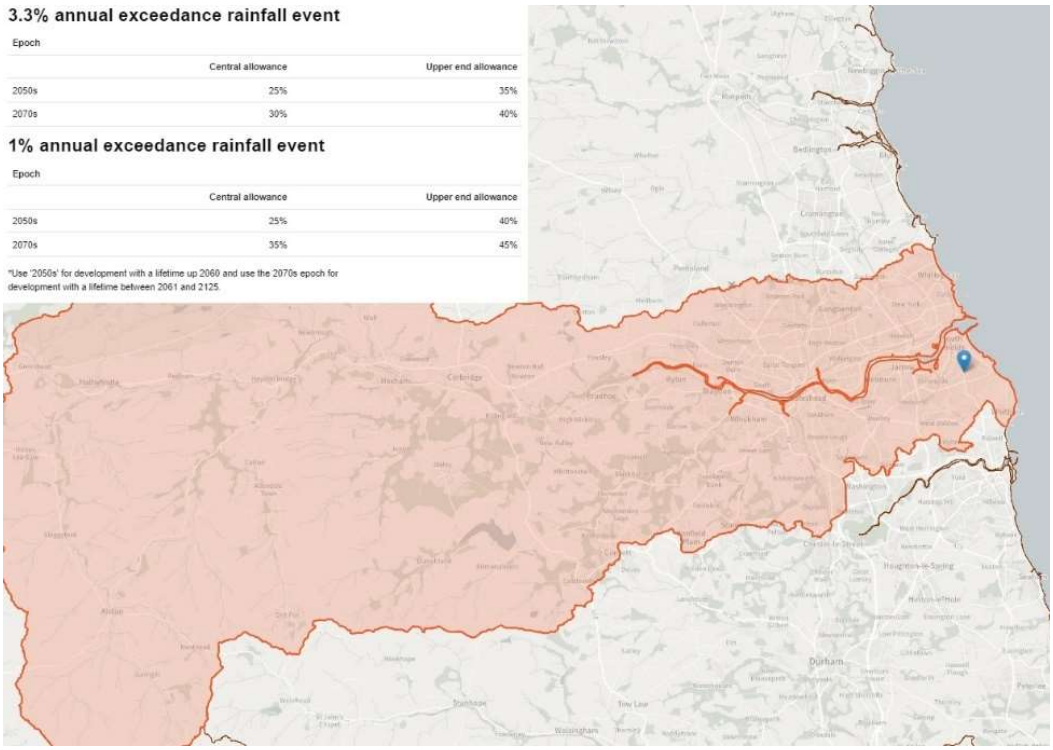
5.1.1 In accordance with the NPPF and SFRA, consideration should be given to natural water flows at the site. The development should not adversely affect flow or increase flood risk elsewhere, including increasing run-off rates. The disposal of surface water should be dealt with in a sustainable way and climate change should also be accounted for. The site drainage strategy is discussed in Section 6.

5.2 Climate Change

5.2.1 There is evidence to suggest that the climate is changing with sea levels predicted to continue to rise along with more frequent short-duration, high-intensity rainfall and more frequent periods of long-duration rainfall. The NPPF recommends that the effects of climate change be accounted for within any proposed drainage strategy or flood risk assessment (FRA), with consideration of the EA flood maps and local authority SFRA.

5.2.2 Increased rainfall or higher intensity short-duration rainfall may increase as a result of climate change. The .GOV website states that for the *Tyne Management Catchment peak rainfall allowances* which includes upper end climate change allowances of 40% for the 1 in 30-year storm (3.3%) and 45% for the 1 in 100-year event (1%), are therefore being allowed for within the new surface water drainage design to take account of climate change as discussed in Section 6.

Figure 5.3 Climate Change Allowances



5.3 Sustainable Drainage Systems (SUDS)

5.3.1 SUDS are a desirable way to manage surface water disposal within new developments and SUDS methods for surface water drainage management are discussed further within the SUDS Manual. When designing surface water drainage strategies priority should be given to disposal of surface water via infiltration drainage systems over (first) discharge to watercourses (second) prior to identifying a possible discharge to sewers.

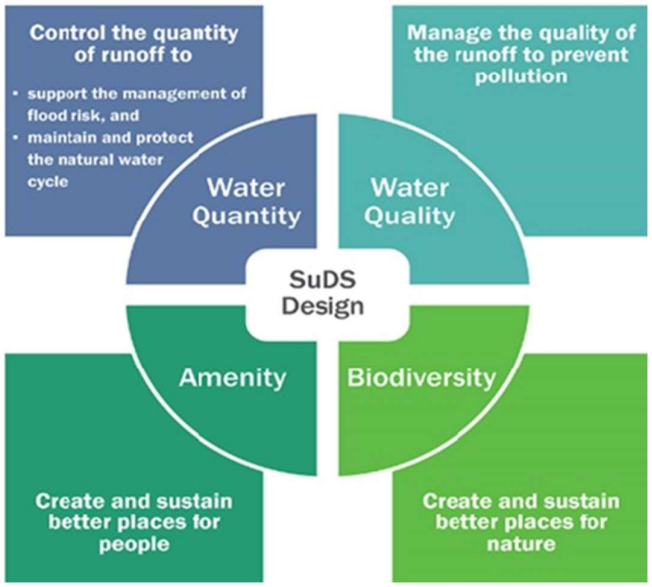
SuDS hierarchy

- Into the ground (infiltration)
- To a surface water body (rivers, watercourses, lakes, ponds, canals etc.)
- Into a surface water sewer, highway drain, or another drainage system
- Into a combined sewer

5.3.2 Following the SuDS hierarchy from the top, The potential for infiltration has been discounted due to the risk of potentially mobilising hydrocarbons within the existing ground, as the site has been used historically as a Petrol filling station for a number of years

5.3.3 As there are no water bodies in the vicinity of the proposed site the only available solution is to utilise the current site connection to the adopted sewer network. discussed in Section 6.

Figure 5.4 Four Pillars of SuDS



5.3.4 The proposed development will address the above 4 pillars of SuDS design criteria with the inclusion of a range of sustainable features through a comprehensive treatment train.

- **Water Quantity** will be strictly controlled to greenfield run off rates for the 1 in 100-year critical storm of up to 2 litres per second (a maximum discharge rate of 2 l/s has been applied to the proposed hydraulic calculations)

- **Water Quality** will be provided through the construction of permeable paving within the proposed car park providing the opportunity for both attenuation and treatment to take place, any flows remaining will be passed through an hydrobrake before communicating with the existing drainage network making use of the existing offsite connection.
- **Biodiversity** Raingarden planters should be considered at the proposed downpipe position to provide an element of biodiversity.
- **Amenity** The propose development is not considered a recreational destination as such the requirement for amenity space has not been applied to the development.

5.3.5 It is proposed to apply all the surface water flows generated by the development, at an attenuated rate to the existing outfall with a new hydrobrake chamber.

5.3.6 The proposed drainage strategy will aim to reduce discharge from the site to as close as possible to existing greenfield rates inclusive of an allowance for climate change.

6.0 DRAINAGE STRATEGY

6.1 Surface Water Drainage Strategy

6.1.1 Following completion of the development with the inclusion of permeable paving within the parking bays the level of post development impermeable area has been estimated to extend to approximately 0.065 hectares (650m^2)

6.1.2 The proposed site is currently classified as brownfield, and is anticipated to discharge into the offsite adopted network at an unrestricted rate however the South Tyneside Council Level 1 SFRA states that:

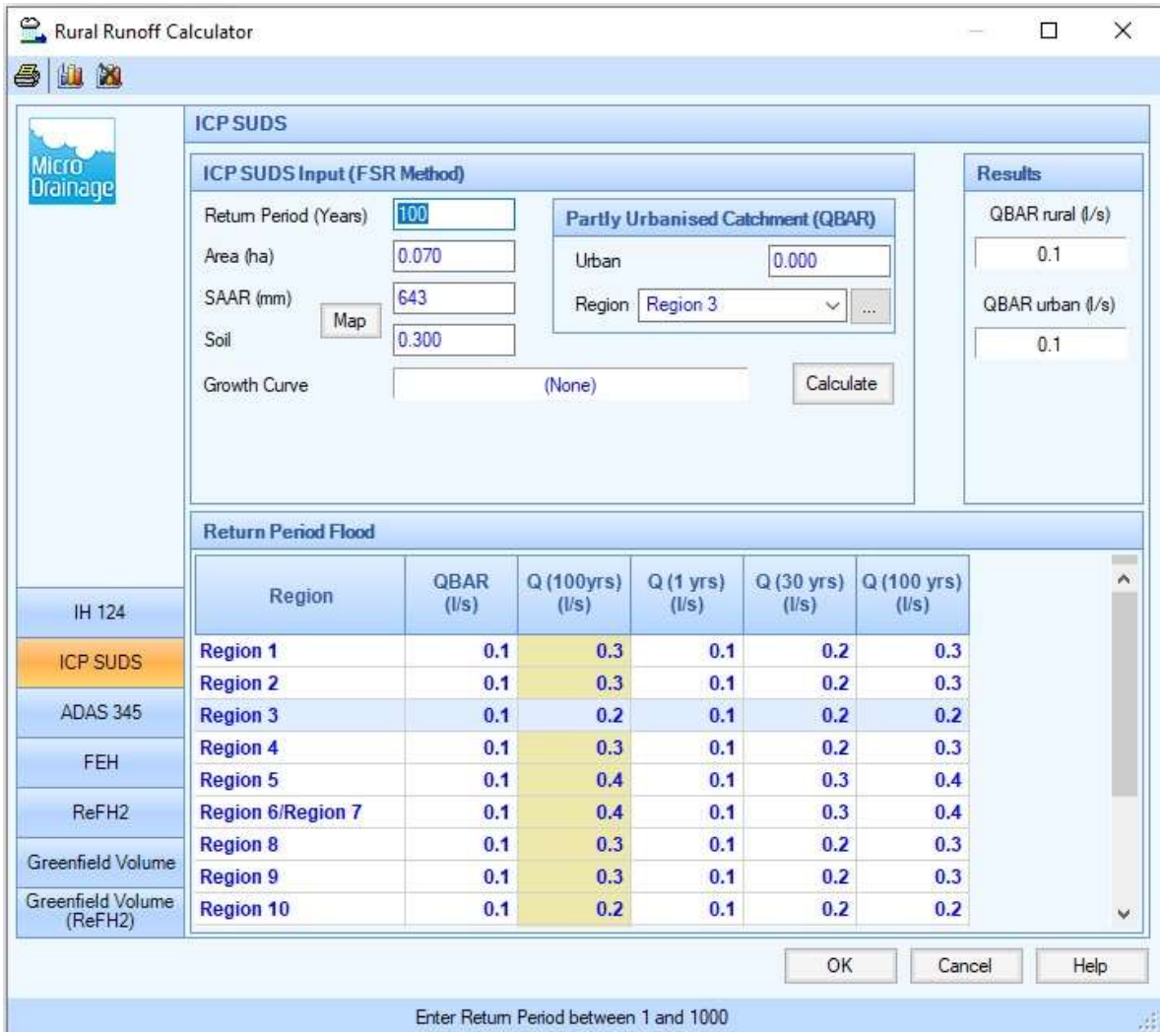
For brownfield sites, where current infrastructure may be staying in place, then runoff should attempt to mimic that of greenfield rates, unless it can be demonstrated that this is unachievable or hydraulically impractical.

6.1.3 The above requirement is further reflected within the, the non-statutory technical standards for sustainable drainage systems (March 2015) states that:

S3 For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100-year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

6.1.4 With the above in mind there are two methods for calculating the greenfield run-off rates the IH124 method and the ICP method. The IH124 method calculates the peak Greenfield run-off flow rates by correlation of the Soil Index Value, the Average Annual Rainfall and the Site Area (SOIL, SAAR and AREA). The IH124 Method should be used for sites in excess of 50 hectares and the resulting discharge is linearly interpolated for the required area. The ICP method uses the IH124 method and automatically interpolates the discharge for sites less than 50 hectares and therefore this is the method that has been used extract shown in Figure 6.1 below.

Figure 6.1 ICP SUDS Greenfield Flow Calculation



6.1.5 The mean annual greenfield run off rate for the site has been calculated as 0.2 l/s for the 1 in 100-year storm 0.2 l/s for the 1 in 30-year storm and 0.1 l/s for the 1 in 1-year storm event.

6.1.6 It is impossible to restrict flows to the above rates using modern flow control devices as such a maximum discharge rate from the development of 2 l/s has been used to inform the proposed design intent.

6.1.7 Attenuation will be provided on the site to ensure that the calculated greenfield run off rate for the 1 in 100-year storm event plus a climate change allowance of 45% does not exceed more than 2 l/s.

6.1.8 Flows generated by the proposed building will be discharged via a series of rainwater pipes into individual chambers located within the purposed paving around the site prior to discharge to the hydrobrake.

6.1.9 It is proposed that the areas of permeable surfacing will act as offline storage structure for the flows generated by the all-external areas.

6.1.10 Proposed Microdrainage outputs for all storms including the 1 in 30 year (3.33%) plus 40% climate change and the 1 in 100 years plus 45% climate change allowance are shown in **Appendix D**.

6.1.11 The site drainage network will be designed in accordance with current best practice to have sufficient capacity not to flood during the critical 1 in 30-year storm (plus 35% allowance for climate change) and also to constrain within the site the flood water generated for the critical 1 in 100-year storm event (plus 40% allowance for climate change). In this way the risk of off-site flooding, which could result in damage to other buildings and essential services, will be minimised and the risk of flooding elsewhere should not be increased as a result of the development proposals.

6.1.12 Using Sustainable drainage techniques it has been possible to avoid any exceedance occurring at the site for all storms up to and significantly beyond the 1 n 100-year storm plus 40% climate change allowance.

6.1.13 An indicative drainage strategy is shown in **Appendix C.**

6.2 Foul Flows

6.2.1 All foul flows relating to the development will re-use the connection from the previous sites use.

6.2.2 The drainage for the PFS is to remain in its current arrangement once a comprehensive CCTV condition survey has confirmed it is in a sufficient condition to be reused.

7.0 MAINTENANCE STRATEGY

7.1.1 SuDS components require good maintenance including inspections to identify performance issues and plan appropriate maintenance needs, checks on the operation and maintenance of the drainage system and landscape management. Therefore, it is intended that those responsible for the drainage within a development will be provided with an Operation and Maintenance Manual as part of the documentation provided under the Construction (Design and Management) regulations 2015 at the end of the construction works. Maintenance requirements that would be appropriate for this development, to be included in the document are outlined below.

7.1.2 All maintenance necessary will be undertaken, appointed and/or suitably managed by SRJ Energy.

7.1.3 The Drainage network and inherent SuDS have been designed with minimal maintenance in mind. The maintenance is generally of a 'common sense' approach and is to comprise:

7.1.4 Regular day to day care: - litter collection, grass cutting and checking the inlets and outlets where water enters or leaves a drainage feature.

7.1.5 Occasional tasks: - managing vegetation in wet areas (ponds, swales, etc.) and removing any silt that builds up in the drainage features.

7.1.6 Remedial work: -repairing damage when, and where, necessary.

7.1.7 Specific recommendations for each feature are provided in the following sections, and should be referred to in the first instance if there are any issues

Permeable Surfacing

7.1.8 The drainage scheme utilises permeable construction for the parking bays as offline storage structures, at the base of the stone build-up is a perforated pipe, which slowly collects the water and conveys it to hydrobrake chamber, via a network of catchpit PPIC's.

Maintenance schedule	Required action	Frequency
Regular maintenance	Litter and debris removal from permeable surface and access	Monthly (or as required).
	Remove weeds within joints of any permeable paving.	Monthly (at start, then as required).
	Trimming of any roots that may be causing blockages.	Annual (6monthly for the first year).
Occasional maintenance	Removal of sediment from catchpit.	Six monthly (or following significant rainfall event).
Remedial actions	Inspect inlets, outlets and inspection points for blockages, clogging, standing water and structural damage.	Monthly.
	Clear perforated pipework of blockages.	As required.
	Replace geotextiles and clean and replace filter media, if clogging occurs.	As required.
Monitoring	Inspect inlets, surfaces and perforated pipework for silt accumulation. Establish appropriate silt removal frequencies.	6 monthly.

Piped System

7.1.9 All pipes will be laid to the specified falls and installed along with the manufacturers' instructions and recommended ancillaries

Regular maintenance	Clean catch pits and manholes and the associated pipes system to remove sediments and debris accumulated during the summer	Annually (6monthly for the first year).
Monitoring	Inspect catch pits and manholes for signs of silt build up within the piped system.	6 monthly

Manholes and PPICs

7.1.10 Manholes are typically sized in accordance with Sewers for Adoption, which relates to the incoming and outgoing pipe diameters. However, as the system is not Adopted, PPICs have been used where manufacturer's limitations permit. Typically PPICs can be used for depths up to 3m and for pipe diameters up to 150mm.

7.1.11 Personnel access into PPIC chambers is not possible, and therefore rodding/jetting should be carried out from ground level. This is generally accepted as good practice and in accordance with good health and safety procedures. Where larger manholes, which could accommodate man access, have been included maintenance should also take place from ground level. Man access should be resisted and only used as a last resort.

Maintenance schedule	Required action	Frequency
Occasional Maintenance and Monitoring	Covers should be lifted and inspected for litter and debris to ensure that the runs are free-flowing.	3 Monthly (or as required).

Flow Control Device

7.1.12 The surface water flow off site is limited to Greenfield run-off rate. The flow is limited by a Hydrobrake Optimum MD-SHE-0064-2000-1200-2000). This is a proprietary system and will be installed in line with the manufacturers written instructions. Operation and Maintenance guidance is provided within the manufacturers' standard documentation.

APPENDICES

APPENDIX A – PROPOSED SITE LAYOUT DRAWING

N

MOOR LANE

FOOTPATH

MOOR AVENUE

FLATS/
WORKSHOP

GARAGE

GARAGE /
WORKSHOP

BIN
STORE

SHOP

IN

OUT

ID SIGN

CANOPY ABOVE

PUMPS

ATM

AIR AND WATER

BRICK WALL

26

168

172

176

2

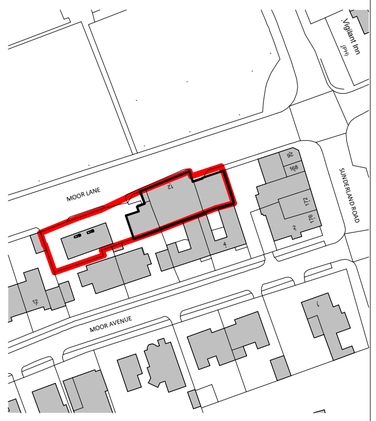
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12

GENERAL NOTES

1. This plan has been prepared for the submission of planning approval only.
2. Any advertisement shown is subject to a seperate application.

Property Schedule		
Application Boundary - Red Line	0.16 acres	0.07 hectare
Building Area Existing		
Existing Gross Building Area	327.34 m²	3523.47 ft²



Location Plan
1 : 1250

PLANNING

PROJECT
MOOR LANE GARAGE
MOOR LANE
SOUTH SHIELDS
NE34 6BZ

TITLE
EXISTING LAYOUT

CLIENT
SRJ ENERGY

JENNINGS DESIGN
8 Feast Field, Horsforth, Leeds, West Yorkshire, LS18 4TJ
www.jennings-design.com 01274 395422 office@jennings-design.com

Drawn:	Check:	Scale:	Date:
Author	Checker	As indicated	JULY 2023

Plan Number: 230860- 02

0 2.5 m 5.0 m 10.0 m
SCALE: 1:200



GENERAL NOTES

1. This plan has been prepared for the submission of planning approval only.
2. Any advertisement shown is subject to a seperate application.

DEMOLITION

EXISTING BUILDINGS TO BE DEMOLISHED, TANKS TO BE BROKEN OUT AND CANOPY TO BE DISMANTED. SITE TO BE CLEARED TO ENABLE REDEVELOPMENT.

HIGHWAYS

SITE ACCESS TO GENERALLY REMAIN AS EXISTING, PEDESTRIAN ACCESS AND ROAD ACCESS TO BE REVISED BY HIGHWAYS CONSULTANT.

BOUNDARY TREATMENTS

ALL BOUNDARY TREATMENTS ARE TO BE AS EXISTING, 3.5M HIGH BRICK WALL TO BE RETAINED AND MADE GOOD.

PROPOSED SHOP

SHOP TO BE NEW STEEL FRAMED CONSTRUCTION WITH MASONARY AND STONE FINISH. STORE TO HAVE ALUMINIUM GLAZING ON SIDE AND FRONT AND DOOR TO BE FITTED WITH SHUTTERS FOR NIGHT TIME CLOSURE.
BUILDING TO HAVE A FLAT ROOF WITH A MASONARY PARAPET, FINISHED WITH COPING STONES.
ALL MASONARY AND STONE WORK TO HARMONISE WITH LOCAL AREA.

FUEL INFRASTRUCTURE

2NO. 60,000 LITRE DOUBLE SKIN BELOW GROUND FUEL STORAGE VESSELS
2NO. 8 HOSE PUMPS
ALL PIPEWORK AND ASSOCIATED INFRASTRUCTURE IN ACCORDANCE WITH LATEST ISSUE OF THE THE BLUE BOOK

CANOPY

TRADITIONAL FORECOURT CANOPY SET WITH A MINIMUM 5M CANOPY HEIGHT TO ALLOW FOR ACCESS.
CANOPY TO BE FINISHED WITH WHITE ALUMINIUM PROFILED SOFFIT AND SMOOTH WHITE ALUMINIUM FASCIAS.
CANOPY TO BE FITTED WITH RECESSED LED SOFFIT LIGHTS AND TO ACHIEVE 100 LUX OVER THE TANKER STAND.

DRAINAGE

ALL EXISTING SURFACE AND FOUL WATER CONNECTIONS ARE TO BE REUSED AND ALL SURFACE WATER DISCHARGED FROM FORECOURT WILL BE CAPTURED WITH ACO (OR SIMILAR) DRAINAGED CHANNELS AND 10,000 LITRE CLASS 1 PETROL INTERCEPTOR.

LIGHTING

2NO. NEW FLOOD LIGHTS COMPRISING OF 4M IN HEIGHT WITH LED HEADS

SURFACE FINISHES:

Denotes macadam surfacing with a build up to be specified by an appointed engineer.

Denotes in-situ cast concrete paving.

Selected and approved blocked paving.

Property Schedule		
Application Boundary - Red Line	0.16 acres	0.07 hectare
Building Area		
Existing Gross Building Area	327.34 m²	3523.47 ft²
Proposed Gross Building Area	225.87 m²	2431.28 ft²
Parking Schedule		
Proposed Parking	Disabled Bay	1
Proposed Parking	Standard Parking Bay	3
Existing Parking		0

B	19.10.23	ATM ADDED AND GLAZING SIZE DECREASED	CS
A	31.08.23	PUMP CANOPY INCREASED AND PEDESTRIAN CANOPY REMOVED	CS

PLANNING

PROJECT
MOOR LANE GARAGE
MOOR LANE
SOUTH SHIELDS
NE34 6BZ

TITLE
PROPOSED LAYOUT

CLIENT
SRJ ENERGY

JENNINGS DESIGN
8 Feast Field, Horsforth, Leeds, West Yorkshire, LS18 4TJ
www.jennings-design.com 01274 395422 office@jennings-design.com

Drawn:	Check:	Scale:	Date:
CS	JHJ	1 : 200	JULY 2023

Plan Number: 230860- 04 (B)

0 2.5 m 5.0 m 10.0 m
SCALE: 1:200

APPENDIX B – FLOOD MAP FOR PLANNING

Flood map for planning

Your reference	Location (easting/northing)
<Unspecified>	**437577/564912**

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following:**

- bigger that 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence **which** sets out the terms and conditions for using government data. https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

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Environment Agency

Flood map for planning

Your reference
<Unspecified>

Location (easting/northing)
437577/564912

Scale
1:2500

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m

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APPENDIX C – INDICATIVE DRAINAGE STRATEGY

ALL LEVELS SHOWN ARE FOR INDICATIVE PURPOSES ONLY EXACT LEVELS TO BE CONFIRMED

KEY

- PROPOSED SURFACE WATER SEWER
- PROPOSED PERFORATED PIPE WRAPPED IN PERMEABLE MEMBRANE
- PROPOSED PERMEABLE SURFACING
- NEW SURFACE WATER INSPECTION CHAMBER 600mm DIAMETER
- H NEW SURFACE WATER HYDROBRAKE MANHOLE 1200mm DIAMETER

FOOTPATH

MOOR LANE

ALTERED CROSSING

GOODS IN

PLANT

DEMOLISHED BUILDINGS

CYCLE HOOPS

SIGN

PPIC1
CL 25.875
IL 24.875

1.000 150mmØ PIPE L2.201m LONG @ 1 in 64.14

FOUL DRAINAGE FROM NEW SHOP TO REUSE EXISTING FOUL CONNECTION FORM PREVIOUS SITE USE

SHOP
FFL - 26.025

1.001 150mmØ PIPE 5.182m LONG @ 1 in 64.14

PPIC2
CL 25.875
IL 24.685

2.000 150mmØ PIPE 10.45m LONG @ 1 in 81.3

PPIC3
CL 25.875
IL 24.814

CUSTOMER PARKING

ENTRANCE

CONTROL

HYDROBRAKE CHAMBER
CL 25.954
IL 24.604

OUT

IN

EXISTING CROSSING

TRADITIONAL CANOPY OVER

1.002 150mmØ PIPE 25.443m LONG @ 1 in 120
(EXACT GRADIENT TO BE CONFIRMED ONCE INVERT LEVEL OF OUTFALL IS ASCERTAINED)

T4

T3

EXISTING DRAINAGE PROVISION THROUGH THE PFS IS TO BE BE MAINTAINED WITH THE EXISTING NETWORK TO BE JETTED AND SURVEYED TO CONFIRM ACCEPTABLE CONDITION FOR REUSE

Air, Water and Vac.

EXISTING BRICK WALL TO BE RETAINED

25.800 25.350 25.050 25.500

DRAINAGE NOTES

1. ALL NON ADOPTABLE DRAINS UP TO 150 Dia. TO BE 'POLYPIPE uPVC UNDERGROUND DRAIN' MANUFACTURED IN ACCORDANCE WITH BS EN 1401-1OR EQUAL APPROVED.
2. ALL NON ADOPTABLE DRAINS WITH A PIPE Dia of 225 or 300 TO BE EITHER A PLAIN WALLED PLASTIC PIPE TO BS 1401-1 (POLYSEWER) OR A STRUCTURED WALL PLASTIC PIPE TO WIS-04-35-01 'POLYSEWER'. OR EQUAL APPROVED
3. ALL ADOPTABLE DRAINS UP TO 300 Dia. TO BE 'POLYSEWER' BY 'POLYPIPE' AND MANUFACTURED IN ACCORDANCE WITH THE WATER INDUSTRY SPECIFICATION WIS-4-35-01.
4. DRAINAGE PIPEWORK 400mm to 600mm DIA TO BE 'RIDGIDRAIN' HDPE BY POLYPIPE OR EQUAL APPROVED.
5. ALL PIPE LENGTHS NOT TO EXCEED 3m.
6. DRAINS TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
7. NEW INSPECTION CHAMBERS (IC) TO BE A MINIMUM OF 450MM DIA. EXCEPT FOR MINI ACCESS CHAMBERS WHICH MAY BE SMALLER, REFER TO M.H. SCHEDULE FOR ACTUAL SIZES.
8. ALL EXTERNAL RAINWATER PIPES (RWP) TO BE TERMINATED AT RODDABLE GULLIES. INTERNAL RWP's TO ARCHITECTS DETAILS BUT SHOULD ALLOW FOR RODDABLE ACCESS.
9. FOR ALL DRAINAGE ABOVE GROUND FLOOR SLAB INCLUDING SETTING OUT FOR PENETRATIONS THROUGH THE GROUND FLOOR SLAB REFER TO ARCHITECTS DRAWING & SPECIFICATIONS.
10. ANY DRAINS PASSING THROUGH SUBSTRUCTURE WALLS TO HAVE A MINIMUM 50mm CLEAR SPACE, RC LINTEL SUPPORT ABOVE & CEMENT FIBRE COLLARS EITHER SIDE TO PREVENT VERMIN ENTRY
11. ANY DRAINS CAST IN & PASSING THROUGH CONCRETE GROUND BEAMS TO HAVE A FLEXIBLE JOINT NOT MORE THAN 150mm FROM THE FACE OF THE GROUND BEAM. (FLEXIBLE JOINT TO MANUFACTURERS DETAILS) AND A MAXIMUM 600mm LONG ROCKER PIPER EITHER SIDE
12. ANY ALTERATIONS TO DRAINAGE PROPOSED BY CONTRACTOR TO BE SUBMITTED TO ENGINEER FOR APPROVAL PRIOR TO COMMENCEMENT OF WORK ON SITE. ANY REVISIONS ARE ALSO SUBJECT TO THE APPROVAL OF THE LOCAL BUILDING INSPECTOR.
13. ALL DRAINS RUNNING UNDER BUILDINGS TO HAVE A MINIMUM FALL OF 1:40 TOWARDS THE BUILDING EXTERIOR. PIPE TO BE ENCASED IN 100MM GRANULAR FILL.
14. COVER LEVELS SHOWN ARE APPROXIMATE ONLY AND SHOULD BE ALTERED TO SUIT FINISHED SURFACE LEVELS.
15. THE BEDDING SPECIFICATION FOR ALL ADOPTABLE DRAINS WHERE COVER IS GREATER THAN 1200mm SHALL BE TYPE 'S'....WHERE COVER IS LESS THAN 1200mm TYPE 'Z' SHALL BE USED
16. THE DEVELOPER/CONTRACTOR MUST SELF VET AND CERTIFY THAT THE DESIGN CRITERIA, MATERIAL STANDARDS AND WORKMANSHIP SPECIFICATIONS FOR THE PROPOSED SEWERS ARE IN ACCORDANCE WITH THOSE SET OUT IN 'SEWERS FOR ADOPTION 7TH EDITION'
17. PROPOSED COVER AND INVERT LEVELS TO BE CONFIRMED BY THE CONTRACTOR PRIOR TO ANY WORKS COMMENCING ONSITE

Rev	Date	Revision Details	By	Chk	App
P1	NOV 23	FIRST ISSUE	GRE		

Cora iHt

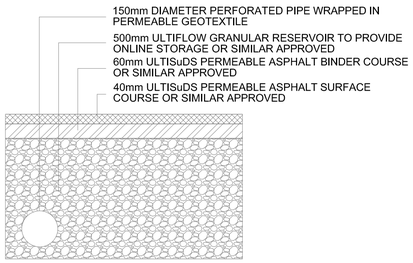
Client: SRJ ENERGY

Project: MOOR LANE

Title: INDICATIVE DRAINAGE ARRANGEMENT SHEET 1 of 2

Drawing No.	Revision
16-2193-100	P1

Scale	1:100 @ A1	Date	NOVEMBER 2023
Drawn	GRE	Chk	App

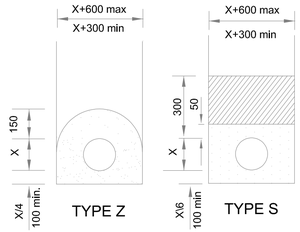


TYPICAL PERMEABLE SURFACING (PARTIAL INFILTRATION) DETAIL INCLUDING ONLINE STORAGE

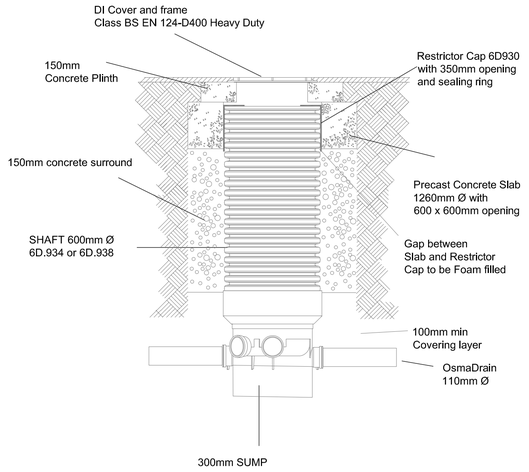
CONCRETE TO S.H.W CLAUSE 503.3 (iii)

GRANULAR MATERIAL TO S.H.W. CLAUSE 503.3 (i).

CLASS 8 MATERIAL TO S.H.W CLAUSE 503.3 (iv)

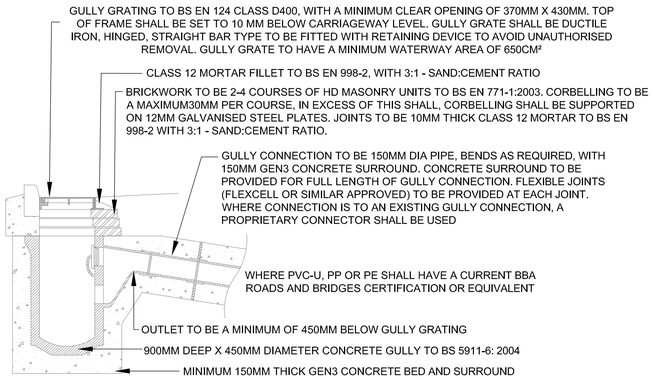


TYPICAL PIPE BED AND SURROUND DETAIL

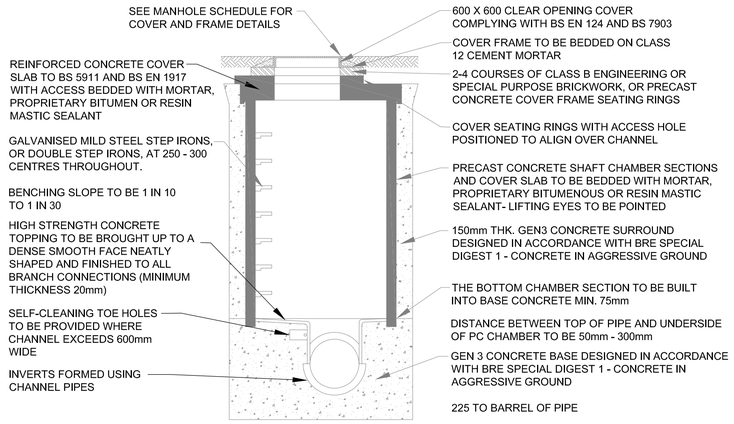


TYPICAL CATCHPIT CHAMBER DETAIL

non entry



ROAD GULLY DETAIL



TYPICAL TYPE 2 CONCRETE MANHOLE (PCC) DETAIL

MAX DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 0m - 3m

Rev	Date	Revision Details	By	Chkd	Appd
P1	NOV.23	FIRST ISSUE	GRE		

Client: SRJ ENERGY

Project: MOOR LANE

Title: INDICATIVE DRAINAGE ARRANGEMENT SHEET 2 of 2

Drawing No.	Revision
16-2201-100	P1

Scale	NTS @ A1	Date	NOVEMBER 2023
Drawn	GRE	Chk	App

APPENDIX D – MICRODRAINAGE CALCULATIONS

File	Checked by
Innovyze	Network 2020.1.3

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.345
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	17.100	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	PPIC1	15 Winter	1	+0%	30/15 Summer			
2.000	PPIC3	15 Winter	1	+0%	30/15 Summer			
1.001	PPIC2	15 Winter	1	+0%	30/15 Summer			
1.002	SMH1 HYDROBRAKE	15 Winter	1	+0%	30/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	PPIC1	24.898	-0.127	0.000	0.06			1.1	OK
2.000	PPIC3	24.831	-0.133	0.000	0.03			0.6	OK
1.001	PPIC2	24.742	-0.093	0.000	0.11			2.0	OK
1.002	SMH1 HYDROBRAKE	24.738	-0.016	0.000	0.10		6	1.6	OK

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File	Checked by
Innovyze	Network 2020.1.3

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Level Exceeded
1.000	PPIC1	
2.000	PPIC3	
1.001	PPIC2	
1.002	SMH1 HYDROBRAKE	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.345
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	17.100	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	PPIC1	30 Winter	30	+40%	30/15 Summer			
2.000	PPIC3	30 Winter	30	+40%	30/15 Summer			
1.001	PPIC2	30 Winter	30	+40%	30/15 Summer			
1.002	SMH1 HYDROBRAKE	30 Winter	30	+40%	30/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	PPIC1	25.482	0.457	0.000	0.13			2.5	SURCHARGED
2.000	PPIC3	25.480	0.516	0.000	0.06			1.0	SURCHARGED
1.001	PPIC2	25.478	0.643	0.000	0.21			3.7	SURCHARGED
1.002	SMH1 HYDROBRAKE	25.474	0.720	0.000	0.11		18	1.7	SURCHARGED

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Level Exceeded
1.000	PPIC1	
2.000	PPIC3	
1.001	PPIC2	
1.002	SMH1 HYDROBRAKE	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.345
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	17.100	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	PPIC1	30 Winter	100	+45%	30/15 Summer			
2.000	PPIC3	30 Winter	100	+45%	30/15 Summer			
1.001	PPIC2	30 Winter	100	+45%	30/15 Summer			
1.002	SMH1 HYDROBRAKE	30 Winter	100	+45%	30/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	PPIC1	25.560	0.535	0.000	0.19			3.8	SURCHARGED
2.000	PPIC3	25.557	0.593	0.000	0.11			1.9	SURCHARGED
1.001	PPIC2	25.555	0.720	0.000	0.41			7.3	SURCHARGED
1.002	SMH1 HYDROBRAKE	25.551	0.797	0.000	0.12		18	1.8	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Level Exceeded
1.000	PPIC1	
2.000	PPIC3	
1.001	PPIC2	
1.002	SMH1 HYDROBRAKE	

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File	Checked by
Innovyze	Network 2020.1.3

Online Controls for Storm

Hydro-Brake® Optimum Manhole: SMH1 HYDROBRAKE, DS/PN: 1.002, Volume (m³): 1.6

Unit Reference	MD-SHE-0064-2000-1200-2000
Design Head (m)	1.200
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	64
Invert Level (m)	24.604
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.0	Kick-Flo®	0.573	1.4
Flush-Flo™	0.282	1.8	Mean Flow over Head Range	-	1.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.5	1.200	2.0	3.000	3.0	7.000	4.5
0.200	1.7	1.400	2.1	3.500	3.3	7.500	4.7
0.300	1.8	1.600	2.3	4.000	3.5	8.000	4.8
0.400	1.7	1.800	2.4	4.500	3.7	8.500	5.0
0.500	1.6	2.000	2.5	5.000	3.9	9.000	5.1
0.600	1.5	2.200	2.6	5.500	4.0	9.500	5.2
0.800	1.7	2.400	2.7	6.000	4.2		
1.000	1.8	2.600	2.8	6.500	4.4		

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Storage Structures for Storm

Porous Car Park Manhole: SMH1 HYDROBRAKE, DS/PN: 1.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.9
Membrane Percolation (mm/hr)	1000	Length (m)	10.3
Max Percolation (l/s)	14.0	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	25.454	Membrane Depth (mm)	0

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