

Stormwater Drainage Strategy for:

Royle Barn Road, Rochdale, OL11 3DT.

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Signed



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CONTENTS

- 1. Introduction**
- 2. Description of Existing Site**
- 3. Description of Proposed Development**
- 4. Drainage Strategy**

Appendices



1.0 INTRODUCTION

Steve Morgan Associates Limited (SMA) were appointed to prepare the stormwater drainage strategy for the proposed development at Royle Barn Road, Rochdale.

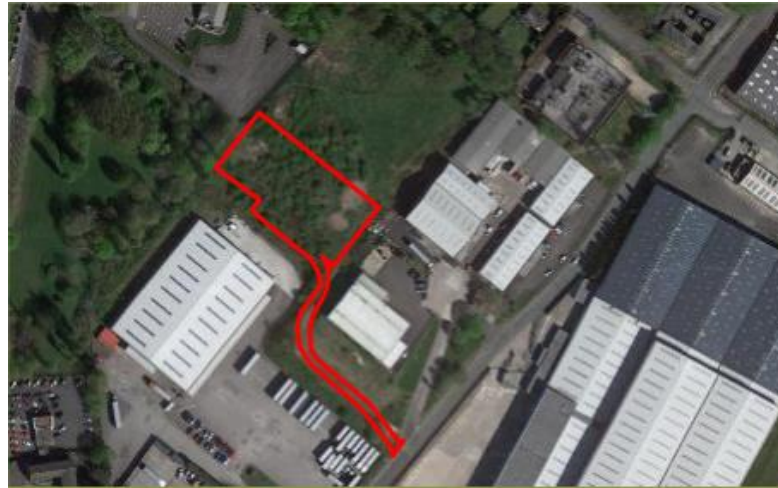


Figure 1
Location Plan

The purpose of this report is to present the stormwater drainage strategy for the proposed development.

2.0 DESCRIPTION OF EXISTING SITE

The site is located at:

Royle Barn Road, Rochdale, OL11 3DT.

The National Grid Reference for the site is 388220, 411208.

The site currently comprises an area of scrubland with access from Royle Barn Road to the south and is bounded to commercial properties and scrubland.

2.1 SITE SOILS AND GEOLOGY

The Soilscales online soils map viewer shows the site is underlain by freely draining, sandy soils.

The Geology of Britain online map viewer shows the superficial deposits beneath the site is Glaciofluvial Deposits, Devensian – Sand and gravel. The bedrock beneath the site is Pennine Lower Coal Measures Formation – Mudstone, siltstone and sandstone.

The Geology of Britain online map viewer shows borehole records located to the south-west of the site. The borehole records confirm the soils and geology as depicted by the soils and geology mapping.

2.2 SITE FLOOD RISK

Fluvial/Tidal Flooding

Environment Agency online Flood Map for Planning shows the site is located in Flood Zone 1, which is land outside of the 1 in 1000-year (0.1% Annual Exceedance Probability [AEP]) extent of fluvial (river) or tidal (sea) flooding, at 'low' risk.

The risk of fluvial flooding is assessed as negligible.

Surface Water Flooding

Environment Agency online flood mapping (Figure 2) shows a surface water flow pathway (low risk) orientated south-east through the site. Flood depth is up to >300mm and velocity is >0.25m/s. Based on a review of the Defra Hazard Rating Table/Calculation, the hazard rating is 0.225, which is 'Very low hazard – Caution'. The site would remain accessible by emergency services.

The risk of surface water flooding is assessed as negligible for most of the site, and low along the surface water flow pathway.

SITE FLOOD RISK (CONT...)



Figure 2

Environment Agency Surface Water Flood Map (accessed February 2025)

Groundwater Flooding

Nearby borehole records recorded groundwater levels between 4.70 and 2.60m b.g.l., which is likely to be associated with shallow (perched) groundwater associated with the underlying superficial deposits/aquifer.

The Geosmart 1 in 100-year groundwater flood risk map (Appendix 1.0) shows that the site is at 'negligible' risk of groundwater flooding and falls in Risk Class 4, where groundwater flooding is 'negligible unless unusually sensitive use'.

The soakaway testing (Appendix 2.0) encountered shallow groundwater from 1m b.g.l.

The risk of groundwater flooding is assessed as medium below ground and low at the surface.

2.3 EXISTING SITE DRAINAGE

The 0.49ha site is comprised of an area of scrubland, with access from Royle Barn Road to the south. The site is underlain by permeable soils and superficial deposits (sands and gravels).

Nearby borehole records recorded groundwater levels between 4.70m and 2.60m below ground level.

Soakaway testing demonstrated low infiltration potential due to the presence of shallow groundwater.

It is likely that drainage is predominantly via infiltration to the superficial deposits, with some infiltration to the bedrock. Where the soils and superficial deposits become saturated after prolonged or an intense rainfall event, rainfall may shed overland, following the topography south, away from the site.

3.0 DESCRIPTION OF PROPOSED DEVELOPMENT

Subject to approval of planning permission(s), the site is to be occupied by a battery energy storage facility. The overall site area to be drained is 900m², of which, 135m² is roof area and 765m² is access road and court. As shown on Patrick Parsons drawing reference ROY-PPC-00-XX-DR-C-0211 rev P5 (Appendix 3.0). Reference will be made within the report to two access road. The main access road is that leading from the public highway and is to be stone finished. The second access road is the internal access road which has a tarmac finish. It should be noted that this was not an original design proposal and was a site change.

4.0 STORMWATER DRAINAGE STRATEGY

The drainage design will be undertaken in accordance with CIRIA C753. The proposed drainage scheme will follow the SuDS train with rainwater treated as near as possible to the source. The design is based on the infiltration rate of 8.92×10^{-6} , obtained from BRE365 testing carried out by Patrick Parsons. This value has been used in all calculations.

It is proposed that, the main site discharges to filter drains. The design has been based on the site area and the calculated rainfall for a 1:100-year storm event plus 40% climate change. Exceedance flows have been designed, as far as is practically possible, to be dealt within the SuDS facilities on site i.e. French drains. The SuDS design philosophy can only be applied to the principle of the SuDS requirements. It is not considered feasible to accommodate excessive and unknown flows within the parameters of a SuDS scheme. This therefore requires additional facilities to collect and safely discharge these flows from the site.

The overall proposal relies on permeable surfaces to all external works where possible, including a stone finish to the access road off the public highway. Site changes resulted in a tarmac finish to the internal access road. ***It is noted that the as-built reflects an impermeable surface to the internal access road. A channel drain is therefore proposed which will discharge to the attenuation tank.***

The use of permeable paving is therefore not included within this design. ***No gullies are proposed on the site within this development.***

For the revised drainage layout, reference should be made to drawing reference GA-07 rev I and GA-08 rev G (attached)

STORMWATER DRAINAGE STRATEGY (CONT....)

The access road is a temporary track for the use of the site operations. The road is proposed to be finished in a permeable stone finish. The road will have a cross fall of approximately 1:40. To avoid flow from the site discharging to the road, a channel drain will be located at the junction with the public highway and connected to the existing drainage network. It may be considered that the channel drain could discharge to a soakaway within the site subject to suitable porosity tests. The area discharging into the channel drain will be minimal and should result in a small soakaway. It is our understanding that the intention is for the road to be stone surfaced and self draining based on information agreed on site.

It is understood that the existing access road from the public highway is temporary as a new access road would be installed at a later date to accommodate future development.

Due to the issues with groundwater, sub-surface flows and surface flooding, land drains and a channel drain has been included in the proposal to assist with collecting short term flooding and discharging away from the site. The land drains have each been designed to drain 140m². The land drains have been extended to a lower level to interrupt glacial flows at low level report on site. Both land drains have been designed to perform to a 1:200-year storm or a 1:100-year storm plus 40% climate change. The 1:200-year storm is considered to be adequate for exceedance flows.

A channel drain has also been proposed as a further cut off for flows in normal storm events.

Exceedance flows have also been catered for with the addition of an attenuation tank which will discharge away from the site via a pump. The method of design is based on the EA Defra design. The attenuation caters for the full 900m² of the impermeable area of the site. The design is based on a 1:100-year storm event plus 40% climate change.



STORMWATER DRAINAGE STRATEGY (CONT....)

The attenuation tank will be required where flows exceed the 1:100-year storm event and will be directed via perforated pipes in the land drains to the tank. Flow discharge should be limited to 5 litres per second via a hydrobrake. Allowance should be made for access to pump for regular maintenance as it is likely that the attenuation tank will only be required in exceedance flows or if the soakaways fail or reduce in capacity over the period of the development. Under normal flow events, the soakaways will provide the primary source of discharge of rainwater. Attenuation tanks have been based on Wavin or similar approved plastic crates with a volume potential of 95%.

It is noted that the LLFA have commented on the location of the attenuation tank and the potential for using the south-east corner of the site for a SuDS feature. The Patrick Parsons drainage strategy identifies one area where porosity was possible, albeit at a very low rate. This does not correspond to the area where the LLFA suggest a SuDS feature. There were also significant issues with groundwater in this area when the site was originally under construction. The concern with this area was the potential use of a large swale or pond which may collect water from unknown sources and potentially flood the site directly adjacent to the road and the equipment. The site was subject to several inflows which were from unknown sources, potentially adjacent units. It remains our opinion that the suggested location was not suitable for a SuDS feature based on the documentation that we have and the site reports.

Further comment was made by the LLFA on the location of the attenuation tank. This was a site decision, however, it is not considered that the attenuation tank could have been located elsewhere at the time it was constructed. It became apparent that the location of the tank was the only suitable area for an excavation of this size. With regard to pipework, I understand that this is all installed. As far as is practically possible, the pipework has been taken outside the structural footprint. Remedial works undertaken by the current contractor have generally removed drainage associated with the tank from beneath equipment.



STORMWATER DRAINAGE STRATEGY (CONT....)

The potential for replacement of the plastic crates has been considered, particularly due to their location beneath the equipment. The design life of the plastic crates is stated by the manufacturers as 50 years. Replacement would only be required should the crates silt up to the extent that they are no longer acting as designed. Reference is made to 'Siltation and SuDS – Myth or Reality' prepared by Steve Wilson and David De Rosa (attached as Appendix 8.0). The report states that the level of siltation could drop by 10% over a 59 year period. This loss of volume has been accounted for in the calculations. It is also considered that the plastic crates will exceed the design life of the site and the requirement to replace the crates whilst the site is in service is highly unlikely.

A separate design has been carried out for a soakaway to collect 500m² of the total site area. The soakaway is required to collect water drained from the base of the retaining wall located to the south-west boundary of the site, in order to prevent pore water pressure, build up. The soakaway must therefore be located outside the boundary of the main site (addressed in the soakaway location report – see Appendix 4.0). The design has been based on a 100-year storm event plus 40% climate change.

Flooding has already been experienced on the site due to external issues, and we have therefore provided what we consider to be the most practical solution for dealing with an unknown quantity of water. The only way to deal with this is to have a mechanism for constant removal, i.e. pumping. The attenuation tank would only come into use for storm events greater than 1:100 year plus 40% climate change. Whilst the issue of exceedance has been considered, the proposal avoids excess rainwater discharging to surrounding sites and thus only transferring the issue.



STORMWATER DRAINAGE STRATEGY (CONT....)

The proposed sheet piled retaining wall will contain a drainage medium to the rear with weepholes along the length of the wall at maximum 1200mm centres. This will relieve pore water pressure behind the wall. The perforated pipe to the rear of the retaining wall will discharge at 2 locations into the shallow 0.8m deep soakaway. The soakaway depth has been kept to a minimum to avoid issues with the design of the retaining wall.

The LLFA have commented on the use of a soakaway to the south west corner of the site to accept the discharge from the rear of the retaining wall. The only information we have on potential porosity is from the Patrick Parsons drainage strategy which suggests very low porosity in the main area of the site, but does provide a figure relating to an area which had porosity potential, albeit low. The rear of the retaining wall has to be drained. The risk of overflow from this soakaway is considered low and the volume of water that will be collected is also relatively low. The soakaway will only collect rainwater that builds up as pore water pressure behind the wall. The issues with groundwater within the boundary of the site were considered to preclude the use of soakaways within the site other than the proposal to self drain the access road from the public highway into the site (See DR-08).



5.0 CONCLUSIONS

It is acknowledged that the proposal differs from the original proposal set out at planning stage. The information provided in the original drainage strategies was inconsistent. The Patrick Parsons report states that soakaways would be a suitable method of disposing of rainwater within the site. The Enzygo drainage strategy reference CRM.349.013.HY.R.001.B dated July 2021 states that infiltration is not a suitable means of disposing of rainwater due to the presence of shallow groundwater.

The extent of the perched water table and the subterranean water flows encountered during the construction of the perimeter retaining walls resulted in a substantial change of design to accommodate the flows. Whilst both the Enzygo and the Patrick Parsons reports relied on data obtained from relevant datasets, the extent of the subterranean water could not be established by these methods. Subsequent investigations undertaken by the original developer located the water levels and locations within the site resulting in a change to the original drainage strategy.

The results of the subsequent investigation indicated that unknown volumes of water were entering the site in the eastern half of the site. The flows were then extending beneath the site towards the perimeter at the location of the retaining wall. The volumes encountered in January 2025 resulted in the collapse of the earth retaining wall. (See report Appendix 7) Whilst it is acknowledged that the volume of rain encountered in late 2024 and early January 2025 was higher than normal, this further demonstrated that the soil did not have the capacity for infiltration. It was therefore proposed that the rainwater was collected on site and pumped away at a rate comparable to greenfield run off. Where possible, and where the soil was proven to have infiltration capacity, soakaways were utilised. The soakaway located in the south-western corner of the site has been used to reduce the pore water pressure on the rear of the retaining wall.

It is also considered likely that flows from adjacent sites are discharging to the site, again, the volumes of which cannot be established.



CONCLUSIONS (Cont.....)

Adhering to the original drainage strategy would not have enabled the site to be developed.

The revised design considers the environmental benefits of permeable paving and addresses the potential issue of the removal of the plastic attenuation crates.



APPENDIX 1.0

Groundwater Flood Risk Map



APPENDIX 2.0

Soakaway Test Results



APPENDIX 3

Patrick Parsons Drawing: ROY-PPC-00-XX-DR-C-0211 rev P5



APPENDIX 4

Soakaway Location Report



APPENDIX 5

Enzygo Drainage Strategy



APPENDIX 6

Patrick Parsons Drainage Strategy



APPENDIX 7

Internal drainage report



APPENDIX 8

Siltation Report

