

**Proposed Educational Development
St. Michael's ALC Site, Carlton Road, Barnsley
Drainage Impact Assessment**

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1. INTRODUCTION

- 1.1 Sanderson Associates (CE) Ltd have been appointed by Barnsley Metropolitan District Council to undertake a Drainage Impact Assessment for a proposed educational redevelopment at a site on Carlton Road, Barnsley. The location of the site is shown on drawing 5534/001 included in Appendix A.
- 1.2 This assessment describes the drainage of the current site together with a preliminary assessment of the possible drainage requirements and measures to ensure the development would not increase surface water run off from the site.
- 1.3 Consultation with Yorkshire Water has taken place to establish the locations of any adopted sewers in the vicinity of the site along with any potential outfall locations and discharge restrictions. To date we have only received the locations of adopted sewers in the area. The consultation response is contained within Appendix B.
- 1.4 Consultation with Environment Agency has taken place. The consultation response is contained within Appendix B.
- 1.5 A separate Flood Risk Assessment has been undertaken for this development in August 2009.

2. EXISTING SITUATION

- 2.1 The site is approximately 10.88Ha (108,766m²) and is currently occupied by St Michael's Catholic & C of E School, Edward Sheerien School and St. Dominic's Catholic Primary School with associated buildings, car parking facilities, sports facilities and play areas. The levels on site vary from 68.00m AOD at the North of the site to 84.40m AOD to the South of the site. Existing site contours are shown on drawing 5534/002 contained within Appendix A which is based upon topographical survey.
- 2.2 The site is bounded to the South and East by the Carlton industrial estate and to the North and West by residential properties. The B6132 Carlton Road also runs along the Western Boundary
- 2.3 Vehicular access to the site is from two access point off Carlton Road to the east side of the site, the access area also currently accommodates a bus waiting areas associated with the schools.
- 2.4 The existing average grade across the site from North East to South West is approximately 1 in 28.
- 2.5 The existing site as shown on drawing 5534/001 contained within Appendix A has an area of 108,766m² (10.88Ha) with 34,800m² (3.48Ha) being impermeable and the remaining 73,966m² (7.40Ha) being permeable. The site is therefore 68% permeable

- 2.6 The current estimated surface water run off rate from the existing site topographical survey has been assessed using the Micro Drainage design suite, WinDES. The estimated run off rate is 235 l/s for a 1 in 1 year return period for an impermeable area of 3.48Ha. The WinDES output files are contained within Appendix C. The surface water run off from the impermeable and roof areas outfall into the existing 375mm diameter surface water sewer located in Carlton Road. There are no other known outfalls from the site.
- 2.7 There are also a number of minor water courses in the vicinity of the site. A small watercourse/drain runs west to east 150m to the southern boundary of the site, this watercourse is culverted under the existing Carlton Industrial Estate. A small unnamed watercourse runs approximately 0.3 miles to the North East of the site and un-named artery of the River Dearne runs approximately 1.4 miles to the east of the site.

3. CONSULTATIONS

- 3.1 As part of this Drainage Impact Assessment, Yorkshire Water and the Environment Agency have been consulted. The correspondences received are included in Appendix B.
- 3.3 The adopted sewer map contained with the response from Yorkshire Water shows that numerous sewers can be found in the vicinity of the site. These include:
- A 300mm diameter concrete surface water sewer runs from South to North under the B6312 Carlton Road to the West of the site. This sewer increases to a 375mm diameter concrete pipe as it runs North.
 - A 150mm diameter Vitruvius clay combined sewer runs from South to North through the residential properties at the western boundary of the site. This sewer also increases in size to a 225mm diameter concrete pipe as it runs North.
 - A 375mm diameter concrete combined sewer runs from West to East and crosses the site at the Northern boundary, under the existing tennis court.
- 3.4 Depth information has not been provided for any of the manholes in the vicinity of the site.
- 3.5 We await further consultation response at the time of writing this assessment from YW to formally confirm acceptable points of discharge and rates of discharge. However our existing site assessment provides a total discharge rate into the existing sewer system.

- 3.6 The Environment Agency response confirmed that they hold no record of past flood events for this area and have no record of any watercourses on or abutting the site.
- 3.7 The Environment Agency state that if the existing site drains to a public sewer. The run off from the proposed development should be attenuated to provide 30% reduction in the final surface water discharge to the public sewer, compared with the existing outflow prior to redevelopment.
- 3.8 The Environment Agency also state that storm water storage facilities should be provided to accommodate the flood volume for a 1 in 100 year return period plus 20% for climate change without causing any flooding to buildings or adjacent land.
- 3.9 We have also confirmed via the Environment Agency Website that the site is not located within an Environment Agency Groundwater Protection zone.

4. PROPOSED DEVELOPMENT

4.1 General Drainage Considerations

- 4.1.1 The proposed development is for the demolition of the existing buildings and the construction of an Advanced Learning Centre and sport facilities including a football pitch, tennis courts, a cricket pitch and athletics track. There will also be car parking and public transport facilities associated with the development. The proposed site area to be developed is approximately $108,766\text{m}^2$ (10.88Ha)
- 4.1.2 On assessing the proposed site layout, the overall impermeable area of the site is estimated to be $29,159\text{m}^2$ (2.92ha) and the permeable area is estimated be $79,607\text{m}^2$ (7.96ha). Therefore there is a proposed decrease in impermeable areas of 16%.
- 4.1.3 It is assumed that there is private drainage within the site, but no evidence of their location has been provided. It can be assumed that because the site has been developed overtime with additional facilities constructed during the course of the sites operational life, it can be said that the drainage onsite has also been upgraded and added to in line with the growth of the site. Therefore it can be assumed that the current drainage on site has not been designed to a deliberate strategy.
- 4.1.4 The foul drainage should be designed in accordance with Sewers for Adoption 6th Edition and procured through a Section 104 Agreement with Yorkshire Water if it is proposed to be adopted. The surface water drainage system in any case should be designed not to flood in a 1 in 30 year storm event and any flood waters arising from a 1 in 100 year event are contained within the site so to not increase the risk of

flooding elsewhere, in agreement with the Flood Risk Assessment for this site.

- 4.1.5 Further investigation of the college site soil strata will need to be carried out to determine if the use of soakaways or other infiltration technique as a form of drainage are feasible.
- 4.1.6 Soakaways, if feasible due to ground conditions are the preferred method of drainage for the proposed site as they are the most sustainable form of drainage to mimic the Greenfield run off rate for the site.
- 4.1.7 If site investigation confirms that soakways are not feasible then a positive outfall into the existing YW system should be utilised (as the existing site does).
- 4.1.8 As the site has no abutting watercourses a drainage system design using a positive restricted outfall into a nearby watercourse would be unfeasible.

4.2 Proposed Foul Drainage

- 4.2.1 Yorkshire Water (YW) have yet to confirm that they can accommodate the proposed foul drainage into the local system. As the site is currently occupied by three educational facilities it can be assumed that the proposal will not generate higher levels of waste than under present conditions and that existing outfalls will be utilised for the re-development.

4.3 Proposed Surface Water Drainage

4.3.1 Piped discharge of the surface water drainage from this site should *only be made into the adopted sewer system* if there is no other sustainable drainage outfall available. There are several alternative SUDS solutions for a site of this size and the descriptions and likely feasibility on this site are discussed in this section.

4.3.2 As stated by the Environment Agency there is a requirement for a 30% reduction in discharge of surface water. There is currently an existing discharge of 235l/s from the site. In line with the Environment Agency requirement this should be reduced by 30% to 164l/s.

4.3.3 The site proposals reduce the impermeable areas by upto 16% by design with any attenuation reducing by a further 14%.

4.4 Storage of Roof Drainage (Rainwater Harvesting)

4.4.1 Storage of Roof Drainage (Rainwater Harvesting) is feasible for the development as this could be incorporated into the design of the buildings and can assist in providing water supplies for flushing of toilets etc within the buildings. However, Green Roofs are more viable on flat roofs and any such provision of green roofs would more than likely put restrictive additional construction cost and maintenance implications for the developer and eventually the property owners and are considered to outweigh the benefits of a green roof system. There is also an aesthetic compromise with these types of SUDS systems which in Planning Terms may not be acceptable.

4.4.2 In conclusion, it is considered that Green Roofs are not a viable option for inclusion in a drainage strategy for this site.

4.5 Infiltration

- 4.5.1 As stated previously a ground investigation will need to be carried out to gauge whether the soil strata would be suitable to accept this method of drainage.
- 4.5.2 In conclusion, it is considered that further investigation will be needed to confirm whether infiltration SUDS is a viable option for this site.
- 4.5.3 If SUDS are viable then roof drainage should discharge directly into soakaways situated a minimum of 5m from any existing or proposed structure on site. Roof drainage is not required to pass through a petrol interceptor.
- 4.5.4 Car park and hard standing areas should pass through a suitable petrol / oil interceptor before outfall into any soakaways.

4.6 *Attenuate rainwater in ponds and open water features.*

- 4.6.1 Attenuation in open ponds and water features before outfall into the public sewer poses a concern with regard to public and pupil safety, Careful consideration must be taken before the implementation of such a system.
- 4.6.2 Due to the open nature of the site surroundings it would be feasible to accommodate a balancing pond which could be designed as a dry basin which would only be required for water storage during a extreme storm event such as a 1 in 30 or 1 in 100 year event including climate change allowance.

- 4.6.3 In conclusion, it is considered that attenuation in ponds and open water features are a viable option for inclusion in a drainage strategy for this site, and should be considered as part of the detailed drainage design for the site. If soakaways are not viable then this type of sustainable drainage should be used.

4.7 *Attenuate rainwater by storing in tanks or sealed water features*

- 4.7.1 Attenuating the surface water run off into oversized pipes or sealed tanks underneath the proposed hardstanding or sport field areas is considered to be feasible. The risk of pollution can be mitigated by passing the highway and hard standing drainage through an oil interceptor before it outfalls into public drainage.
- 4.7.2 This form of storage could be from pre cast concrete culverts or other techniques such as Storm-cell under public open space to achieve the required storage.
- 4.7.3 This option should only be used if open storage areas are not deemed *feasible by the approving authority.*

5. CONCLUSIONS AND RECOMMENDATIONS

- 5.1 The current proposal is for the site to be re-developed as an educational facility.
- 5.2 The proposals decrease the impermeable area on this site by 5,641m² (0.56Ha), therefore there will be a decrease in the volume of surface water run off from this site by approximately 16% just by the redevelopment.
- 5.3 Surface water run off from car park and hardstanding must pass through a suitable petrol interceptor to prevent the passage of pollutants, into either the ground or public sewer (whichever drainage system is ultimately used).
- 5.4 The preferred method of drainage of this site is by soakaways.
- 5.5 A ground investigation will need to take place to see whether soakaways are feasible for this site.
- 5.6 If soakaways are not feasible due to ground conditions, then the proposed drainage should be restricted to 164l/s, (subject to YW approval) and attenuated by means of open ponds or underground storage tanks.
- 5.7 As stated previously Yorkshire Water (YW) have yet to confirm that they can accommodate the proposed foul drainage into the local system. As the site is currently occupied by three educational facilities it can be assumed that the proposal will not generate higher levels of waste than under present conditions and that existing outfalls will be utilised for the re-development.

- 5.8 It is concluded that the site can be designed and drained without detrimental impact to the adjoining properties or land uses, and provide significant betterment to the existing site drainage scenario.

APPENDICES

APPENDIX A

Drawings