

Trinity Academy, Barnsley

Flood Risk Assessment and Drainage Strategy Report

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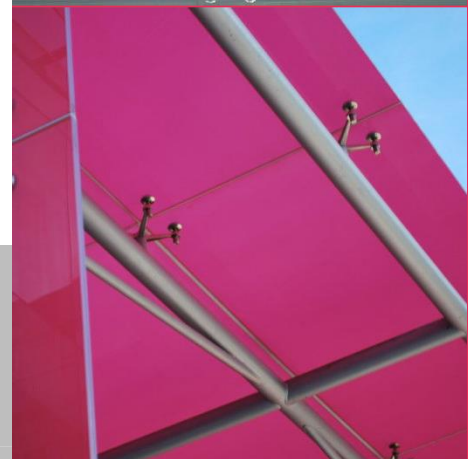
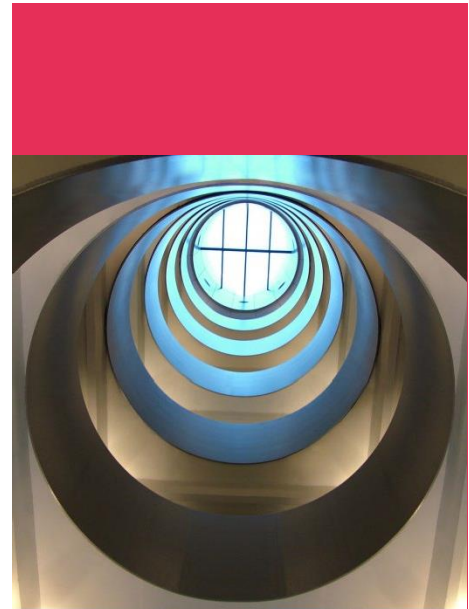
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Proposals contained or forming part of this report represent the outline design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material derivation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

Where the proposed works, to which this report refers, are undertaken more than twelve months following the issue of this report Curtins shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Curtins.

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References

- Updated National Planning Policy Framework (NPPF) 2019 – Section 14
- National Planning Guidance (NPG) GOV.UK – Guidance - Flood Risk and Coastal Change Site Specific Flood Risk Assessment
- Barnsley M.B.C Strategic Flood Risk Assessment – (JBA) 2011 (SFRA)
- Barnsley M.B.C Preliminary Flood Risk Assessment 2011 (PFRA)
- Barnsley M.B.C Local Flood Risk Management Strategy 2017
- Geo-Environmental Assessment Waterman Infrastructure & Environment 2020

Appendices

- Appendix A - Redline Planning Plan & Site Development Proposal Plan
- Appendix B – Topographical and Drainage Survey
- Appendix C - Environmental Assessment
- Appendix D – Utilities Layout and CCTV survey

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- Appendix F – Surface Water Layouts & Details
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- Appendix J – Foul Water Layout

This report is prepared following the standard section format and order of the Planning Practice Guidance GOV.UK - Flood risk and coastal change site specific flood risk assessment: Checklist

1.0 Development Site and Location

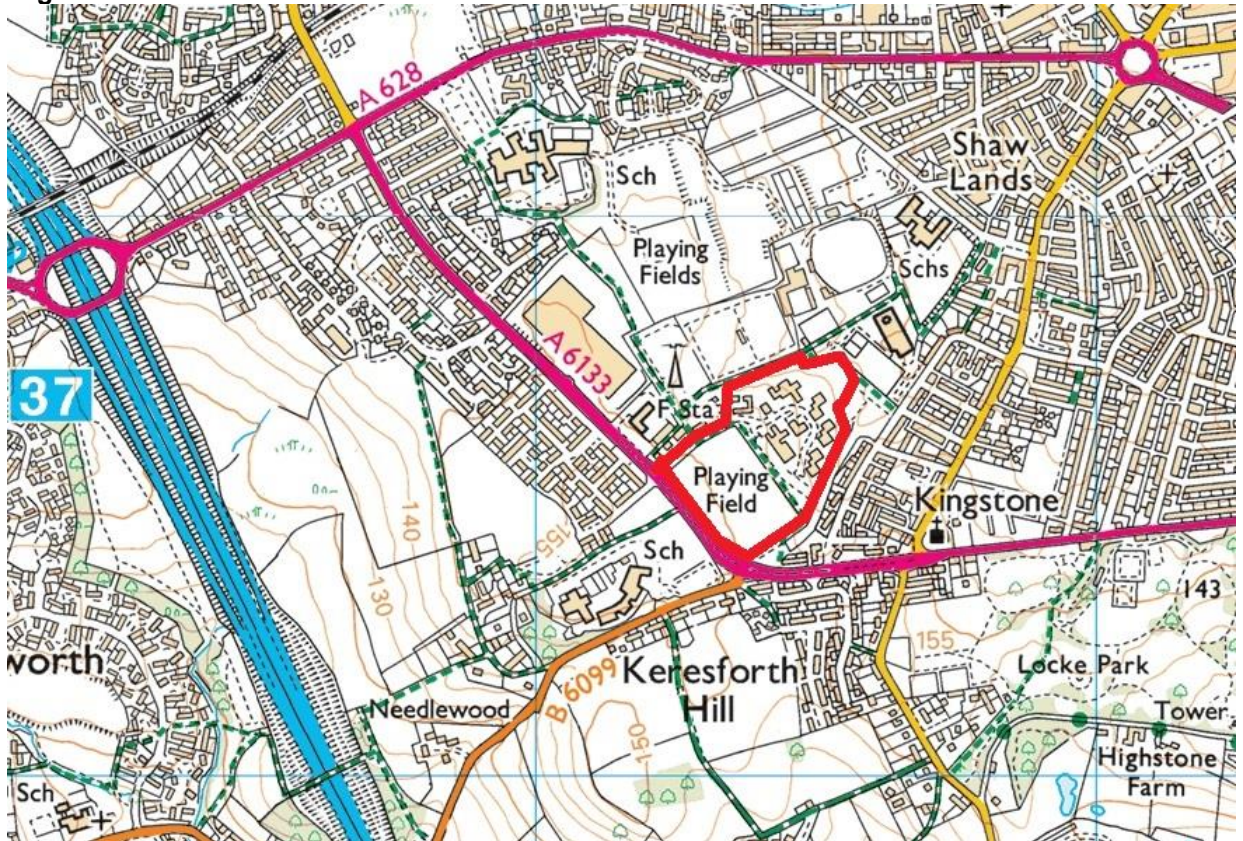
1.1 Site Location

The proposed new Trinity Academy site is located at former Keresforth Centre NHS facility and a playing field adjacent to the A6133 Broadway.

The postcode of the site is S70 6RS. The approximate Ordnance Survey grid reference of the site area is SE333056.

An Ordnance Survey map extract showing the site location marked **RED** is below in Figure 1.

Figure 1. Location Plan



1.2 Current Use

The existing site comprises of the former Keresforth Centre NHS facility and a playing field adjacent to the A6133 Broadway.

The site is bound by A6133 Broadway to the south-west, residential properties and playing fields to the north, Joseph Locke Primary school to the east and a mixture of allotments and two-storey residential properties to the southeast.

A GoogleEarth extract is shown in Figure 2 which identifies the site area outlined **RED**.

Figure 2. GoogleEarth Aerial Photograph



1.3 Flood Zone

Initial observation (see Section 5 for detail) of Environment Agency, Barnsley Metropolitan District Councils Preliminary & Strategic Flood Risk Assessment and Local Flood Risk Management Strategy flood risk mapping shows the site area to be within a **Flood Zone 1 Low Probability** flood risk area.

National Planning Policy Guidance Table 1: Flood Zones advises that Flood Zone 1 Low Probability comprises of land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).

2.0 Development Proposals

2.1 Proposals

The proposed works consist of the demolition of the eight number NHS facilities with the construction of a three storey teaching block and adjoining sport hall with associated hard landscaping, soft landscaping, and drainage.

The proposed teaching block and sport hall buildings are located at the back of the site on the lower lying land with the playing fields on higher land fronting the A6133 Broadway.

Plans showing the existing site and proposals are contained in Appendix A

2.2 Vulnerability

With reference to the National Planning Policy Guidance GOV.UK Flood risk and Coastal Change Site Specific Flood Risk Assessment – Guidance Table 2, the development proposals can be regarded as: -

School Buildings - **More Vulnerable**, Non-residential uses for health services, nurseries and **educational establishments**.

2.3 Estimated Lifecycle of Development

As the proposed redevelopment is classed as commercial usage, a standard 60 year lifecycle would typically be assumed. This will be factored in consideration of the impact of climate change on any assessed flood risk to the site throughout this flood risk assessment.

3.0 Sequential Test

Table 3 Flood risk vulnerability and flood zone compatibility shows that More Vulnerable development within Flood Zone 1 is appropriate.

Sequential Testing is therefore considered carried out and the development proposals are appropriate for the given the flood zone.

4.0 Climate Change

The impacts of climate change will be considered within each of the following report sections on site specific flood risk.

On the basis these factors will be considered in this assessment, the risk from the impacts of climate change are considered **LOW** unless identified for a specific element of flood risk later in this report.

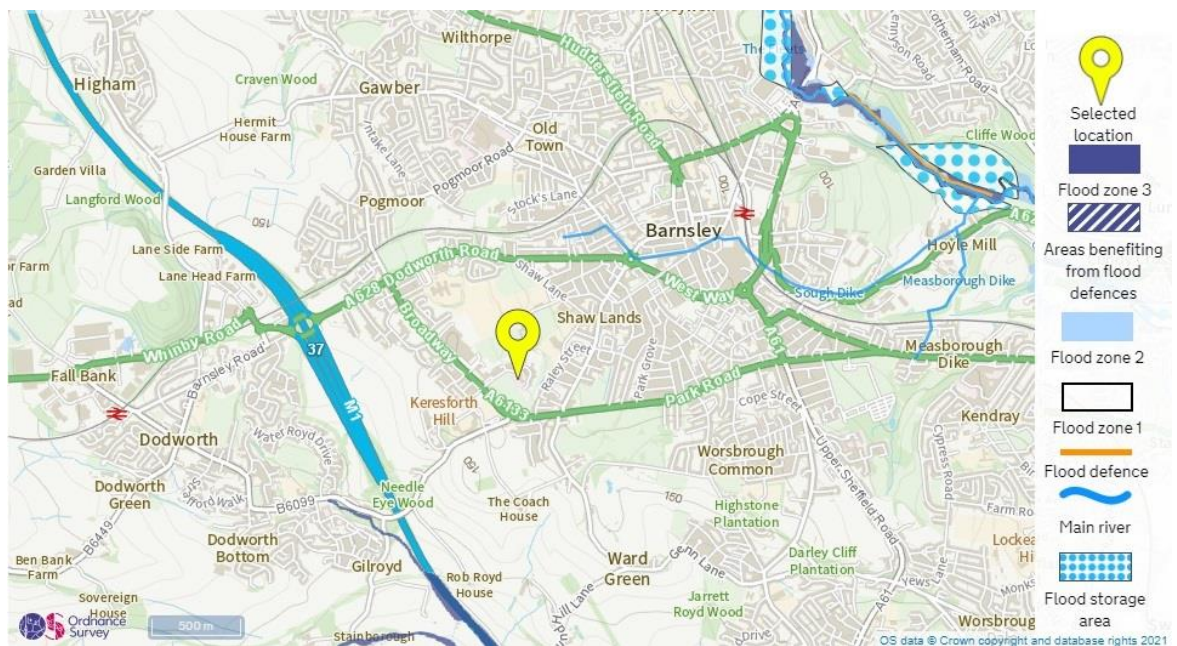
5.0 Site Specific Flood Risk

5.1 Environment Agency Online Planning Flood Map

The Environment Agency’s website provides on-line mapping to identify flood zoning for planning purposes. An extract is shown in Figure 3 with the site location identified by the yellow location pin.

This map extract confirms the site is Low Risk Flood Zone 1 and at considerable distance from higher risk flood zones to the east.

Figure 3. Environment Agency Flood Map for Planning (Rivers and Sea)



With reference to National Planning Guidance Table 1: Flood Zones, **Flood Zone 1 Low Probability**, comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%). The site can therefore be considered at very **LOW** risk from river and sea flooding.

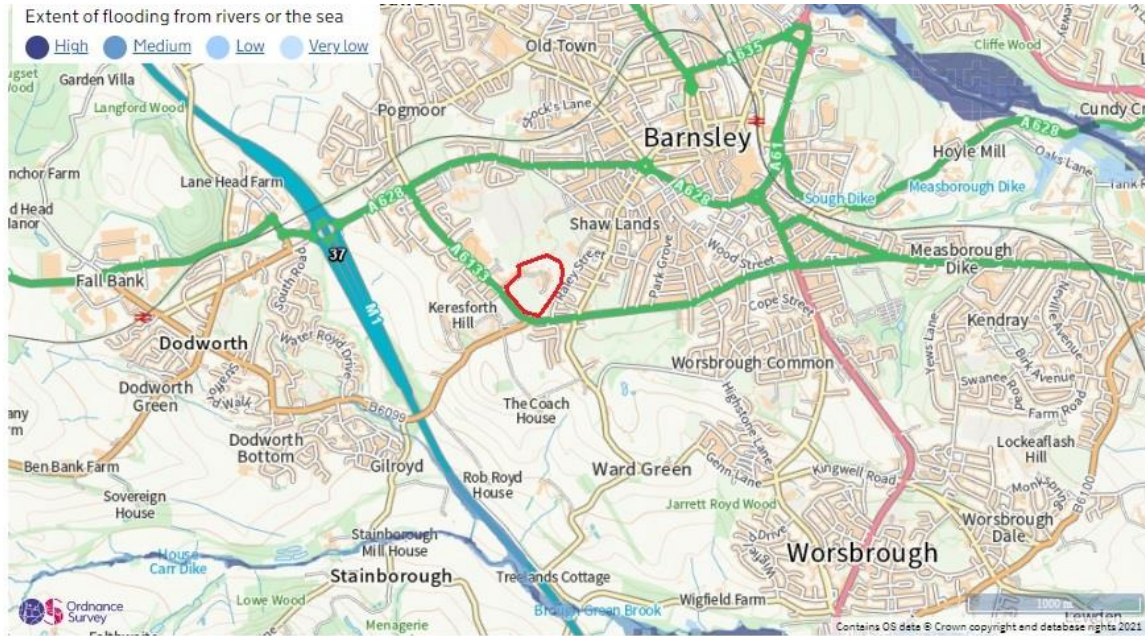
The Sough Dike running through Barnsley to the north east of the site is shown as 'Main River' and does not have any mapped flood risk associated with it.

No risk is shown associated with any of the local watercourse features to the north and south of the site boundary so these will be 'Ordinary Watercourse' under Barnsley MDC Lead Local Flood Authority jurisdiction and not Environment Agency.

The impacts of climate change on main river flood levels and extents are not considered to present a risk given the distance the site is from the high risk flood zones. The impact of climate change is therefore **LOW**.

The Environment Agency also provide another river and sea flood risk extents map of which an extract is provided in Figure 4.

Figure 4. Environment Agency Extent of Flooding from Rivers or the Sea

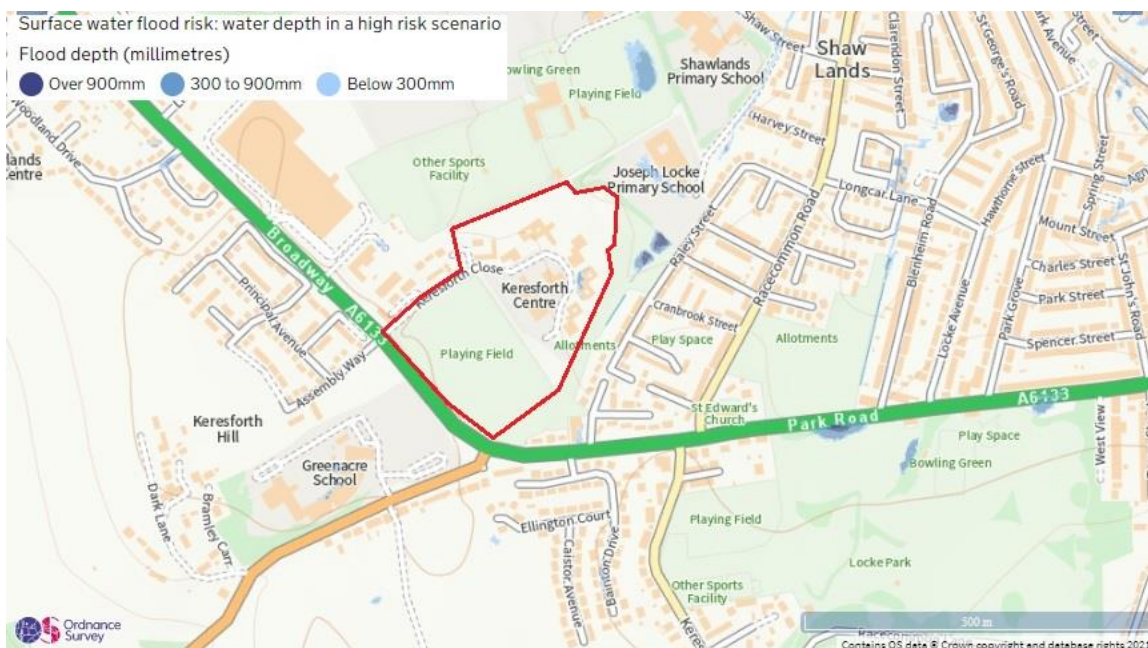


As with figure 3 the mapping confirms the site to be at low risk from river and sea flooding.

5.2 Environment Agency Surface Water Flood Risk Mapping

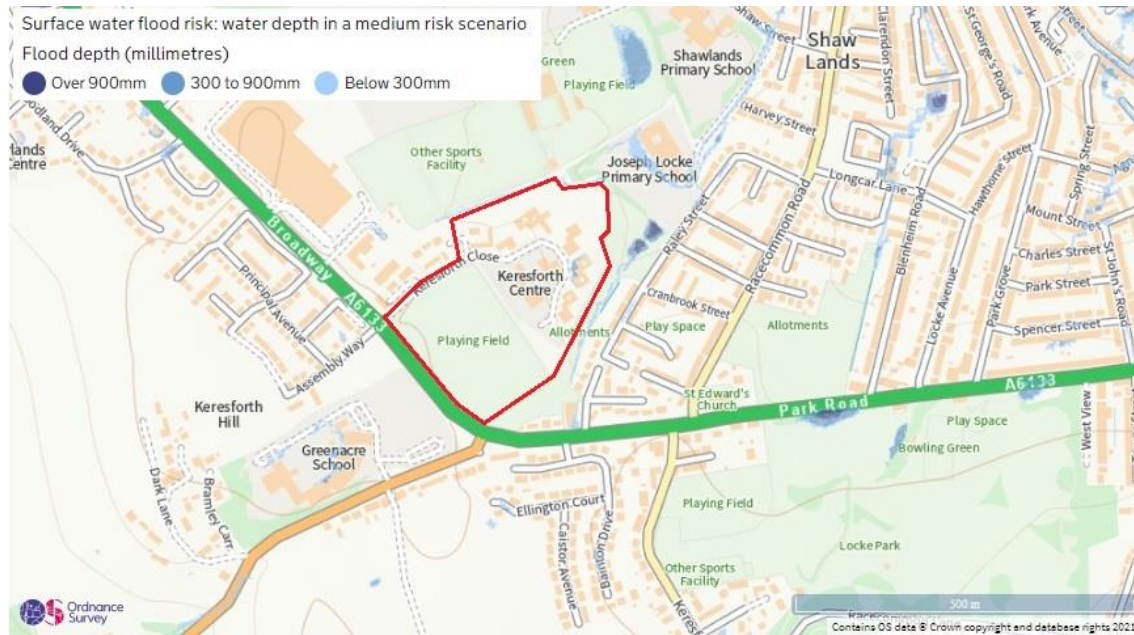
Extracts of the Environment Agency 'Flood Risk from Surface Water' maps showing the High Risk (1 in 30 year), Medium Risk (1 in 100 year), Low Risk (1 in 1000 year) plus combined overall extent of flood risk, are shown in Figures 5, 6, 7 & 8.

Figure 5. Environment Agency Flood Risk from Surface Water - High Risk (1 in 30 year)



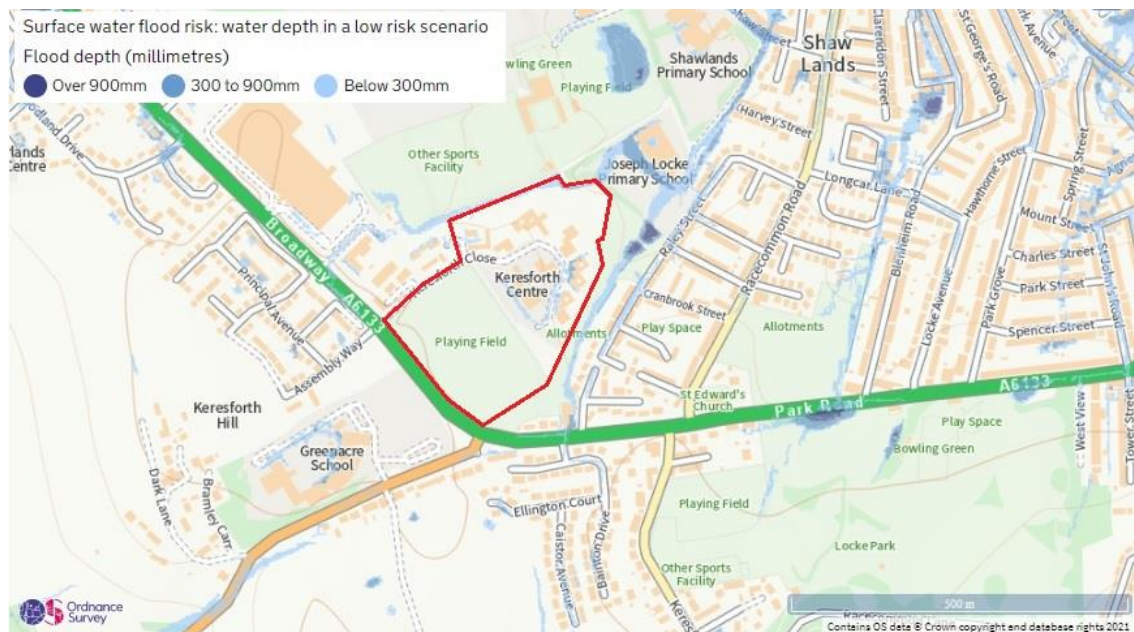
It can be seen on the map extract that the risk from surface water flooding is all round low risk. This risk level (1 in 30 year) is typical of flash summer events where localise ponding occurs as surface water disperses to drains, so suggests the site is currently well drained.

Figure 6. Environment Agency Flood Risk from Surface Water Medium Risk (1 in 100 year)



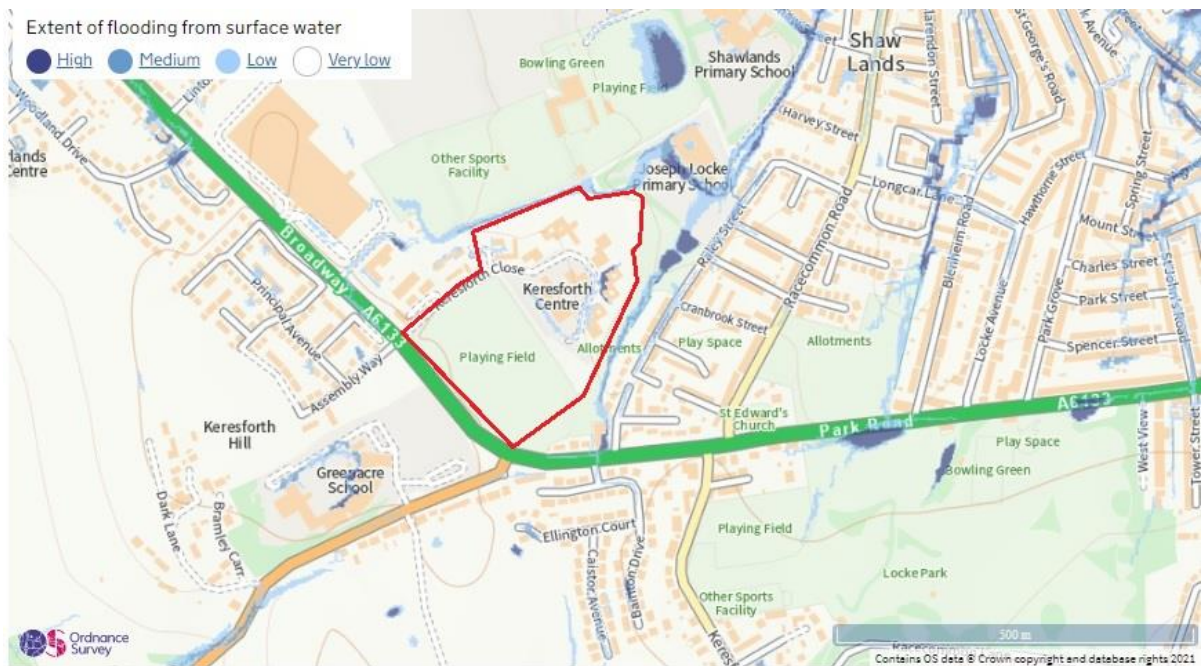
The 100 year event is similar to that of the 30 year with no high risk identified to the site or local area other than a small pocket in the south east. This level of risk is typical of longer duration winter events where again localise ponding occurs as surface water disperses to drains.

Figure 7. Environment Agency Flood Risk from Surface Water Low Risk (1 in 1000 year)



This is the most extreme surface water event and now some areas of risk are identified around the north and south boundary associated with the two ditches.

Figure 8. Environment Agency Flood Risk from Surface Water (Extents)



This combined extents map shows which is a combination of 1 in 30, 100 and 1000 year extents shows that risk across the site is very **LOW** with mapped risk areas primarily concentrated around the channel lines of the north and south ditches.

Observation of ground levels from the topographical survey (see Appendix B) of where the new buildings are to be placed suggest that floor levels will be elevated above these areas of flood risks associated with the ditches. It should also be noted the risk only develops for the most extreme 1 in 1000 year event and for normal 30 and 100 year design events the risk associated along these ditch lines is completely insignificant.

It is also considered that with the new drainage being designed and installed to modern standards with flow restriction and attenuation designed for future events with climate change that the risk of increased rainfall intensities over the lifecycle of the new development will remain **LOW**.

A review of the Barnsley M.D.C. Flood Risk Assessments documents concurs with this assessment of surface water flood risk using current Environment Agency mapping.

5.3 Barnsley M. B. C. Flood Risk & Surface Water Management Reports

A review of the Barnsley M. B. C. Flood Risk & Surface Water Management Reports and interactive mapping on the Councils website has been carried out.

The assessments confirm the findings in Section 5.1 and 5.2 that the site is located in an area at low risk from river, sea and surface water flooding.

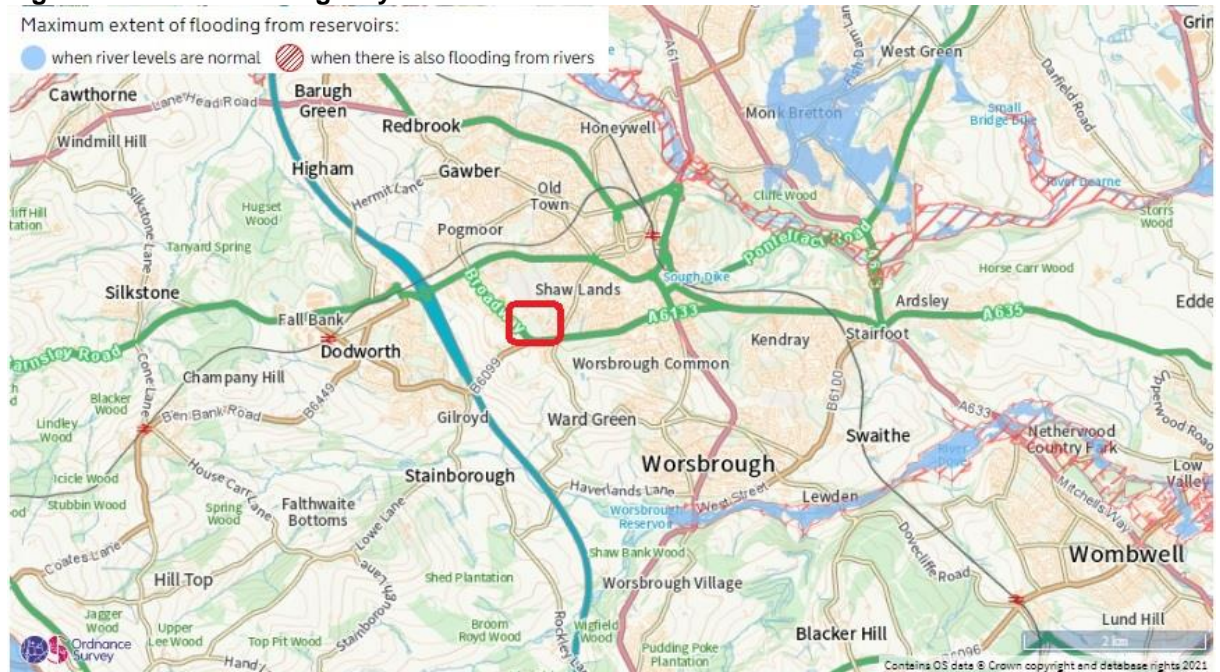
No past (historic) flood events, sewer flood events, or flood reports are mapped for the site location.

Although groundwater risk is not mapped in this reporting, Section 5.7 of the Waterman Infrastructure & Environment Geo-Environmental Assessment 2020 shows ground water at depth below the site and unlikely to present a flood risk. The risk of groundwater flooding is therefore considered **LOW**.

5.4 Environment Agency Reservoir Flood Risk Mapping

The Environment Agency produce mapping showing areas at risk should catastrophic failure of reservoirs occur. An extract is shown in Figure 9 with the site location marked **RED**.

Figure 9. Environment Agency Flood Risk from Reservoirs



The site area is shown clear of the risk zones all of which are at considerable distance. The risk is therefore considered **LOW**. Given the distance from the risk areas and elevated location the risk of climate change increasing reservoir failure risk to the site is also **LOW**.

5.4 Other Flood Risks

Flooding from canals and other artificial waterbodies can present a risk. There are no canals or other waterbodies nearby which are considered to present flood risk. On this basis the risk is considered **LOW**.

Flooding from existing sewers and drains can present a flood risk which will generally relate to surface water flooding during extreme rainfall rather than foul sewer flooding. On the basis any existing drainage will be removed or reconfigured where required, the risk is considered **LOW**.

Flooding from new drainage can present a risk of flooding. New drains for the site will be designed to the requirements of Building Regulations, Barnsley M.D.C. Councils LLFA/Flood Risk Management and Yorkshire Water requirements (see Section 6). The risk of flooding from the new drainage is therefore considered **LOW**.

5.5 Flood Risk Summary

5.51 The following can therefore be summarised in terms of flood risk: -

Primary River/Sea Flood Risk	LOW
Surface Water Flood Risk	LOW
Reservoir Flood Risk	LOW
Groundwater Flood Risk	LOW
Canal and Artificial Waterbody Risk	LOW
Existing Drainage Flood Risk	LOW
New Drainage Flood Risk	LOW
Risk from Climate Change	LOW

6.0 Surface Water Management

6.1 SuDs Hierarchy

Building Regulations 2010 Requirement H3 stipulates that rainwater from roofs and paved areas is carried away from the surface to discharge to one of the following, listed in order of hierarchy:

- I. Discharge into the ground;
- II. Discharge to a surface water body;
- III. Discharge to a surface water sewer;
- IV. Discharge to a combined sewer where there are absolutely no other options and only where agreed in advance with the relevant sewage undertaker.

6.2.1 Infiltration

Due to coal mining presence and soil contamination which has been recorded on site, the use of soakaway type drainage is not considered viable.

More details regarding the contamination risks can be found in the Environmental Assessment in Appendix C.

6.2.2. Watercourse

The site is currently drained by a traditional drainage that outfalls to the private culverted watercourse located to the north of the site. It is proposed to discharge surface water from the development to the existing watercourse via the private surface water network, to the east of the site. This route is currently responsible for managing the vast majority of the existing school surface water runoff with no apparent method of quantity control.

Utilities layout and CCTV survey have been presented in Appendix D.

Attempts to obtain the maps showing the watercourse location and details have been unsuccessful due to lack of LLFA records.

Public sewer maps have been presented in Appendix E.

6.2 Discharge rate

The following Sustainable Drainage Systems (SuDS) have been proposed on the scheme to provide surface water storage to allow discharge flows from the site to be restricted without flood risk to the site:-

- Pond
- Swales
- Subbase attenuation to filter drains and rain gardens
- Below ground geocellular storage tank

Proposed Surface Water Layouts & Details are shown in Appendix F.

As per Barnsley Borough Council pre-planning advice for design of surface water drainage, flows will be discharged to the private culverted watercourse at the existing brownfield runoff rate with 30% betterment which has been calculated to be 97 l/s. Subject to agreement with the LLFA.

Correspondence regarding the discharge rate has been included in Appendix G.

The surface water system has been designed to accommodate the 1 in 100 year plus 30% allowance for climate change storm event with a sensitivity check up to 40%. The drainage has been designed to accommodate all flow during the 1 in 30 year storm event below ground.

MicroDrainage calculations are presented in Appendix H.

6.3 Water Quality

The new SuDS Manual (CIRIA C753, November 2015) introduced a slightly different approach compared to the previous version for the water quality management of surface water. The manual describes risks posed by the surface water runoff to the receiving environment as a function of:

- The pollution hazard at a particular site (i.e. the pollution source);
- The effectiveness of the SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels (i.e. the pollutant pathway); and,
- The sensitivity of the receiving environment (the environmental receptor).

In accordance with the SuDS Manual, the site is classified as presenting a low pollutant hazard level in vehicular areas (car parking). However, in order to ensure water quality improvement into the drainage system, a combination of swales and petrol interceptor device is proposed to treat the runoff from the vehicular access areas.

7.0 Foul Water

There is a public foul water sewer running beneath the site along the northern boundary, with a diameter of 225mm. Foul water to be connected to the sewer by a gravity connection via the existing public chamber.

Pre development enquiry has been submitted for this development and Yorkshire Water has accepted a connection in principle. The Yorkshire Water response is included in Appendix I.

A S106 application will be required for the proposed point of connection to the public sewer.

8.0 Occupants and Users of the Development (Access & Egress)

It is an important consideration of a Flood Risk Assessment to consider the occupants and users of the development should flooding occur.

With the low all round flood risk there should be safe access and egress at all times should flood conditions prevail elsewhere in the local neighbourhood.

9.0 Exception Test

With reference to NPPF Table 1 Flood Zones, according to Environment Agency mapping, the site is located within a Flood Zone 1 Low Probability.

With reference to NPPF Table 2 Flood Risk Vulnerability Classification, the proposed usage would be More Vulnerable classification.

With the site being located within a Flood Zone 1 Low Probability and being of More Vulnerable classification, reference to NPPF Table 3 Flood Risk Vulnerability and Flood Zone Compatibility, shows that 'Development is Appropriate'.

On this basis, it is considered no further input with regards to Exception Testing is required.

10.0 Residual Risk

Usually there is long term residual risk to any commercial or residential development. As this proposal is located in an overall low risk area at distance from the higher flood risk areas it is highly unlikely to be impacted by climate change increasing flood depths and extents over the intended lifecycle.

On this basis residual risk can be considered **LOW**.

11.0 Flood Risk Assessment Credentials

This Flood Risk Assessment has been carried out by Curtins civil engineering team with extensive experience of flood risk assessment and drainage design.

This flood risk assessment has been carried out following the general requirements of the NPPF and Barnsley Metropolitan District Councils Lead Local Flood Authority/Flood Risk Management requirements.

12.0 Flood Risk Assessment Conclusion & Recommendations

12.0 Conclusion

A Flood Risk Assessment has been conducted in general accordance with the requirements of the NPPF to support the development planning application of Trinity Academy, Barnsley for a new educational facility.

This Flood Risk Assessment confirms the site is at all round low flood risk and will remain so for its intended lifecycle. This is summarised as:-

Primary River/Sea Flood Risk	LOW
Surface Water Flood Risk	LOW
Reservoir Flood Risk	LOW
Groundwater Flood Risk	LOW
Canal and Artificial Waterbody Risk	LOW
Existing Drainage Flood Risk	LOW
New Drainage Flood Risk	LOW
Risk from Climate Change	LOW

The outline drainage strategy described in Section 6 and as shown on the drawings in the appendix confirms the new development will not increase flood risk to the site or others.

13.0 Recommendations

The proposed drainage strategy described in Section 6 and as shown on the drawings in the Appendix C, of this FRA should be progressed to detail design ensuring the discharge rates, outfall points and volumes of attenuation are maintained to ensure the site remains at low flood risk and does not increase flood risk to others.

Appendices

Appendix A - Redline Planning Plan & Site Development Proposal Plan

Appendix B – Topographical and Drainage Survey

Appendix C - Environmental Assessment

Appendix D – Utilities Layout and CCTV survey

Appendix E – Public Sewer Maps

Appendix F – Surface Water Layouts & Details

Appendix G – Pre-planning advice

Appendix H – MicroDrainage Calculations

Appendix I – Yorkshire Water Pre-development enquiry response

Appendix J – Foul Water Layout

Appendix A

Redline Planning Plan & Site Development Plan

Appendix B

Topographical and Drainage Survey

Appendix C

Appendix C - Environmental Assessment

Appendix D

Appendix D – Utilities Layout and CCTV survey

Appendix E

Appendix E – Public Sewer Maps

Appendix F

Appendix F – Surface Water Layouts & Details

Appendix G

Appendix G – Pre-planning advice

Appendix H

Appendix H – MicroDrainage Calculations

Appendix I

Yorkshire Water Pre-development enquiry response

Appendix J

Foul Water Layout

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