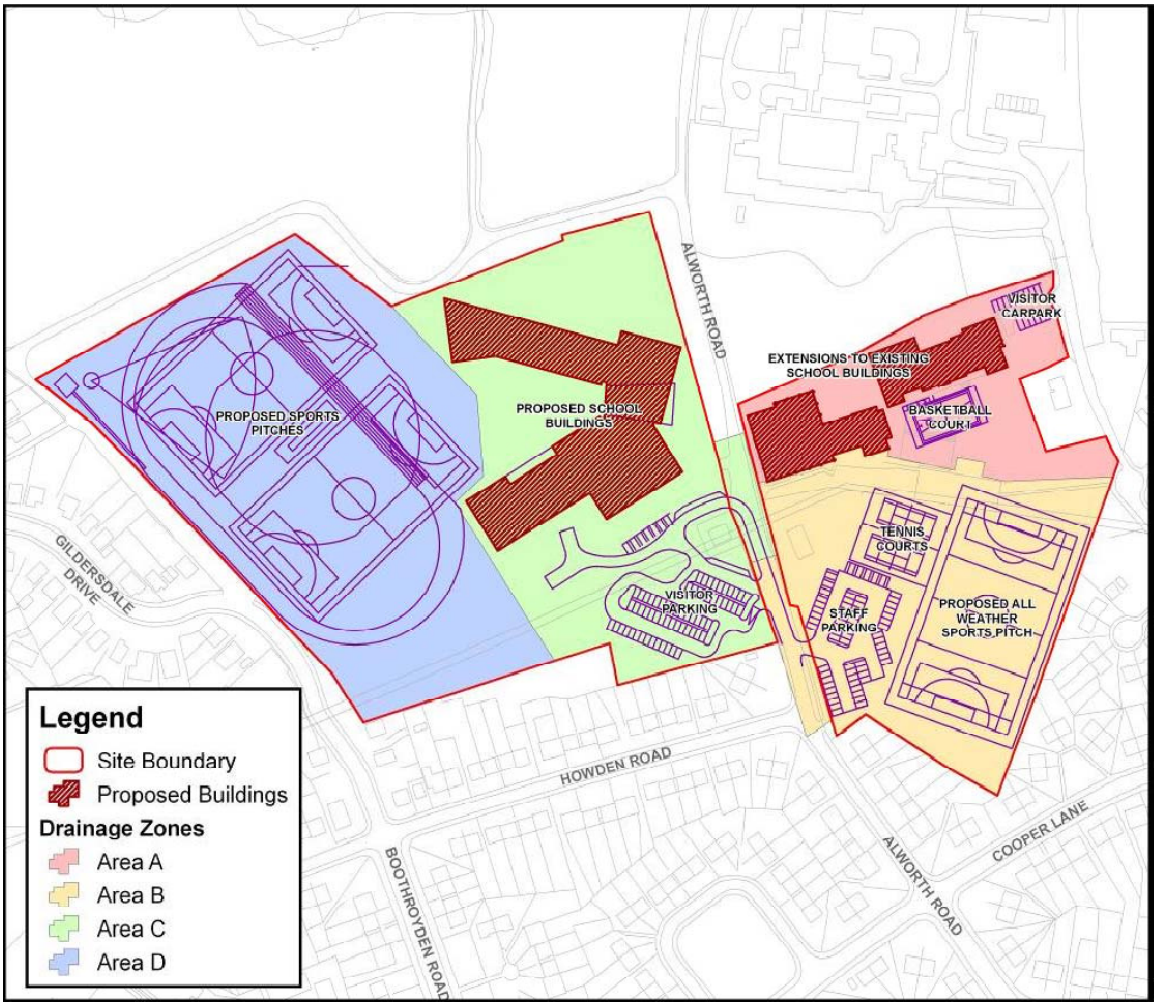
A.1 Site Drainage

As part of the drainage strategy the site will be split up into four separate drainage areas to ensure a more cost effective design, as well as enabling the discharge to be minimised at each discharge point. Appendix Figure A-1 below details the school layout and the four drainage sectors.

Appendix Figure A-1 Site Drainage Areas



Area A comprises of the extended sports hall and gym areas of the existing school, located to the north east of the site as well as the new basketball area and visitors car park, as detailed in Appendix Figure A-1. Area B consists of the all-weather sports pitch, tennis courts and staff car parking, situated at the south east corner of the site. Area C comprises of the new school building, surrounding play areas and visitor parking to the west of Alworth Road. Area D comprises the two proposed grassed sport pitches, west of the new school building.

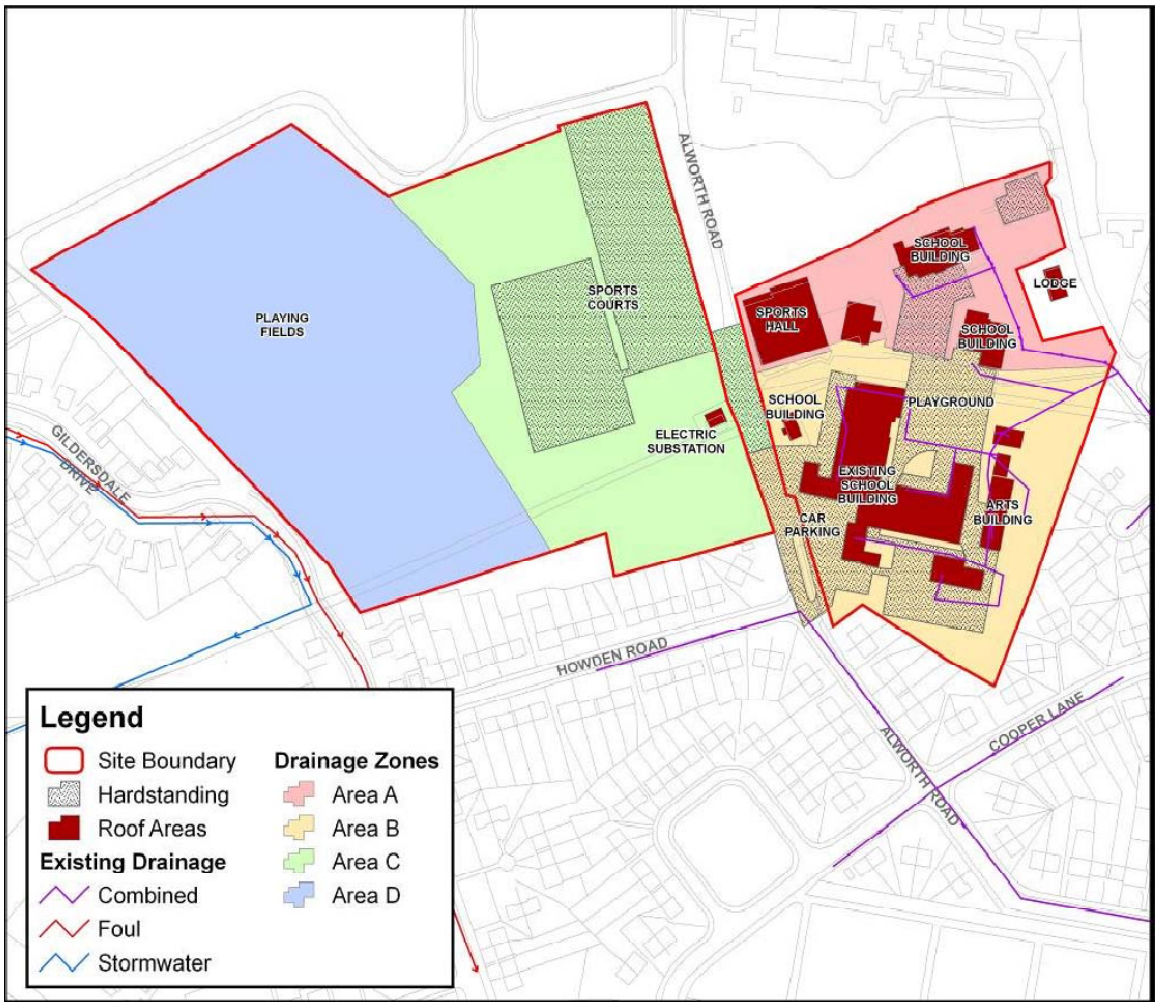
A.1.1 Existing Drainage Regime

The existing Area A incorporates a sports hall and gym, school classrooms and hard paved areas with an approximate combined roof and hardstanding area of 3,225m2.

Area B which constitutes the existing main school building and playground area has an approximate impermeable area of 7,173m2.

Areas C and D cover the existing playing field and hard paved sports court areas. Area C has approximately 8,417m2 of impermeable surface, including the sports courts, an area of Alworth Road and the existing electrical substation. Area D is currently permeable grassed surface.

Appendix Figure A-2 Existing Site Drainage



Conservative rainfall intensities of 50mm/hr for hardstanding and 75mm/hr for roof areas have been applied to determine a comparison of impermeable area runoff generated from the site. Results of calculations for the existing site are detailed in Appendix Table A-1.

Appendix Table A-1 Existing Site Runoff

Drainage Area	Impermeable Area		Runoff
	Roof	Pavement	
A	2,045m2	1,179m2	59 l/s
B	3,198m2	6,094m2	152 l/s
C	55m2	8,362m2	117 l/s
D	-	-	-

Surface water runoff from areas A and B currently discharge via reticulated sewerage to a 225mm diameter combined sewer in Chain Road.

The majority of stormwater runoff from hardstanding surfaces in area C discharges to surrounding permeable ground in the school playing fields. Some runoff will enter Alworth Road and has the potential to pass overland to the south, to street drainage adjacent to the school entrance in Alworth Road.

Rainfall on area D currently passes directly to ground through infiltration. Anecdotal evidence from the school caretaker reported that land drainage was in place under some areas of the playing fields but this drainage had been compromised during previous works on the site and was no longer functional. The pitches were reported to occasionally suffer from surface water ponding.

A.1.2 Proposed Drainage Regime

The proposed development of North Ridge Campus will incorporate a new surface water drainage system to collect and manage runoff from buildings, hardstanding areas and sports pitches.

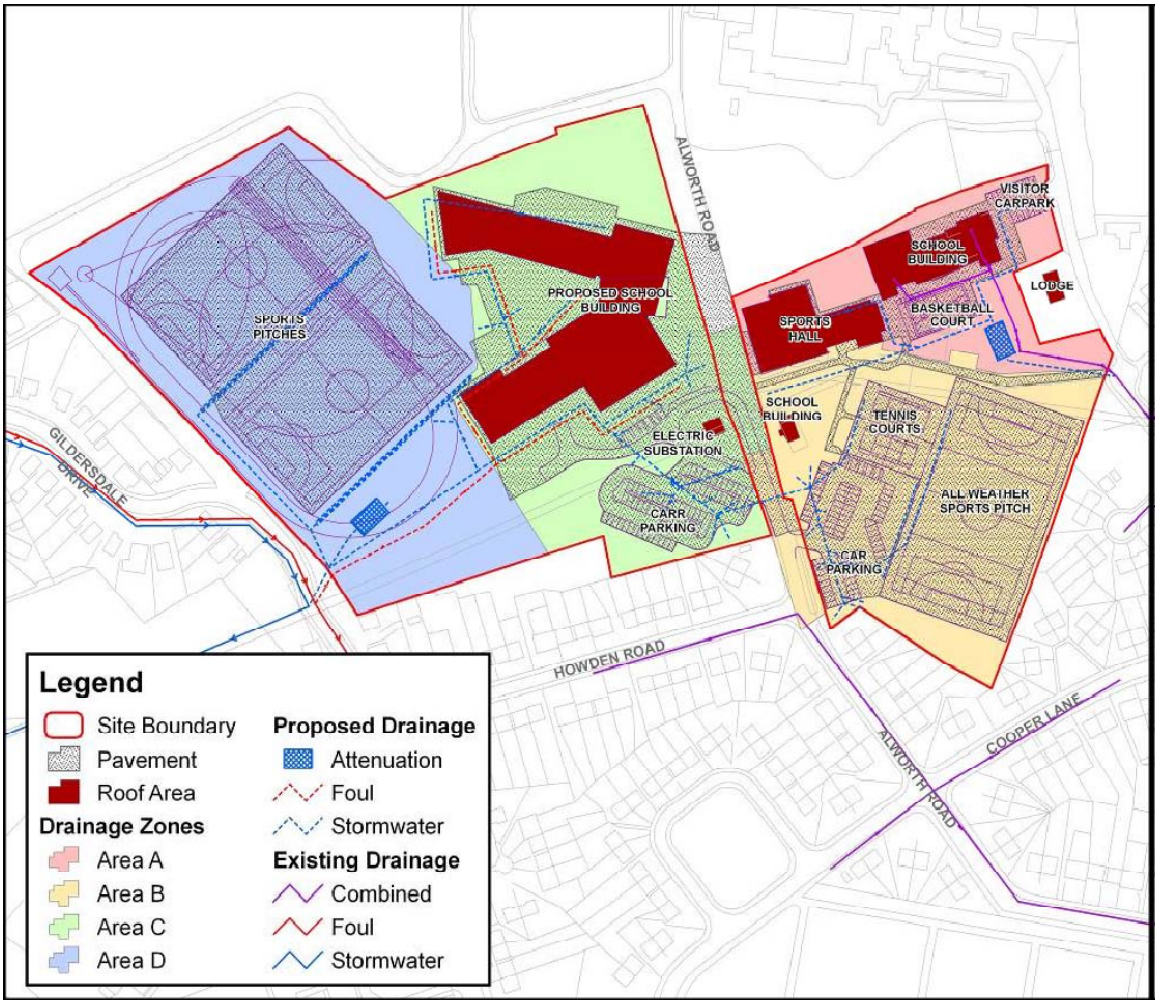
Area A will incorporate an extension to the sports hall, a new basketball court and landscaping that will incorporate paved areas. Impermeable surfaces within area A will have an approximate combined roof and hardstanding area of 4,544m^2.

The only remaining building within area B under the development proposal is the school bungalow, however the development of an all-weather sports pitch, tennis courts and car parking areas will mean that a significant portion of this area remains impermeable. Impermeable surfaces within area B will have an approximate combined roof and hardstanding area of 10,479m^2.

Area C is the location of the proposed main school building. New car parking areas will also be incorporated to the south of the school building, adjacent to the existing electrical substation, which will be retained. Impermeable surfaces within area C will have an approximate combined roof and hardstanding area of 11,358m^2.

Two new sports pitches will be constructed within area D. The pitches will be served by a drainage scheme that discharges to the new stormwater drainage system. No buildings will be located within area D. As the new pitches are to be drained, the lands the pitches occupy have been considered to be impermeable surface within these calculations, although it should be noted that the time of concentration for runoff will be significantly higher than that for hardstanding area. The sports pitches occupy an area of 11,887m^2.

Appendix Figure A-3 Proposed Site Drainage



Using the same rainfall intensities adopted for assessment of the existing site of 50mm/hr for hardstanding and 75mm/hr for roof areas, impermeable area runoff generated from the proposed development has been calculated and is detailed in Appendix Table A-2.

Appendix Table A-2 Proposed Site Runoff

Impermeable Area			
Drainage Area	Roof	Pavement	Runoff
A	2,522m2	2,022m2	81 l/s
B	93m2	10,386m2	146 l/s
C	4,901m2	6,457m2	192 l/s
D	-	11,887m2	58 l/s

Proposed surface water runoff from area A will continue to discharge to the 225mm diameter combined sewer in Chain Road via new stormwater sewer reticulation.

A new stormwater drainage network will be developed for area B to manage surface water runoff from the new car parking and sports areas. All drainage from this area will pass under Alworth Road and discharge into stormwater reticulation serving areas C and D, ultimately discharging to existing surface water sewers in Boothroyden Road. Attenuation for extreme rainfall events will be provided in area D.

Development of the main school building within area C will include the design of new stormwater reticulation for the management of runoff from the large roof areas and the extensive paved areas surrounding the building. Drainage will fall towards the south west of area C before passing into area D reticulation and ultimately discharging to existing surface water sewers in Boothroyden Road. Attenuation for extreme rainfall events will be provided in area D.

New sports pitches to be constructed within area D will be served by land drainage channels which will convey rainfall runoff to stormwater sewers to the south west of the site. Off-line attenuation will be provided adjacent to the site discharge point, to accommodate excess flows generated in areas B, C and D during extreme rainfall events. Following consultation with the Environment Agency, discharge to the surface water sewer in Boothroyden Road will be restricted to Greenfield runoff rates.

A.3 Runoff Restrictions and Attenuation

A.3.1 Chain Road Sewer

Original surface water discharge to the combined sewer in Chain Road includes runoff flows from areas A and B. The proposed surface water drainage scheme peak estimate for surface water discharge from area A following the redevelopment of the site is 81 l/s, which means a reduction in peak flow to Chain Road sewer of over 60%.

In agreement with united Utilities, it is currently proposed that discharge to the Chain Road sewer be restricted to 47 l/s, with on-line attenuation provided in the form of underground storage to facilitate the accommodation of flows for events up to the 1 in 30 year rainfall event.

A.3.2 Boothroyden Road Sewer

The majority of surface water drainage is designed to discharge to an existing stormwater sewer in Boothroyden Road to the west of the site. Consultation with the Environment Agency has determined that discharge to the sewer will be limited to greenfield runoff rates, which have been calculated to be 4.14 l/s/ha for North Ridge Campus. Areas B, C and D which will drain to the sewer constitute a plan area of 5.7ha, which provides a limiting discharge from the site of 23 l/s.