Flood Risk Assessment

226254 – NETA Relocation, Stockton Riverside College, Stockton-on-Tees, Teesside

Billinghurst George & Partners
Civil & Structural Engineers, Building Surveyors
Wellington House, Wellington Court, Preston Farm, Stockton-on-Tees, TS18 3TA
T: 01642 876 470 E: consulting@bgp-teesside.co.uk @BGPconsulting

Flood Risk Assessment

Project: NETA Relocation, Stockton Riverside College, Stockton-on-Tees, Teesside

Client: Stockton Borough Council

LLFA: Stockton Borough Council

BGP Job No: 226254

Document Checking:

Prepared By: Z.Waller – Civil Technician

Checked By: R. Walton – Associate Director (BEng MSc CEng MICE)

Issue	Date	Status	Checked for Issue
001	19/04/2024	Planning	RJW

This document has been prepared solely as a Flood Risk Assessment for The Education Training Collective regarding the proposed site at Stockton Riverside College, Stockton-on-Tees, Teesside. Billinghurst George & Partners accepts no responsibility or liability for any use that is made of this document other than by the Client for which it was originally commissioned and prepared.

Contents

Appendices

1. Introduction

1.1. This Flood Risk Assessment has been prepared in accordance with the requirements of The National Planning Policy Framework (Ministry of Housing, Communities and Local Government - February 2019) [The Framework] and the Planning Practice Guidance to the National Planning Policy Framework Website (Launched 6th March 2014) [The Technical Guidance].

1.2. This Flood Risk Assessment has been prepared to supplement the planning application for the new Car park extension at Stockton Riverside College, Stockton-on-Tees. See Appendix A for the Site Location Plan and Appendix B for the proposals.

1.3. The proposals are to construct a new car parking facility to provide additional parking for SRC and the future NETA Relocation building that will be submitted as a future planning application. The new car park will be constructed on a greenfield parcel of land adjacent to Harvard Avenue.

2. Existing Site & Drainage

2.1. Site Location

2.1.1. Site Name: NETA Relocation, Stockton Riverside College

2.1.2. Site Address: Harvard Avenue, Thornaby, Stockton-on-Tees, TS17 6FB

2.1.3. OS Grid Reference: E: 445454, N: 518693

2.1.4. National Grid Reference: NZ454186

2.2. Site Description

2.2.1. Site Area: 0.520ha

2.2.2. Existing Land Use: Greenfield parcel of land.

2.2.3. Proposed Land Use: Construction of a new car parking facility.

2.2.4. Local Planning Authority: Stockton Borough Council

2.2.5. Sewer Undertaker: Northumbrian Water (NWL)

2.2.6. The site is located approximately 1km east of Stockton Town Centre and approximately 4.2km southwest of Middlesbrough Town Centre. The site is within the boundaries of Stockton Riverside College campus. The site is bound by Harvard Avenue to the eastern boundary, University Boulevard to the northern boundary, Durham University Queen's campus to the eastern boundary and Princeton Drive to the southern boundary. Existing private office buildings are in proximity to the proposed developments.

2.3. Flood Zone (Table 1 NPPF)

2.3.1. The development lies within Flood Zone 1, except for a small area of Flood 3. This area is isolated to the existing headwall outfall. (See Appendix C for Flood Maps).

2.4. NPPF Site Classification (Table 2 NPPF)

2.4.1. The vulnerability classification for the new Car Park is "Less Vulnerable.

2.5. **Flood Zone "Compatibility" (Table 3 NPPF)**

	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone 1	Yes	Yes	Yes	Yes	Yes
Flood Zone 2	Yes	Exception test required	Yes	Yes	Yes
Flood Zone 3a	Exception test required	No	Exception test required	Yes	Yes
Flood Zone 3b	Exception test required	No	No	No	Yes

2.5.1. The proposal to construct the new car park acceptable in terms of flood risk in accordance with Table 3 of the NPPF (above).

2.6. Sequential Testing

2.6.1. Sequential testing is not required for this scheme.

3. Definition of the Flood Hazard

3.1. Tidal Flood Risk

3.1.1. Stockton Riverside College Campus is approximately 12.0km from the sea and located at an elevation of approximately 4.50m AOD. It is therefore considered that the site will not be affected by flooding from the sea.

3.1.2. The risk of flooding from the sea is categorised as LOW.

3.2. Fluvial Flood Risk

3.2.1. The nearest named watercourse is the River Tees. This is located approximately 20m north west of the site and flows predominantly West to East.

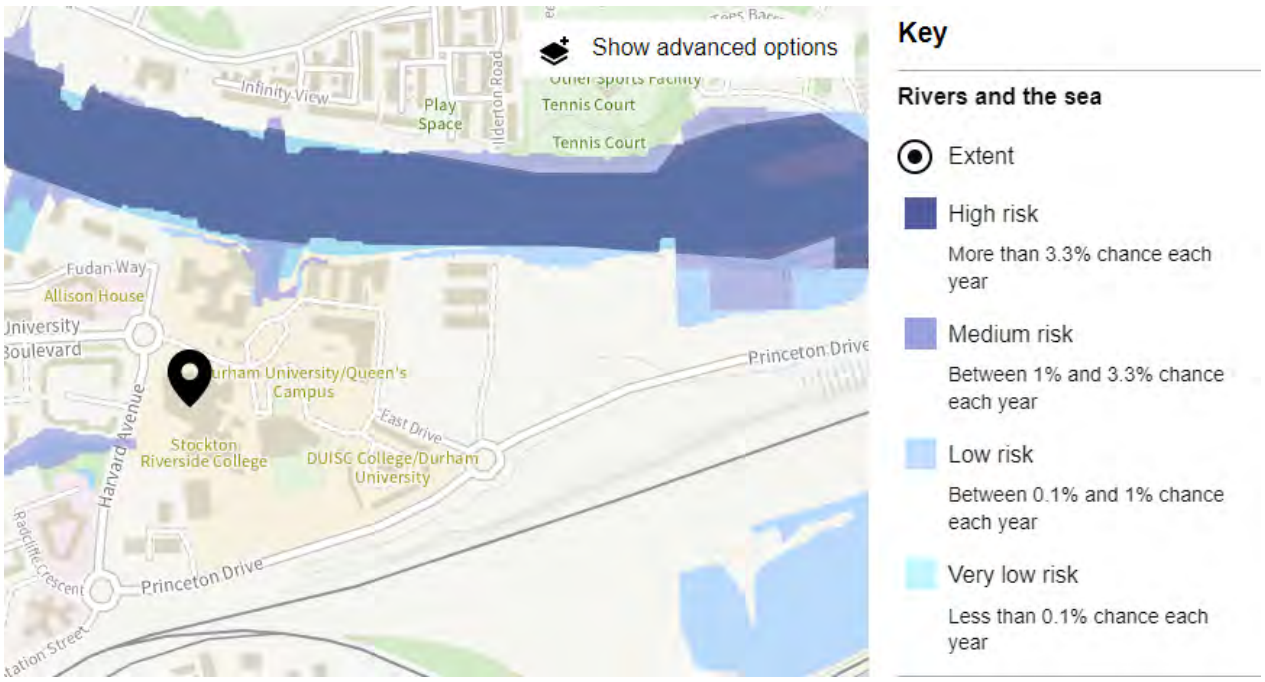


Figure 1 – Environment Agency Fluvial Flood Map for Planning – Rivers and Sea

3.2.2. The Environment Agency 'Flood Map for Planning' (Figure 1 and Appendix C) shows that the proposed site is entirely within Flood Zone 1. Flood Zone 1 is land that is assessed as having less than a 1 in 1000 (0.1 percent) chance of flooding each year. Apart from a small area of flood zone 3 that is isolated to the existing headwall outfall. This will not affect the proposed site as it is lower in level than the proposed site and then River Tees levels are relatively static due to the Tees Barrage that controls the river levels.

3.2.3. It is considered that the risk of flooding to the site from fluvial sources is categorised as LOW.

3.3. Overland Flood Risk

3.3.1. Intensive rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems can run quickly off land and result in localised flooding.

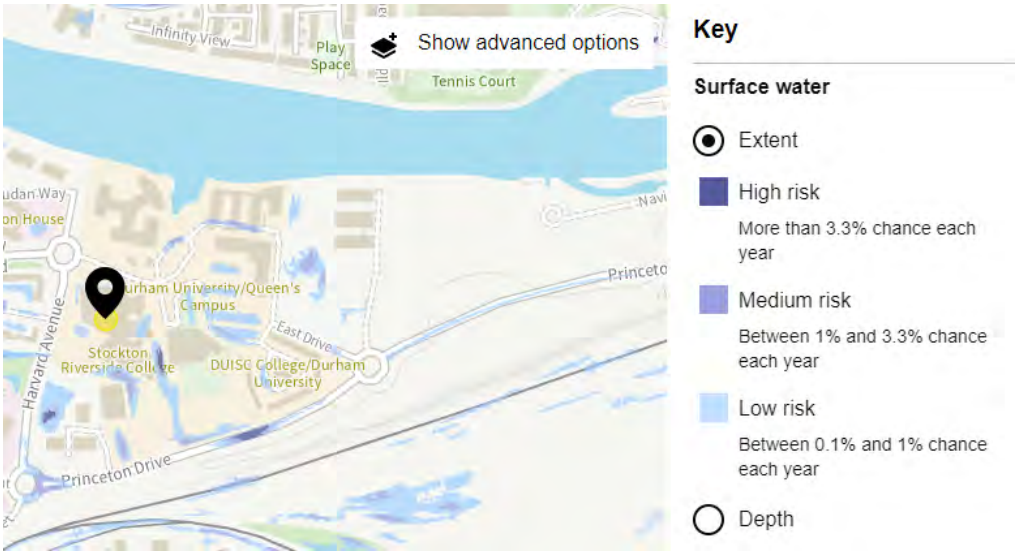


Figure 2 – Environment Agency Surface Water Flooding Map for Planning

3.3.2. Figure 2 shows the extents of flooding during various surface water flooding events. The areas with the darkest blue colour are representative of the "high" risk scenario, which are the surface areas predicted to flood in the more frequent storms (<1 in 30 year). The areas with the lightest blue colour are representative of the "low" risk scenario, which are the surface areas predicted to flood in the less frequent storms (>1 in 100 year). As expected, the less frequent and more intense storms would affect a larger surface area.

3.3.3. Figure 2 indicates an area varying from low to high risk in the vicinity of the proposed car park. This area of overland flooding is likely caused by the current topographical levels in this area. The levels drop to a small depression within the open green space of approximately 4.40m AOD (See Appendix E). The proposals are to construct a new car park that will include a positive drainage system which would rapidly remove rainfall from the surface. Permeable paving will be used to collect surface water flows from the car park.

3.3.4. Based on the above information, the existing risk of flooding from overland sources is categorised as HIGH, however, the proposed works will mitigate this risk to LOW.

3.3.5. The proposed development will not increase flood risk to adjacent sites as the levels will be similar to existing and generally below adjacent areas.

3.4. Groundwater Flood Risk

3.4.1. Groundwater flooding occurs when water levels in the ground rise above surface elevations. It is most likely to occur in low lying areas underlain by permeable rocks.

3.4.2. In the area of the proposed car park the ground consisted of clay topsoil to depths of between 0.10mbgl and 0.20mbgl. Made ground was relatively uniform in this area, comprising of very gravelly sand fill with low to medium cobble content. This was encountered to depths of between 2.00mbgl and 2.50mbgl. The extent of the excavation in these areas was 2.5m depth. It can be assumed that depths below this will be similar in composition to the borehole samples taken nearby. A layer of organic soft locally very soft peat was encountered to depths of 5.40mbgl and 7.40mbl then natural ground generally comprised soft and very soft silty slightly sandy organic low strength clay to depths of between 11.5mbgl and 12.10mbgl.

3.4.3. The report notes Groundwater was encountered within the boreholes at depths of between 2.80m and 4.40m below ground level. Deeper strikes were encountered at depths between 9.30mbgl and 12.10mbgl.

3.4.4. The information above suggests the risk of flooding to the proposed site from ground water is therefore categorised as LOW due to the depth of the ground water encountered and the generally low permeability soils.

3.5. Flooding From Sewers

3.5.1. See the existing Northumbrian Water sewer records within Appendix D. This shows that there is a 225mm adopted Foul Water sewer that runs from north to south along the western boundary of the site. There is also an abandoned 375mm sewer that runs from south east to north west across the site.

3.5.2. The probability of these sewers flooding and posing a risk to the development site is low as these sewers are owned and maintained by Northumbrian Water (NWL). Additionally, the sewers are understood to be relatively deep based on the depths shown on the NWL records (between 4.0m – 5.0m).

3.5.3. Any foul water flooding due to blockages will be localised within the car park area and is unlikely to pose risk to existing adjacent buildings due to the distances and difference in level.

3.5.4. Existing drainage will be present that serves the existing car park area and the existing buildings. It is understood the Stockton Riverside College buildings and surrounding areas ultimately discharge into the river Tees given the lack of adopted surface water sewers in the vicinity of the site. It is expected that existing foul flows connect directly in to the adopted NWL Foul sewer running along the western boundary.

3.5.5. It is not expected that there will be significant risks associated with flooding from existing private sewers and the likelihood of these occurring are relatively low as they will be maintained as part of the private ongoing site maintenance works.

3.5.6. Based on the above the risk of flooding from sewers is categorised as LOW.

3.6. Flooding from Artificial Sources

3.6.1. Based on the Environment Agency map 'Flood Risk from Reservoirs' the site is at risk from any artificial sources such as reservoirs. The maximum extent of flooding is shown on Figure 3 below. The risk shown is associated with a failure of the Tees Barrage. The tees barrage was opened in 1995 and is regularly maintained.

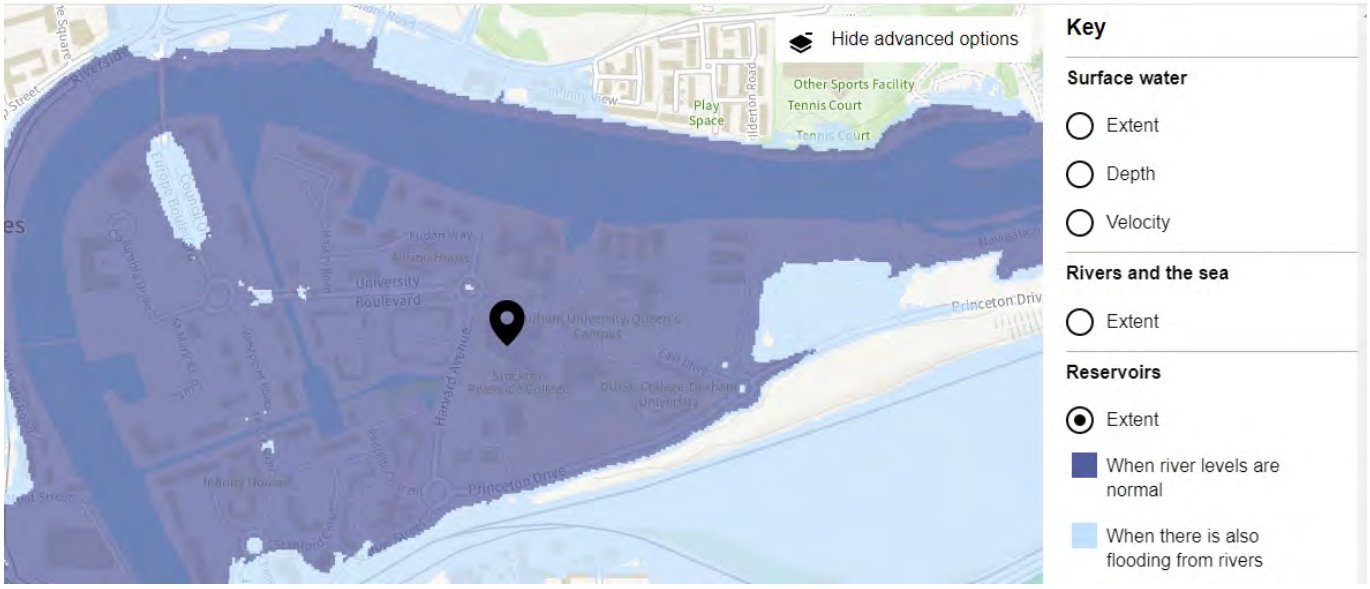


Figure 3 – Environment Agency Reservoir Flood Map for Planning

3.6.2. Additionally, the damage and widespread impact from reservoir breaches are severe and therefore it is particularly important to suitably maintain these structures. They are regularly inspected and it is considered extremely unlikely that a failure would occur.

3.6.3. Based on the above, the risk of flooding from artificial sources is categorised as LOW.

4. Probability of Flooding

4.1. The Environment Agency maps have been reviewed (see Appendix C). The entirety of the development site is identified as being in Flood Zone 1 as categorised by the National Planning Policy Framework (NPPF) and Technical Guidance.

4.2. Flood Zone 1 describes the land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year.

4.3. The previous section describes other flood hazards and the risk they pose to this project. A summary of the existing flood risk and the mitigation required is provided within Table 1 below.

4.4. The previous section describes other flood hazards and the risk they pose to this project. All sources of Flood Risk for the proposed works are categorised as LOW. Apart from surface water which can be mitigated as part of the proposed works.

4.5. Based on the previous section the overall assessment of the probability of flooding to the existing site is LOW.

Table 1 – Summary of existing flood risk and mitigation strategies

Flood Risk Source	Current Risk Level	Mitigation Requirement during detailed design	Risk Level following Mitigation
Tidal or Fluvial Flooding	LOW	The development is in Flood Zone 1, which is land that is assessed as having less than a 1 in 1000 (0.1 percent) chance of flooding each year – no mitigation required.	LOW
Surface Water	HIGH	An area of low to medium risk is situated in the vicinity of the proposed car park. As part of the works, levels are to be built up to remove these low spots. Flows will be contained within the extents of the car park. Mitigation methods will reduce the associated risk.	LOW
Groundwater	LOW	Low risk due to the depth of the ground water encountered and the generally low permeability soil - no mitigation required.	LOW
Sewer Flooding	LOW	Low risk due to maintenance carried out by Northumbrian Water on the adopted sewers or the on-site maintenance team for the private sewers. Design proposed levels to direct surface water around buildings or structures that could form a barrier and away from building entrances. Ensure proposed drainage is designed in accordance with best practices with an allowance for climate change.	LOW
Artificial Sources	LOW	The damage and widespread impact from reservoir breaches are severe and therefore it is particularly important to suitably maintain these structures. They are regularly inspected and it is considered extremely unlikely that a failure would occur.	LOW

5. Climate Change

5.1. NPPF Planning Practice Guidance website provides information on the impacts of climate change, which include sea level changes, river flash flooding and more frequent high intensity, short-duration rainfall. These are based on the Environment Agency current recommendations.

5.2. As concluded previously the risk of flooding from all sources is low in the proposed works. Therefore, these sources of flood risk are unlikely to be affected by climate change.

6. Flood Risk Management Measures

6.1. As stated in previous sections, the site is at low risk of flooding from tidal, fluvial, sewer, overland, groundwater and artificial sources post development. All impermeable areas will be positively drained via a positive drainage system.

6.2. The client should ensure all drainage is regularly inspected and maintained to avoid blockages.

7. Off Site Impacts

7.1. The proposals for this site should not increase the flood risk elsewhere off site for the following reasons:

- The proposed surface water discharge rate will be restricted as close as reasonably practicable to Greenfield runoff rates and agreed with the Lead Local Flood Authority and Environment Agency.
- The impermeable areas within the site will be positively drained via a proposed drainage network and designed to the 1 in 100-year storm + climate change, with attenuation provided accordingly.
- See BGP Drainage Philosophy that is to be submitted as part of this planning application for further details.

8. Residual Risks

8.1. Recommendations have been made within Section 4 and Section 7 to mitigate against any flood sources that pose any significant risk to the proposed site. All sources of flooding have been considered and the conclusion is that any residual risks are negligible.

9. Conclusions

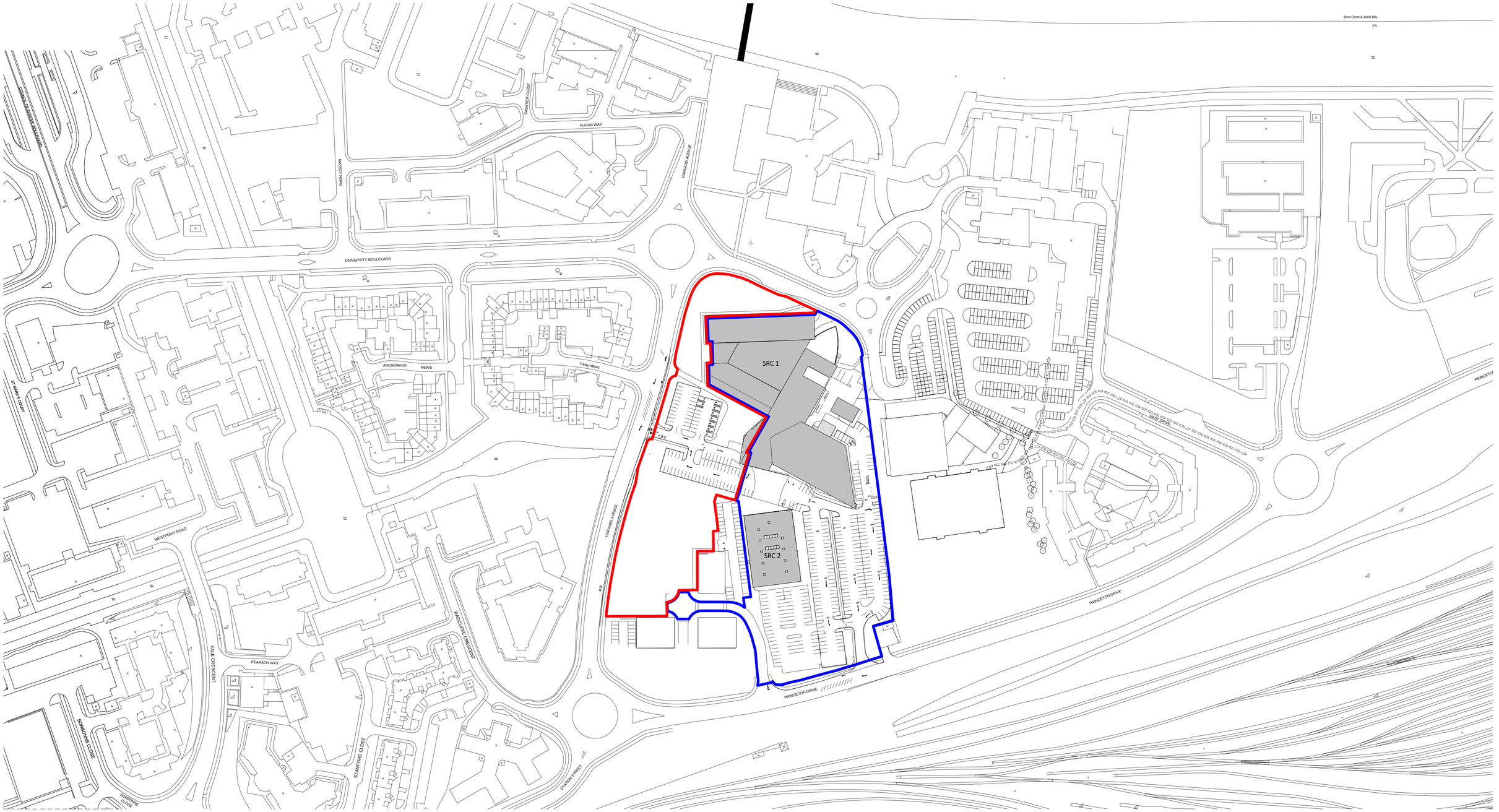
9.1. From the analysis the risk of flooding to the Proposed Car Park at Stockton Riverside College is LOW from all forms of flooding as categorised in the Framework and Technical Guidance. The flood designation for both sites is LOW.

9.2. The proposed uses of land are appropriate in this Flood Zone. (Tables 1, 2 & 3 of the Technical Guidance).

9.3. This report has been prepared with reference to the information available at the time of writing. The summary and recommendations may be revised upon receipt of additional or further information.

Appendix A

Site Location Plan



1. Existing Site Location Plan

SCALE - 1 : 1250@A1

1:1250 Scale 25m 0 25m 50m 100m

Legend

- Site Boundary
- Other Land Owned by Applicant

Key Plan

Rev	Date	Drn	Chk	Description
P01	17.04.24	CMKC	CMKC	Boundary Amended

GSSarchitecture
KETTERING | HARROGATE | GLOUCESTER | MILTON KEYNES | NEWCASTLE

Project Title:
NETA Relocation – Stockton Riverside College

Client:
The Education Training Collective

Drawing Title:
Site Location Plan

Drawn By:	Checked By:	Scale @A1:	Date:
JMS	AEM	1 : 1250	16.01.24

Status:

File No: E058b

Drwg No: (S)01

Rev: P01

Appendix B

Proposed Site Layout

NOTES

Legend

- Site boundary
- Existing spot level retained (AOD) — 6.030
- Retained vegetation
- Retained vegetation - grassland areas to be enhanced (ref BNG assessment)
- Species rich grassland
- Proposed native hedge
- Proposed native tree (small) (planted as standards)
- Existing trees to be retained
- Existing tree to be removed
- Tarmac
- Permeable block paving
- Proposed retaining wall (up to 1m)
- Proposed lighting column
- Adopted foul water sewer with 3 and 6m easement line shown
- Proposed vehicular barrier

REVISION | P01	DATE | 18.04.24	BY | AC	CHECKED | AC	
First issue. Issued for planning				
CLIENT	The Education Training Collective			
PROJECT	**NETA Relocation - Stockton Riverside College**			
TITLE	Car Park Relocation - Overall Site			
DWG No.	N1366-ONE-ZZ-XX-DR-L-0001		REV	P01
STATUS	Preliminary			
SCALE	1:500 @ A1	DATE 18.04.24	DRN BY	AC

0 5 10 20
metres 1:500

ONE-ENVIRONMENTS

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NOTES

Legend

- Site boundary
- 6.030 Existing spot level retained (AOD)
- Retained vegetation
- Species rich grassland
- Proposed native hedge
- Proposed native tree (small) (planted as standards)
- Existing trees to be retained
- Existing tree to be removed
- Tarmac
- Permeable block paving
- Proposed retaining wall (up to 1m)
- Proposed lighting column
- Adopted foul water sewer with 3 and 6m easement line shown
- Proposed vehicular barrier

HARVARD AVENUE

BUS STOP

SRC 2

REVISION | P02	DATE | 18..04.24	BY | AC	CHECKED | AC	
Various amendments. Issued for planning				
REVISION | P01	DATE | 09.04.24	BY | TL	CHECKED | AB	
First issue.				
CLIENT	The Education Training Collective			
PROJECT	**NETA Relocation - Stockton Riverside College**			
TITLE	Car Park Relocation - General Arrangement Plan			
DWG No.	N1366-ONE-ZZ-XX-DR-L-0001		REV	P02
STATUS	Preliminary			
SCALE	1:200 @ A1	DATE 09.04.24	DRN BY	TL

0 2 4 8 metres 1:200

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Appendix C

Environment Agency Flood Maps

Flood map for planning

Your reference	Location (easting/northing)	Created
<Unspecified>	**445416/518713**	**18 Apr 2024 9:27**

Your selected location is in flood zone 3, an area with a high probability of flooding.

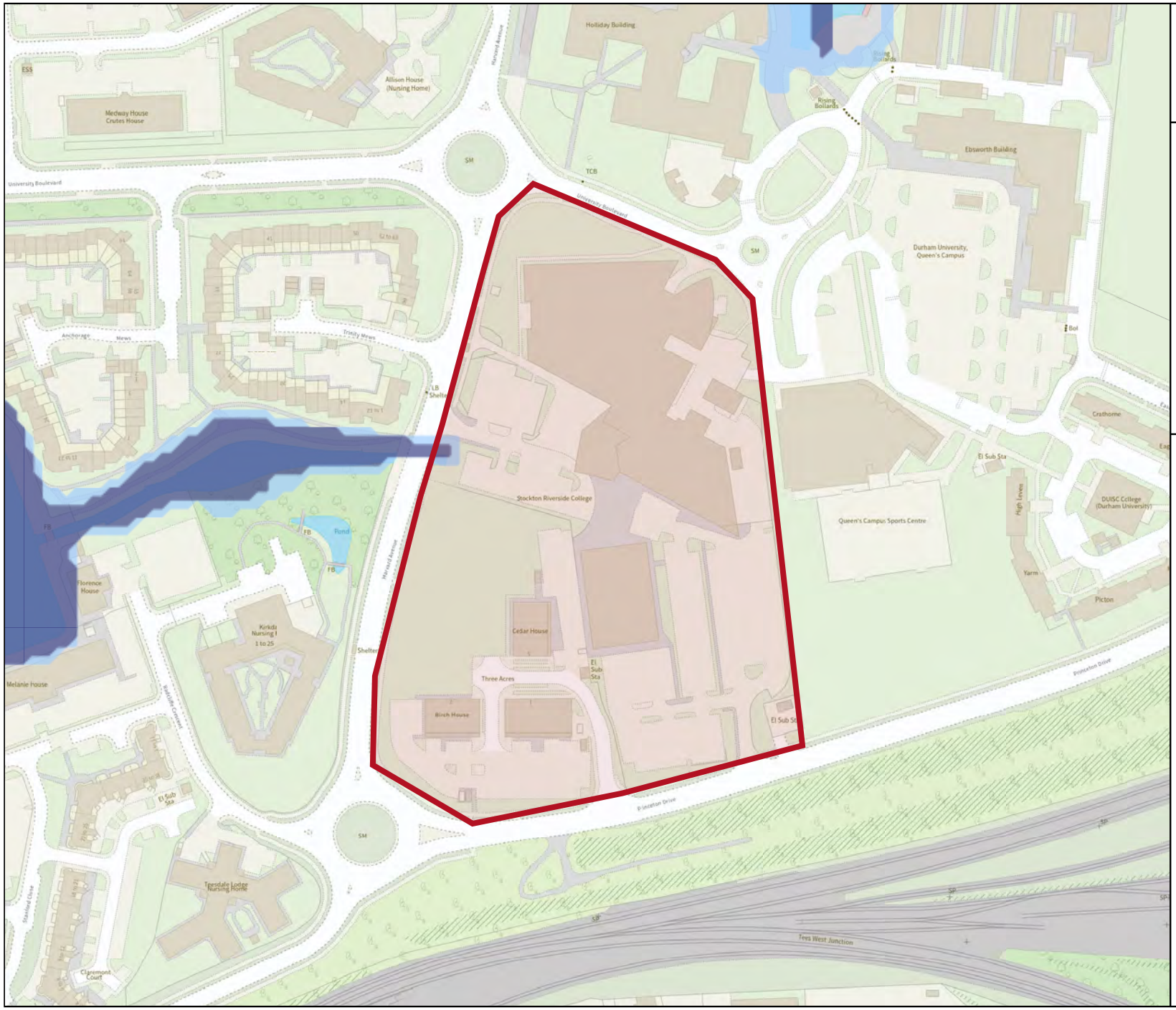
This means:

- you must complete a flood risk assessment for development in this area
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (see www.gov.uk/guidance/flood-risk-assessment-standing-advice)

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.



Environment Agency

Flood map for planning

Your reference
<Unspecified>

Location (easting/northing)
445416/518713

Scale
1:2500

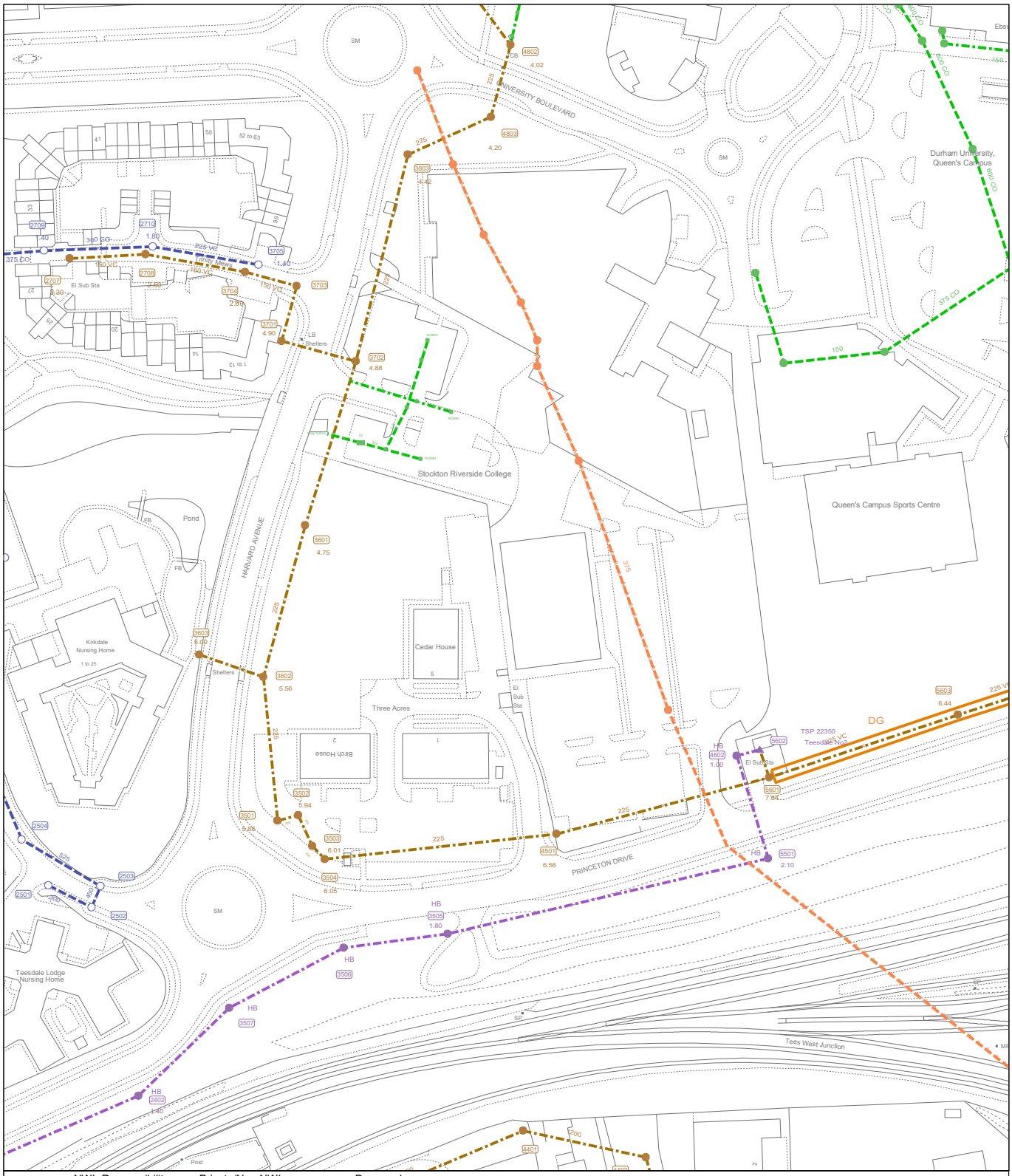
Created
18 Apr 2024 9:27

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

0 20 40 60m

Appendix D

Northumbrian Water Drainage Records



NWL Responsibility		Private/Non NWL		Proposed	
Combined		Combined		Combined	
Foul		Foul		Foul	
Surface		Surface		Surface	
Treated Eff		Treated Eff			
Untreated Eff		Trade Eff			
Overflow		Watercourse			

Annotations

- Direction of flow
- Backdrop
- Abandoned
- Rising Main

Symbols

- Chambers
- Inlet/Outlet
- Treatment Works
- Pumping Station
- Capped End
- Balancing Pond
- Termination Node
- Rodding Eye
- Unknown End
- Attribute Change
- Air Valve
- Property Connection
- Lamp Hole
- Hatchbox
- Dual Usage Chamber

NORTHUMBRIAN WATER *living water*

User : DAWSJ1

Date : 25/07/2022

Title : 0000

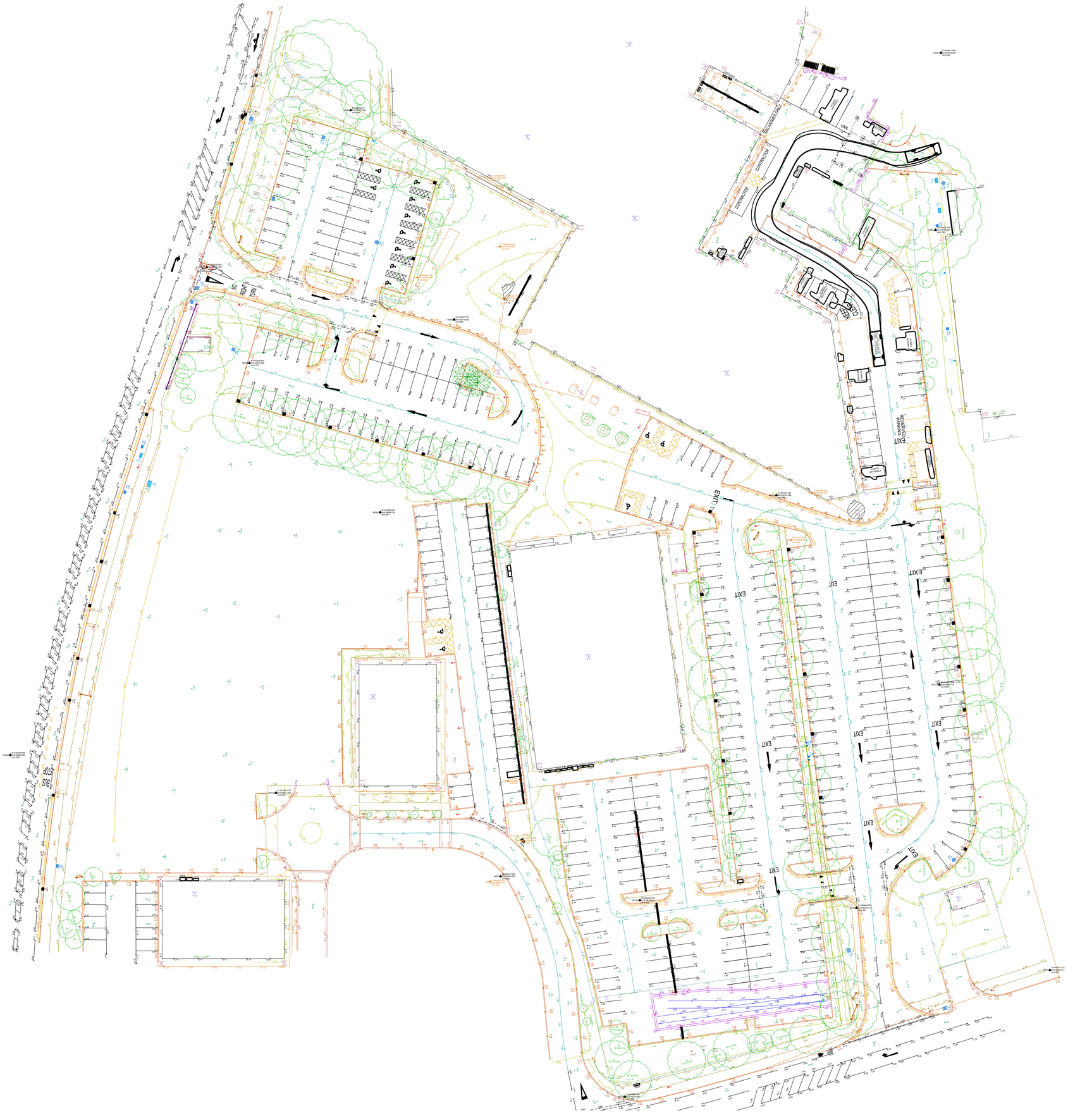
Centre Point : 445415,518676

Map Sheet : NZ4518NW

20 m

Appendix E

Topographic Survey


BUS STOP
BUS STOP
DELIVERIES ONLY
CONTRACTOR
CONTRACTOR
VAN
RESERVED PARKING
EXIT
EXIT
EXIT
EXIT
EXIT
EXIT
EXIT
EXIT
EXIT
EXIT

Appendix F

Reference Documents List

The National Planning Policy Framework (March 2012)	Communities and Local Government
The Technical Guidance to the NPPF (March 2012)	Communities and Local Government
Flood Risk Assessment Guidance Note 1	Environment Agency