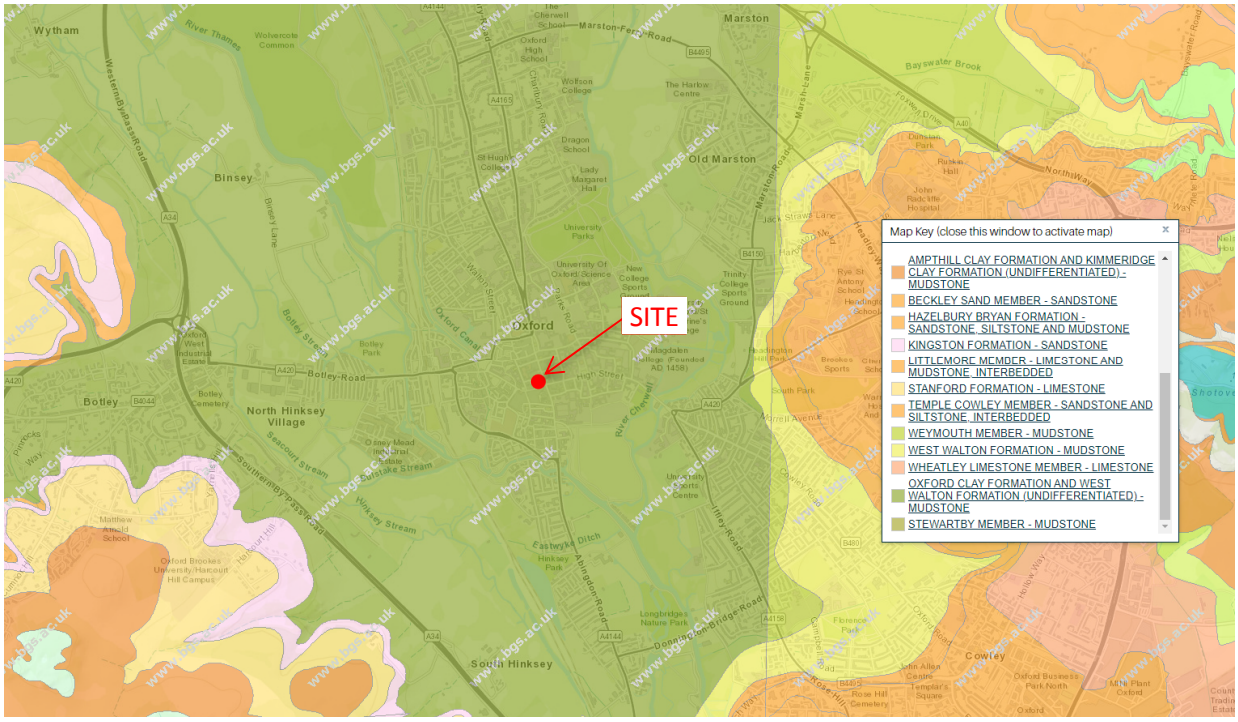


Figure 2.5 – BGS Bedrock Geology

2. 2. Proposed Development

The proposal involves the wholescale redevelopment of the property, involving refurbishment of some of the existing built structure, part demolition and new built development too, in a three phased scheme. Ultimately, the redevelopment will deliver a largely new building in its appearance comprising a mix of uses, with retail, offices, student accommodation and research and development laboratories.

The proposal also involves the removal of the existing roofed, enclosed mall, and its replacement by a series of new open-air streets through the redeveloped site, linking the site in from Queen Street, Shoe Lane and Cornmarket Street, and with a completely new public thoroughfare created through from Frewin Court.

At the centre of the redeveloped site, a new public square will be provided, landscaped with tree planting and areas for the public to sit and for outside seating to be provided in connection with the new cafés/restaurants that will front onto the square. Leading off this public square, a free lift access will also be provided to a new rooftop level where a café facility with terrace will allow views out across Oxford to be enjoyed.

The masterplan to date proposes to deliver the following:

- Retail units at ground level facing Queen street and Cornmarket street mall throughways
- Laboratories within the existing structure containing units 14/15/16 (refer to Appendix C)
- Offices
- Student accommodation within the existing unit 20 structure
- Public open usage space and upsized access paths

The existing Queens street mall and Cornmarket mall thoroughfares are proposed to be kept. An additional thoroughfare is proposed through the current service yard to the North-West of the site. All thoroughfares are proposed to convey to a new open square in the centre of the site, providing a focal point for site users *see figure 2.6*.

The site proposed includes a combination of major refurbishments and newbuild:

- The existing Units 14/15/16 structure is to be kept with further structural additions and alterations
- The unit 20 structure (formerly Clarendon House) will have majority of its footprint retained with a proposed demolition to areas facing the new square and service yard. It is also proposed that further storeys be added in limited areas of the existing structure.
- The remaining structures across the site propose to be demolished and rebuilt

The scope is to split the development into 3 zones, where each zone will be completed to different programme dates *see Appendix C – phasing overview*. A brief scope of phasing is as follows:

Zone 1 – Refurbishment of the existing unit 14/15/16 structure, demolition of the South-West area of the site adjacent to Queen street mall entrance and some South-East structures.

Zone 2 – Refurbish & Demolish/rebuild of unit 20 building and clarendon house including structure adjacent to Cornmarket street mall entrance.

Zone 3 – Demolish/rebuild the South east area of site including existing *Menkind* and *McDonalds* units.

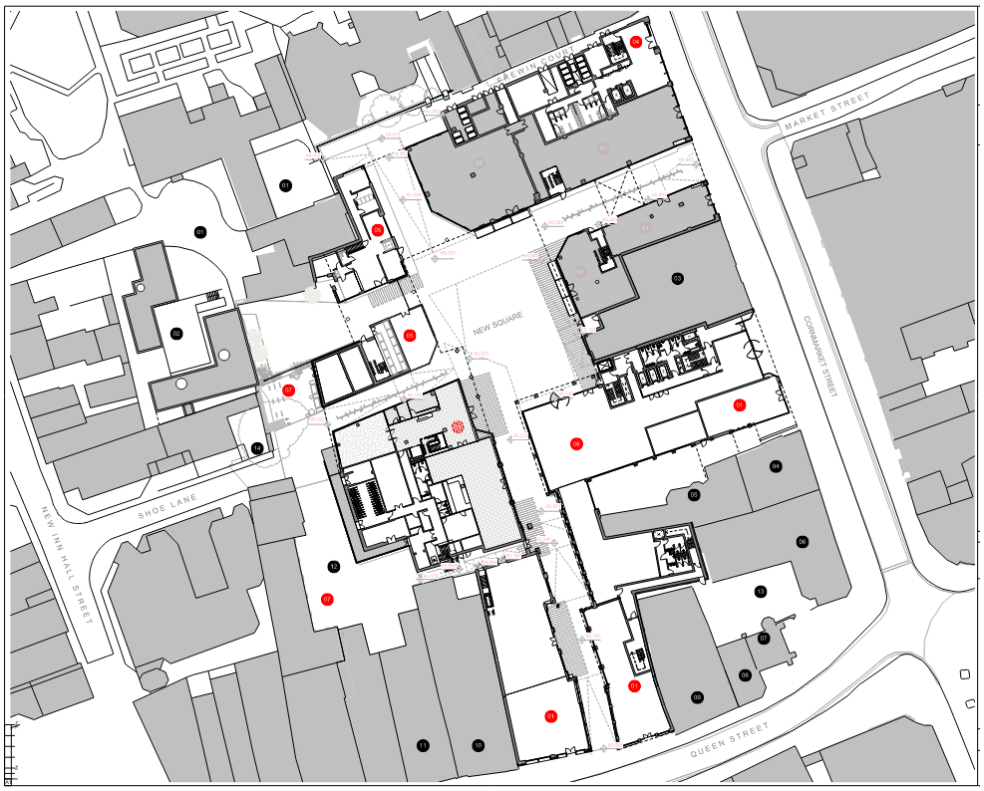


Figure 2.6 – Extract from Development Plans Appendix C - Ground Floor Masterplan as Proposed, Revision K

3. Drainage Strategy

3. 1. Existing Drainage Regime

3. 1. 1. Public Sewers

The public sewer network adjacent to the site is operated by Thames Water (*see figure 3.1)*. TW's asset plans indicate the following public sewers within the immediate vicinity of the site;

- A 225/300mm foul water sewer and 225mm surface water sewer runs south to north down Cornmarket Street along the eastern site boundary.
- A 225mm foul water sewer runs east to west down Queens Street past the southern boundary of the site.
- A 225mm surface water sewer runs east to west down Queens Street, the head of run indicated to be opposite the street access to Queens Street Mall
- A 225mm foul water sewer originating on site at the head of Shoe Lane, at the entrance of Shoe Lane Mall on the west of the site
- A 225mm surface water sewer originating near North Bailey House, towards the western end of Shoe Lane, close to the junction with New Inn Hall Street. (NB: a subsequent CCTV survey indicates that this sewer is not present on Shoe Lane and instead originates on New Inn Hall Street).

A copy of the TW asset plans is included in *Appendix E*.

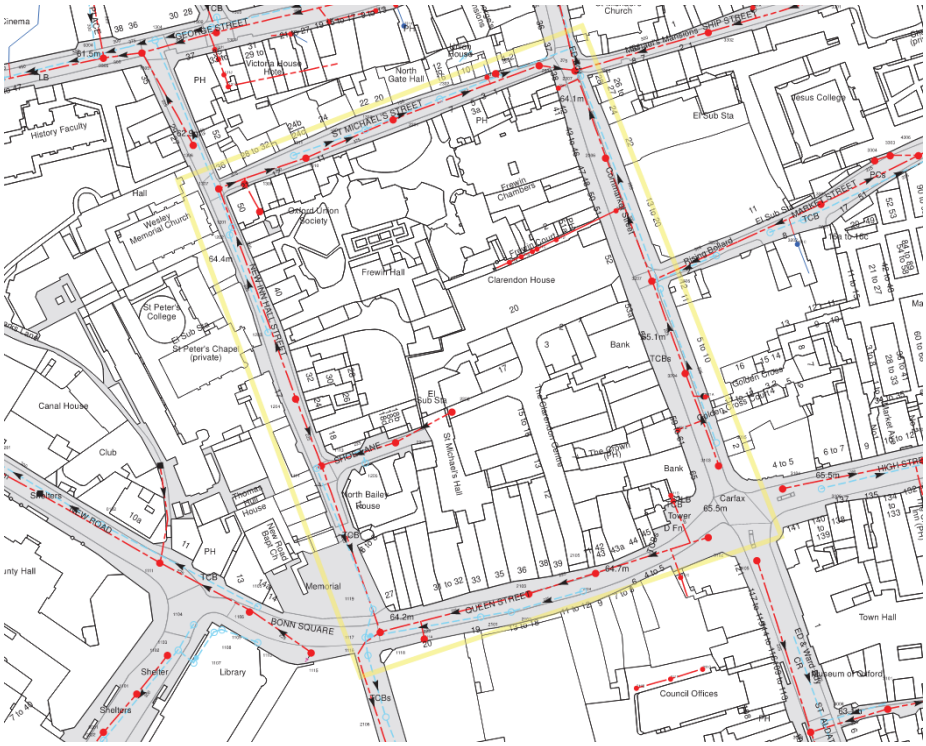


Figure 3.1 Extract from Thames Water Asset & Agreement Appendix E

3. 1. 2. On-site Private Drainage Network

Based on historic records, surveys and a CCTV survey undertaken in November 2020, a plan showing the assumed existing site drainage regime has been compiled and is included in *Appendix G.*

The existing site is served by 6 separate drainage networks, 3no. surface water and 3no. foul water. The systems can be split into 3 zones. Foul and surface water networks within each zone run side by side, often within the same chamber access within cast iron sealed pipes.

Network 1:

Network 1 begins at the Southern end of Queen Street Mall and turns West towards Shoe Lane past the existing Units 14/15/16. The foul and surface water systems are separate at the point they discharge to the Thames Water foul sewer on Shoe Lane at Thames Water manhole 2202 *Appendix E*.

This network is believed to serve the majority of the proposed Phase 1 and Phase 3 areas, with only the existing Units 14/15/16 roof area draining via a separate system.

It is believed that the building fronting Queen Street discharges to this drainage system and that there is no positive connection to the public foul or surface water sewers in Queen Street.

This network is also believed to serve a couple of areas outside of the site boundary, as highlighted on the *Subscan Survey, Appendix G*. This includes The Crown Inn public house and area of the southern service yard behind the building containing units 14/15/16.

Network 2:

Network 2 originates in the service yard to the North of Shoe Lane and bears East, running within the internal commercial units prior to discharging to the sewers in Cornmarket Street. It is not clear from the CCTV survey if the foul and surface water sewers discharge to the relative Thames Water sewers in Cornmarket Street, but it is believed that there are two separate connections leading off site.

This network is believed to take a small amount of roof catchment from Barclays Bank, which is located outside of the site boundary on the eastern boundary of the site.

Network 3:

Network 3 runs beneath unit 20 along the northern boundary of the site, adjacent to Frewin court. It discharges to the sewers in Cornmarket Street with the outfall chamber in the basement of Clarendon House, which sits on the corner of Frewin Court and Cornmarket Street.

Following the results of the CCTV survey, the existing site surface water networks were modelled based on the assumptions outlined above and the following is noted;

- All existing networks show surface flooding in the 1% and 3.3% AEP storm periods.
- All networks show existing surcharged systems for the 100% AEP storm periods.

A summary of the existing and proposed flows are included in tables 3.2-3.5.

Microdrainage outputs of all existing and proposed systems are included in *Appendix I*

3. 2. Proposed Drainage Regime

Section 5 of the OCCGSW, Policy S3 notes '*For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonable practicable to the greenfield runoff rate from the development for the same rainfall even, but should never exceed the rate of discharge from the development prior to redevelopment for that event'.*

During early consultation the Planning Officer, Felicity Byrne, noted the challenges in developing the site and its various constraints. The proposed development does not change the wider masterplan site layout and proposes to erect new structures largely within the existing structural footprints, whilst renovating others, some additional constraints are noted below;

- Existing dense site, within limited open areas for below ground storage
- Potential archaeology limiting areas of dig
- Phased development with areas of the site remaining operational during works
- 'New build' areas draining via existing drainage that runs through areas to be renovated or existing areas that will remain in operation during construction.

The proposed drainage strategy observes the SUDS hierarchy, which is discussed further in 3.2.1 and looks to maximise the storage at roof level on the 'new build' areas of the site. Additional attenuation is proposed beneath the courtyard square in 'Phase 2' of the development.

Due to the various site constraints it is not possible to reduce the overall site run-off to greenfield rates. The strategy proposes to reduce this from the new building roof areas as far as is practicable and strives to mitigate the existing on-site flooding risk.

The proposed networks and associated development phases are discussed in detail in 3.2.2.

3. 2. 1. SUDS Assessment

Based on Oxford local Plan – 2036 Policy RE4 hierarchy of drainage SUDS is a required consideration. *The LLFA strongly recommends early consideration of SuDS when formulating the development design and layout, so as to successfully integrate suitable, efficient SuDS, which offer wider environmental benefits.*

Policy RE4 states that '*All development proposals will be required to manage surface water through Sustainable Drainage Systems or techniques to limit run-off and reduce the existing rate of run-off on previously developed sites. Surface water runoff should be managed as close to its source as possible, in line with the following drainage hierarchy:*

a) Store rainwater for later use; then:
b) Discharge into the ground (infiltration) then:
c) Discharge to a surface water body; then:
d) Discharge to a surface water sewer, highway drain or other drainage system; and finally:
e) Discharge to a combine sewer.

a) **Store rainwater for later use:**

Due to the various site constraints there is limited space for storage below ground. Proposals include the installation of blue roofs in Phase 1 and 3, as seen in *Appendix D*. In some areas the blue roof will be combined with a green roof which will reduce run-off during low intensity rainfall events through evaporation and evapotranspiration. A below ground *geocellular* tank is proposed beneath the Phase 2 courtyard, which will alleviate existing surface flooding, and store water for more gradual discharge.

b) **Discharge into the ground (infiltration):**

Due to constraints of highly built up area, nearby basements and a bedrock of low permeability Oxford clay it is deemed unfeasible to infiltrate rainwater into the ground *see Geology 2.1.6*

c) **Discharge to a surface water body**

There is no nearby surface water body to discharge to *see Hydrology 2.1.3*

d) **Discharge to a surface water sewer, highway drain or other drainage system**

The existing sewage networks can be seen in *Appendix E* under Thames water asset plans and *Appendix G* Subscan Survey. The site is proposed to drain surface water via the existing connections into the surface water sewers in Cornmarket Street. There is no surface water near to the western boundary of the site, with the nearest surface water sewer located in New Inn Hall Street at the western end of Shoe Lane.

e) **Discharge to a combined sewer.**

Network 1 is proposed to discharge surface water as per the existing outfall, to the public sewer in Shoe Lane. This sewer is noted on TW's asset plans to be a foul water sewer however, based on the recent CCTV survey and lack of surface water sewer in the immediate vicinity, it is believed to carry combined flows.

The proposed strategy considers the drainage hierarchy within the feasibility of the development following guidance from Ciria Report 609.

3. 2. 2. Surface Water Philosophy

The surface water network proposal is designed to contain up to the 1% annual exceedance probability (accounting for surcharge) with a 40% allowance for climate change consideration, with only minimal surface flooding such that it does not cause risk to person or property.

The development will be separated into three phases, as indicated on drawings 5140-WAL-ZZ-SW-DR-D-3000-3003 *Appendix D*, as follows;

- Phase 1 (except unit 14/15/16 roof) and Phase 3 areas will drain into Network 1, commencing by the Queen Street Mall entrance and discharging to Thames water's foul sewer in Shoe Lane. It is proposed to re-use all existing drainage apart from laterals from the new building's downpipes which will be replaced as required to suite the development.
- The existing unit 14/15/16 roof will drain as per existing to Network 2.

- Phase 2 is split over Network 2 and Network 3. Areas covering development zones 2B and the unit 14/15/16 roof will drain into Network 2, starting at the service yard and running East to discharge to the TW sewers in Cornmarket Street.
- Areas covering development zones 2A will drain into Network 3, running underneath Clarendon house and draining to TW sewers Cornmarket Street.
- Zones 2a and 2b run on independent networks and will therefore not interfere with each other or phases 1 and 3.
- All networks will discharge to sewers by gravity. Existing and proposed basement areas will be pumped locally to discharge under gravity via the wider site network.
- The proposed sewer network can be seen in *Appendix D*.

Phase 1:

Phase 1 covers approximately 2270m^2 of which 830m^2 is the existing unit 14/15/16 roof draining to Network 2. Phase 1 comprises the demolition of the existing structure and construction of a new 3 storey structure on the corner of Queen Street and Queen Street Mall. A new roof structure is to be constructed over the existing unit 14/15/16 roof and Queen Street Mall, which is currently under cover, the roof will be removed as part of the proposed works and this will become an external area.

The new building covers an area of approximately 710m^2. It is proposed to install a plan area of approximately 388m^2 of blue on top of the new building and to restrict run-off from the blue roof to 1 l/s for storms within 1% AEP (+40% climate change). The blue roof design and restriction will need to be confirmed by a Blue Roof specialist during detailed design.

Phase 1 is proposed to discharge via the existing Network 1 to the public sewer in Shoe Lane, as per the existing arrangement. The exception is the new structure over the unit 14/15/16 roof which is proposed to drain to Network 2 as it does currently. Phase 3 areas, which also drain to Network 1 are proposed to be kept live during the Phase 1 works.

Opening up Queens Street Mall roof will require the installation of new surface drainage along the mall which will be connected to the existing Network 1 system via new laterals. This will need to be undertaken whilst maintaining pedestrian access through Queen street mall.

Following the Phase 1 development there will be an 8.8% reduction in peak flow discharge from Network 1 to the sewer however, it should be noted that there will be a 50% reduction in peak flow run-off from the new building area, from 26.8 l/s to 12.2 l/s (based on the 1% AEP +40%, 15 mins winter storm Mircrodrainage output of 136.153 mm/hr).

As discussed previously Network 1 services Phase 1, Phase 3 and additional off-site areas. Phase 3 and Queens Street Mall are to remain operational during the Phase 1 works whilst the off-site catchment areas are not within the development design scope. These limiting factors mean it is not feasible to further restrict peak-run off to sewer during Phase 1.

The strategy proposes that there will be no on-site surface flooding in the 3% AEP storm and only minor on-site flooding, such that it does not pose risk to person or property in the 1 % AEP (+40% climate change). This is compared to up to 25.8m^3 predicted site flooding for the same storm event pre-development.

It should be noted that both pre and post development, surface flooding is predicted in the off-site area of the Crown Building public house. This area is outside of the development design scope, with limited design

data available however, based on the data available and assumptions noted on the drawing, the model indicates that there will be a 34.5% reduction in surface flooding in this area post Phase 1 development.

A summary of the existing vs. proposed peak rates and surface flooding are presented in tables 3.2-3.6.

Phase 2:

Phase 2 covers a total catchment area of approximately 3423m^2 and predominantly comprises the renovation of the existing buildings, with a small area to be demolished and re-built on the eastern corner of the square. The central square is currently under cover and the roof will be removed with the existing commercial units and façade adapted to suit the new external environment.

Zone 2a (Network 3); is not expected have any significant associated works and is proposed to drain via the existing drainage network as per the current arrangement.

Zone 2b (Network 2); runs through the proposed central square. It is proposed to install a below ground geocellular tank beneath the central square and upgrade some of the existing pipework upstream of the tank, to alleviate the existing on-site flood risk. Additionally, the landscape architect has proposed a 'SUDS friendly' paving feature to direct water over land to shallow storage depressions which double up as water features and encourage evaporation.

It is estimated that approximately 71.25m^3 storage will be required to negate on-site surface water flooding for storms up to 1% AEP event (+40% climate change). The tank is proposed to be a *Permavoid geocellular* tank, to permit shallow cover and reduce the plan areas as the tank will need to be coordinated with the proposed landscaping. Localised tree pit attenuation will be considered and can be connected to the below ground tank.

Following the Phase 2 development there will be a reduction in peak flow discharge from Network 2 to the public sewer in Cornmarket street of up to 46.8% for the 1% AEP +40%cc. Factoring in the existing flows from Network 3 this translates to an overall reduction in peak flow run-off to sewer of up to 26.9% following the development of Phase 2.

Phase 3:

Phase 3 covers an area of 1425m^2, it is located on the eastern side of Queen Street Mall and is proposed to be entirely new construction. Blue and green roofs are proposed to viable areas of the new roof and cover an area of approximately 514m^2.

The proposed roof is set at varying levels and as such it is not considered feasible to restrict run-off from all areas. It is proposed to restrict this from the blue roof areas to 1.5 l/s for storms up to the 1 in 100 year (+40% climate change). The blue roof design and restriction will need to be confirmed by a Blue Roof specialist during detailed design.

Following the Phase 3 development, there will be a reduction in peak flow run-off from Network 1 to the sewer of up to 25% from pre-development rates for 1% AEP event (+40% cc).

The strategy proposes that there will be negligible on-site surface flooding in the 1% and no flooding in the 3% AEP storms (+40% climate change).

Modelled flooding within the off-site Crown Building public house area is shown to reduce by over 75% post Phase 3 development compared with existing.

3. 2. 3. Surface Water Peak Flow Tables

In line with 4.4 of OCCGSW the surface water network has been undertaken using the FSR rainfall data, as the critical storm duration is less than 60 minutes and therefore it is considered to be more accurate than the FEH data.

The model results presented in the tables below have the 1, 3 and 100% AEP events with up to 40% climate change as indicated, for the 15 mins, winter storm event. A copy of the full Microdrainage model results are included in *Appendix I*

Network 1 Existing Vs. Proposed							
Catchment	**Peak flow rate/Return period**			**Surface flood volume m3**			**offsite surface volume flooding m3**
	1yr storm	30yr storm	100yr storm	1yr storm	30yr storm	100yr storm	100yr storm
Existing (0% cc)	29.5	44.6	49.5	0	3.3	9.8	16.8
Existing (40% cc)	35.7	51.2	57.2	0	12.2	25.8	27.7
Proposed following phase 1 (0%cc)	25.8	42.4	45.5	0	0	0.3	11
Proposed following phase 1 (40%cc)	32.9	47.2	52.5	0	1.2	6.3	20.6
Proposed following phase 3 (0%cc)	18.8	37.1	39.7	0	0	0	4.0
Proposed peak flow rate following phase 3 (40%cc)	25.9	40.3	42.6	0	0	1.3	12.3

Table 3.2 - Network 1 existing vs. proposed peak flow rates and surface volume flooding

Network 2 Existing Vs. Proposed						
Catchment	Peak flow rate/Return period			Surface flood volume m3		
	1 year storm	30 year storm	100 year storm	1 year storm	30 year storm	100 year storm
Existing (0% cc)	23.0	40.0	49.9	0	11.3	15.6
Existing (40% cc)	27.8	52.4	62.3	0	17.6	26.0
Proposed (0%cc)	19.2	25.7	28.5	0	0	0
Proposed (40%cc)	21.0	29.4	33.1	0	0	0

Table 3.3 - Network 2 existing vs. proposed peak flow rates and surface volume flooding

Network 3 Existing/Proposed						
Catchment	Peak flow rate/Return period			Surface flood volume m^3		
	1 year storm	30 year storm	100 year storm	1 year storm	30 year storm	100 year storm
Existing (0% cc)	14	25.3	29.6	0	0	0
Existing (40% cc)	17.6	31	36.6	0	0	0

Table 3.4 - Network 3 peak flow rates and surface volume flooding where existing is expected to remain unchanged N.B. The model assumes that the existing network is completely sealed at ground level as all manholes are internal and believed to have sealed cast-iron fittings. The table shows existing values where Network 3 proposed to be left unchanged.

Network catchment Areas m^2			
	Network 1	Network 2	Network 3
Phase 1	1460	830	0
Phase 2a	0	0	1120
Phase 2b	0	2310	0
Phase 3 structure	1425	0	0
offsite	430 (Crown PH – assumed)	90 (Barclays Bank – assumed)	0
Total on-site catchment area	2885	3140	1120
estimated storage volume provided	$72.8m^3$	$71.25m^3$	$0m^3$

Table 3.5 - Network associated catchment areas and estimated storage provided
NB: Areas noted are approximate and based on existing data, CCTV survey information and 'best guess' assumptions

3. 2. 4. Foul Water Philosophy

The existing foul drainage Networks 1,2 and 3 are proposed to remain and re-used as existing. Existing runs will be cleaned and repaired as necessary and additional laterals constructed to suit the new proposed building requirements.

These foul networks run independently of surface water drains, although chambers are shared in most instances with the internal pipework running in sealed cast iron fittings.

Additional localised systems are anticipated to be required to serve the new buildings along Queen Street Mall, which will discharge into the existing Network 1 system.

The proposed peak design flow for the networks is calculated as 6.3 L/s, 2.7 L/s and 2.5 L/s for Networks 1,2 and 3, respectively. This compares to existing peak foul flows of approximated 2.2l/s, 0.7l/s and 1.5l/s. The increase in peak outflows across all three networks is associated with a transition from primarily retail usage to accommodation, food and beverage areas and a laboratory. A pre-planning enquiry will be submitted to Thames Water to confirm capacity within the local sewer network for the proposed development.

N.B. the existing and proposed peak foul flows for Networks 2 and 3 cross the same structure, as such these networks may have varying proportions of their total. Proposed and existing calculations based on *Appendix C – Masterplans 18029 Revision K* and *Appendix G – Existing Site plans.*

There are new laboratories proposed within the Phase 1 development which will require a Trade Effluent license with Thames Water. The laboratory drainage is to be kept separate from the main building foul drainage and discharge to a separate location. A flow monitoring and quality control chamber is indicated at the outfall to be detailed further during the next design stage. A trade effluent licence will need to be obtained prior to connection.

It is assumed that any future commercial kitchen or food and beverage establishment will provide grease traps at source, which should be stipulated within the tenancy agreements and Operations and Maintenance manuals.

3. 2. 5. Design Criteria

When designing the surface water drainage network, it should be assessed against the following criteria to comply with British and European Standards BS EN 16933-2:2017;

- No significant surcharging (gravity flow only) for storm flows with a 50% AEP
- No flooding for storm flows with a 3.3% AEP
- No flooding off-site or flooding that would present a risk to person or property for storms with a 1% AEP
- An additional 40% allowance for climate change will be applied to all calculations

Based on the above assessment, the volume of water to be stored will be determined using the MicroDrainage analysis software based on the following input variables;

- Storm Water Return Period - 1 in 100 years + 40%
- Site location – to determine the rainfall hyetograph characteristics
- Pipe network volume – calculated by the automated process

Foul water drainage design will be in accordance with BS EN 16933-2:2017. Based on the population method the following references have been used to assess the foul drainage peak design flow. Tables can be found in *Appendix H – Foul Design Peak Flow*.

- CIRIA report 121 CI 1.1.2
- Axcell et al, Real estate finance and investment, city university research paper no. 2001.01, Feb 2001 p.10
- Ciria report 121 table 2.
- Ciria report 177 table 4.4
- Metric handbook part 17 table III – fast food/takeaway
- M&E engineer for laboratory peak flow rate

3. 2. 6. Increase in Impermeable Area Mitigation

The total site area has remained the same where permeability has increased from the existing therefore mitigation is not needed.

3. 2. 7. Residual Risk and Mitigation

The designers will need to consider the flow of water through the site for exceedance flow when designing the finished levels.

4. Below Ground Drainage Maintenance Plan

4. 1. Introduction

All below ground drainage components on the development should be inspected regularly and maintained to ensure design flow conditions are maintained. Inspection and maintenance will be the responsibility of the Client appointed building management company.

It is recommended that a Below Ground Drainage Maintenance Plan is implemented. Reference should be made to Section 6 of BS EN 752:2017 but in general, maintenance activities are likely to comprise of:

- Regular Maintenance – Litter collection, gardening to control vegetation growth, inlet checks.
- Occasional Tasks – Checking the SuDS features and removing any silt/blockages that build up.
- Occasional Tasks – Checking blue roof drainage/outlets as specified by specialists.
- Occasional Tasks – Schedule checks on flow monitoring and quality control carried out by laboratory tenant
- Remedial Work – Repairing damage where necessary.

4. 2. Proposed Below Ground Drainage Maintenance Plan

Below is an indication of the minimum expected undertakings to inspect and monitor the onsite below ground drainage at Clarendon shopping centre and Clarendon house, Oxford. The below list is not extensive and is to be read in conjunction with any specific inspection and maintenance requirements set by product manufacturers.

A land ownership boundary will demarcate the region in which the owner or appointed building management company will maintain drainage features inside of this boundary. The owner or appointed building management company will be responsible for the maintenance of drainage features inside this boundary.

	Regular Maintenance	Frequency	Responsibility
1	Litter management		
1.1	*Regularly remove litter from paving, drainage channels, blue roofs, permeable paving, gullies and manhole sumps*	Monthly	Client or appointed Maintenance Contractor
2	Inlets and Outlets		
2.1	*Inspect inlet structures such as RWP's, channel drains and gullies removing silt, as necessary. Check for any physical damage.*	Monthly	Client or appointed Maintenance Contractor
3	Subterranean Works		
3.1	*Inspection of flow control device to identify any areas that are not operating correctly and clear out and debris from chamber.*	Monthly for first 3 months then every 6 months	Client or appointed Maintenance Contractor

3.2	*Inspect and identify any areas of pipework that are not operating correctly, undertake remedial works if required.*	Monthly for first 3 months then annually	Client or appointed Maintenance Contractor
	Occasional Maintenance		
3.3	*Inspect drainage runs using CCTV technology and clean with powered jet cleaner where required*	Every 6-8 Years	Client or appointed Maintenance Contractor
4	Inspection and control chambers		
4.1	*Inspect and clear out sediment from catchpit*	Annually	Client or appointed Maintenance Contractor
4.2	*Remove inspection chamber covers, inspect for free-flowing water and remove debris/silt as required*	Annually	Client or appointed Maintenance Contractor
4.3	*Inspect quality control and flow monitoring chambers for laboratory usage*	Monthly for first 3 months then annually	Specialist Maintenance Contractor
5	**Remedial Management**		
5.1	*Remedial works carried out as required following maintenance inspections*	As required	Specialist Maintenance Contractor

Note:

- Special inspection and immediate appraisal may be required in the event of a structural accident, fire, flooding, reported structural distress or suspected inadequacy.
- It is recommended that in situations where an expected severe storm is to hit that all gullies, drainage channels and manhole sumps are cleared of any debris material.
- Refer to the manufactures of all attenuation systems and flow control devises for their specific inspection regime requirements for their products.
- All inspections should be carried out by the appropriate persons and they should be confined space trained if entering below ground structures such as manholes.

4. 3. SUDS Maintenance Requirements

Regular maintenance on SuDS is required for blue roofs, permeable paving and attenuation systems. Appendix D drainage strategy will show indicative locations of the SuDS to be maintained. Further information will be provided in the detailed design. The owner or appointed building management company will be responsible for maintaining continual operation of SuDS within the site boundary to a minimum of CIRI SuDS Manual guidance.

Maintenance Schedule	Action	Frequency
Blue roofs operations and Maintenance Requirements (taken from green and brown roofs guidance)		
Regular inspections	*Inspect components including soil substrates, vegetation, irrigation systems, membranes and roof structure for proper operation, integrity of waterproofing and structural stability*	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drainage system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular maintenance	*Remove debris and litter to prevent clogging of inlet drains and interference with plant growth*	Six monthly and annually or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly and annually or as required
Remedial Actions	*if drain outlet has settled, cracked or moved, investigate and repair as appropriate*	As Required
Attenuation Storage tanks Operations and Maintenance Requirements		
Regular Maintenance	*Inspect and identify areas that are not operating to requirement. Take remedial action if needed*	Monthly for 3 months, then annually
	Remove debris from catchment ingress where it may affect performance of system	Monthly
	For system where rainfall infiltrates into tank above check ingress at filter point, vent pipes and rodding eyes for sediment blockage	Annually
Remedial actions	*Repair/replace inlets, outlets, overflows and vents*	As Required
Monitoring	*Survey inside of tank for sediment build-up and remove if necessary*	Every 5 years or as required

5. Conclusions

The existing site is heavily constrained, which impacts the potential SUDS opportunities and ability to reduce peak surface water run-off to greenfield rates.

The existing site is served by 3 separate surface water systems with phases and system crossing over, adding a further constraint to the drainage design development.

The proposed strategy aims to maximise blue roof storage potential on new build structures and provide additional below ground storage beneath the proposed landscape square in Phase 2.

Following Phase 1, there will be an 8.8% reduction in peak flow run-off to the public sewer in Shoe Lane but a significant decrease in on-site surface water flooding.

Following Phase 2, there will be a 46.8% reduction in peak flow run-off to the public sewer in Cornmarket Street and the existing on-site surface water flood risk mitigated.

Following Phase 3, there will be up to a 25% reduction in peak flow run-off to the public sewer in Shoe Lane, and a 95% reduction of on-site flooding for 1% AEP +40%.

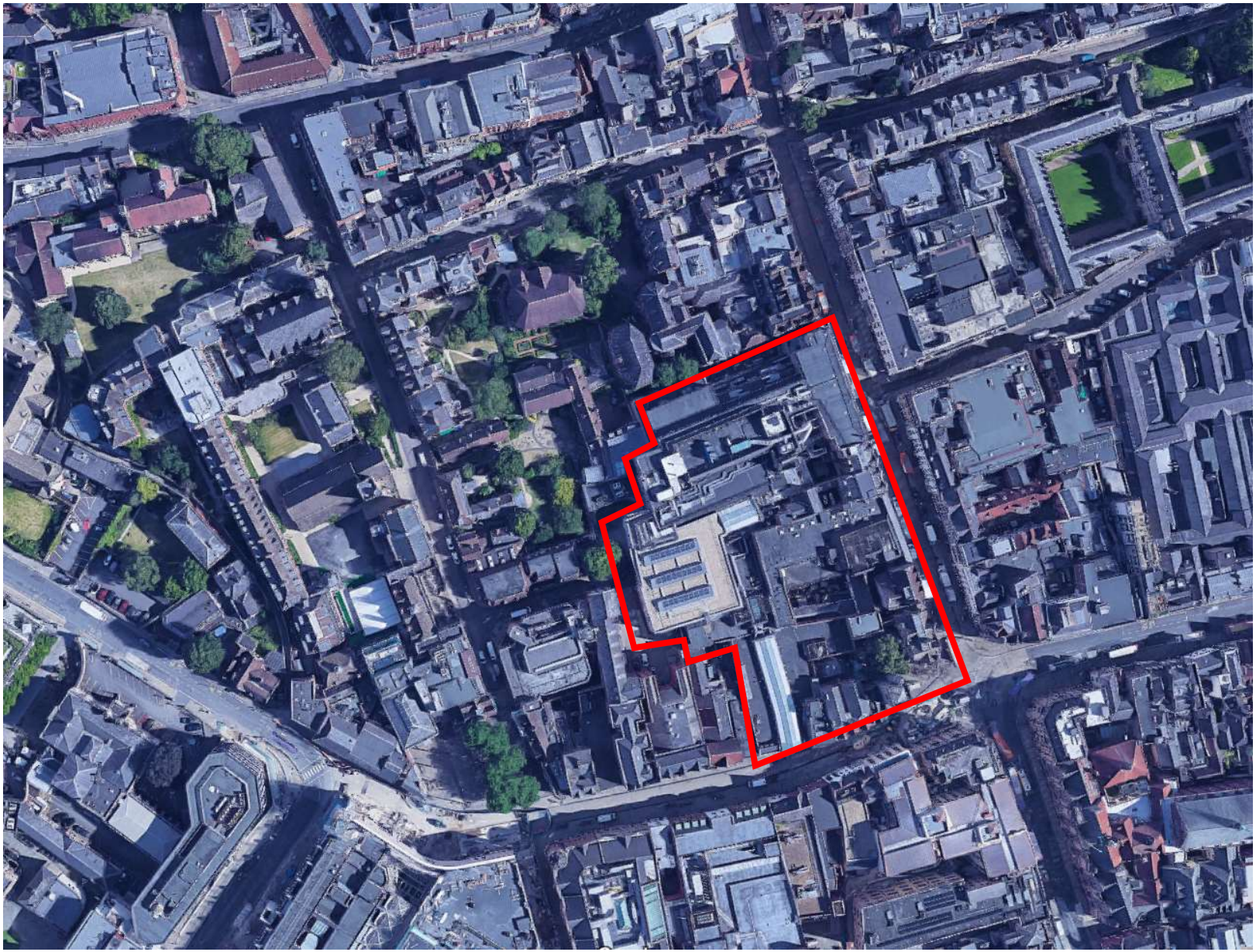
The proposed foul water peak-flows will increase as a result of the development with the inclusion of additional office space, laboratories and student accommodation. However based on CCTV surveys the site network capacity is deemed sufficient.

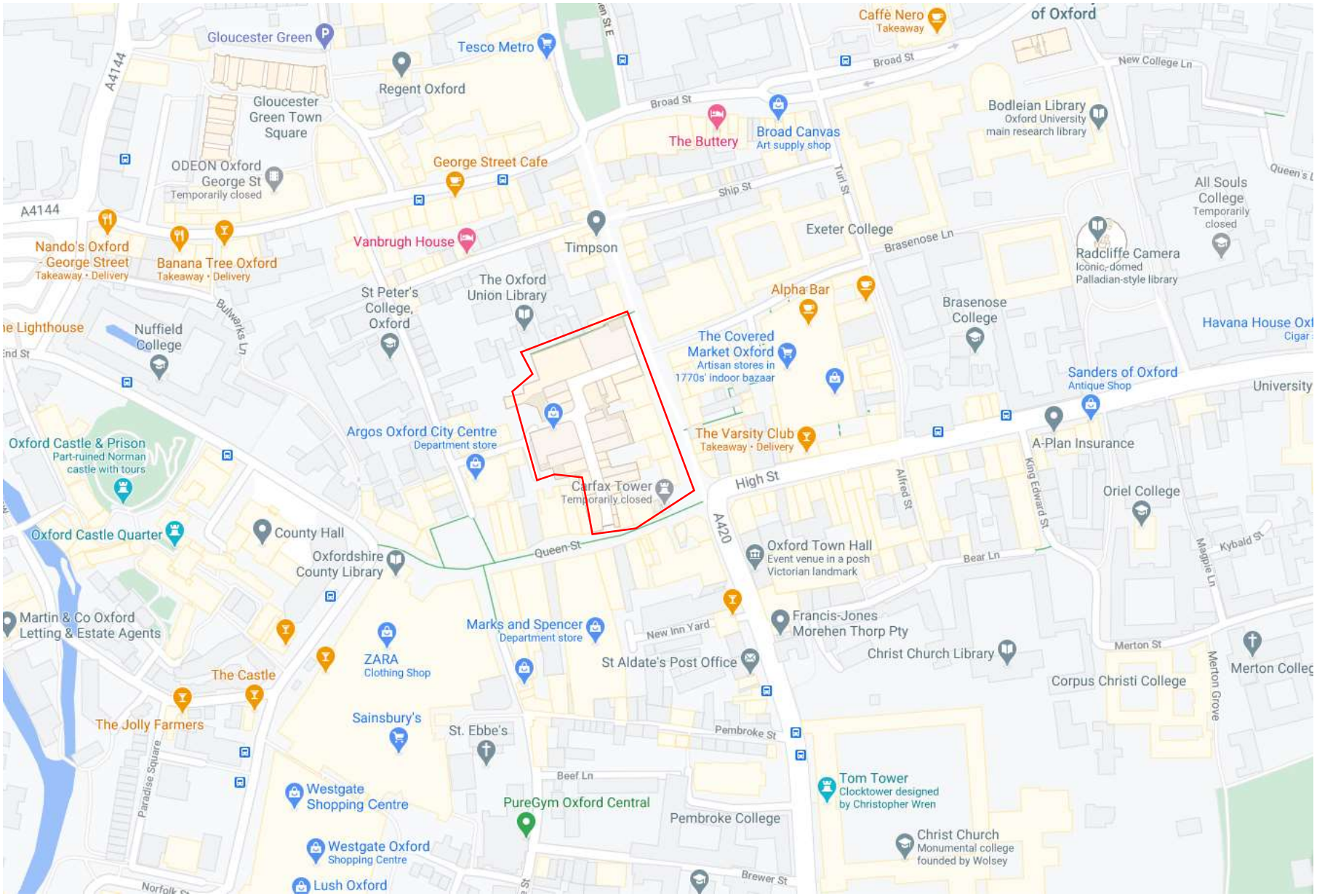
This report demonstrates that flood risk will be reduced both on and -off site as a result of the proposed development.

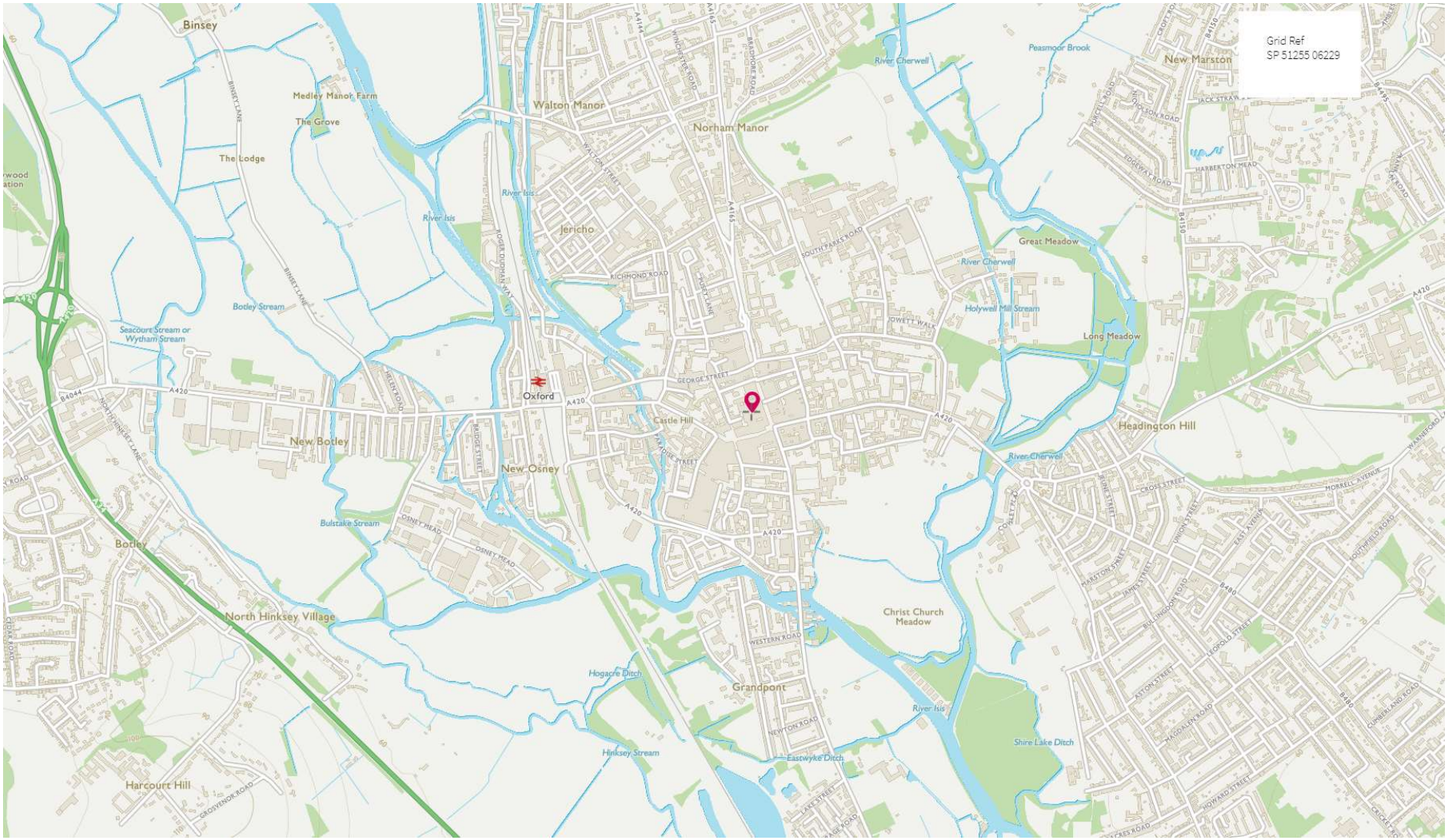
WALSH

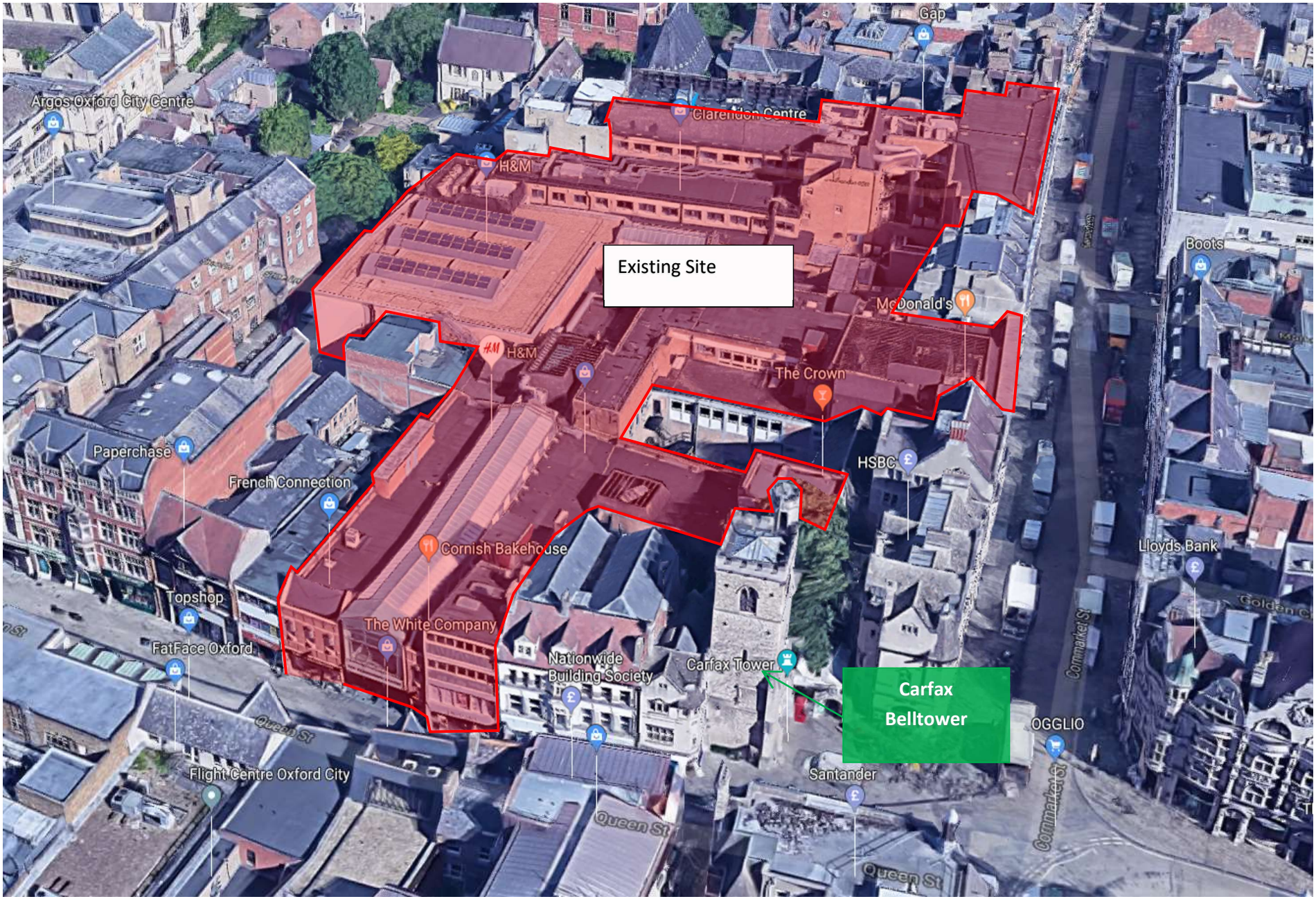
Appendix A **Location Plan**

WALSH




Gloucester Green
Tesco Metro
Caffè Nero
Takeaway
of Oxford
Regent Oxford
Gloucester Green Town Square
A4144
Broad St
New College Ln
The Buttery
Broad Canvas
Art supply shop
Bodleian Library
Oxford University main research library
ODEON Oxford George St
Temporarily closed
George Street Cafe
Ship St
Turl St
All Souls College
Temporarily closed
Nando's Oxford - George Street
Takeaway · Delivery
Banana Tree Oxford
Takeaway · Delivery
Vanbrugh House
Timpson
Exeter College
Brasenose Ln
Radcliffe Camera
Iconic domed Palladian-style library
St Peter's College, Oxford
The Oxford Union Library
Alpha Bar
Brasenose College
Nuffield College
Bulwarks Ln
The Covered Market Oxford
Artisan stores in 1770s' indoor bazaar
Havana House Oxf
Sanders of Oxford
Antique Shop
University
Argos Oxford City Centre
Department store
The Varsity Club
Takeaway · Delivery
A-Plan Insurance
Oxford Castle & Prison
Part-ruined Norman castle with tours
Carfax Tower
Temporarily closed
High St
Alfred St
King Edward St
Oriel College
Oxford Castle Quarter
County Hall
Oxfordshire County Library
Queen St
A420
Oxford Town Hall
Event venue in a posh Victorian landmark
Bear Ln
Kybald St
Magpie Ln
Martin & Co Oxford Letting & Estate Agents
Marks and Spencer
Department store
New Inn Yard
Francis-Jones Morehen Thorp Pty
Christ Church Library
Merton St
Merton Colleg
The Castle
ZARA
Clothing Shop
St Aldate's Post Office
Corpus Christi College
Merton Grove
The Jolly Farmers
Sainsbury's
St. Ebbe's
Pembroke St
Paradise Square
Beef Ln
Tom Tower
Clocktower designed by Christopher Wren
Westgate Shopping Centre
PureGym Oxford Central
Pembroke College
Christ Church
Monumental college founded by Wolsey
Westgate Oxford
Shopping Centre
Lush Oxford
Brewer St


Grid Ref
SP 51255 06229
Binsey
Medley Manor Farm
The Grove
The Lodge
Walton Manor
Norham Manor
Jericho
River Isis
River Cherwell
Peasmoor Brook
New Marston
Great Meadow
Holywell Mill Stream
Long Meadow
Botley Stream
Seacourt Stream or Wytham Stream
Oxford
Castle Hill
Headington Hill
New Botley
New Osney
Bulstake Stream
Botley
North Hinksey Village
Christ Church Meadow
Hogacre Ditch
Grandpont
Hinksey Stream
Eastwyke Ditch
Shire Lake Ditch
Harcourt Hill
A420
A4144
A4165
A4158
B4150
B4495
B480
B4044


Existing Site
Carfax Belltower
Argos Oxford City Centre
Clarendon Centre
H&M
Gap
Boots
McDonald's
The Crown
HSBC
Paperchase
French Connection
Cornish Bakehouse
Lloyds Bank
Topshop
The White Company
FatFace Oxford
Nationwide Building Society
Carfax Tower
OGGLIO
Santander
Flight Centre Oxford City
Queen St
Commarket St

Appendix B **Flood Maps for Planning**

WALSH

Flood map for planning

Your reference	Location (easting/northing)	Created
<Unspecified>	**451257/206227**	**8 Dec 2020 10:23**

Your selected location is in flood zone 1, an area with a low probability of flooding.

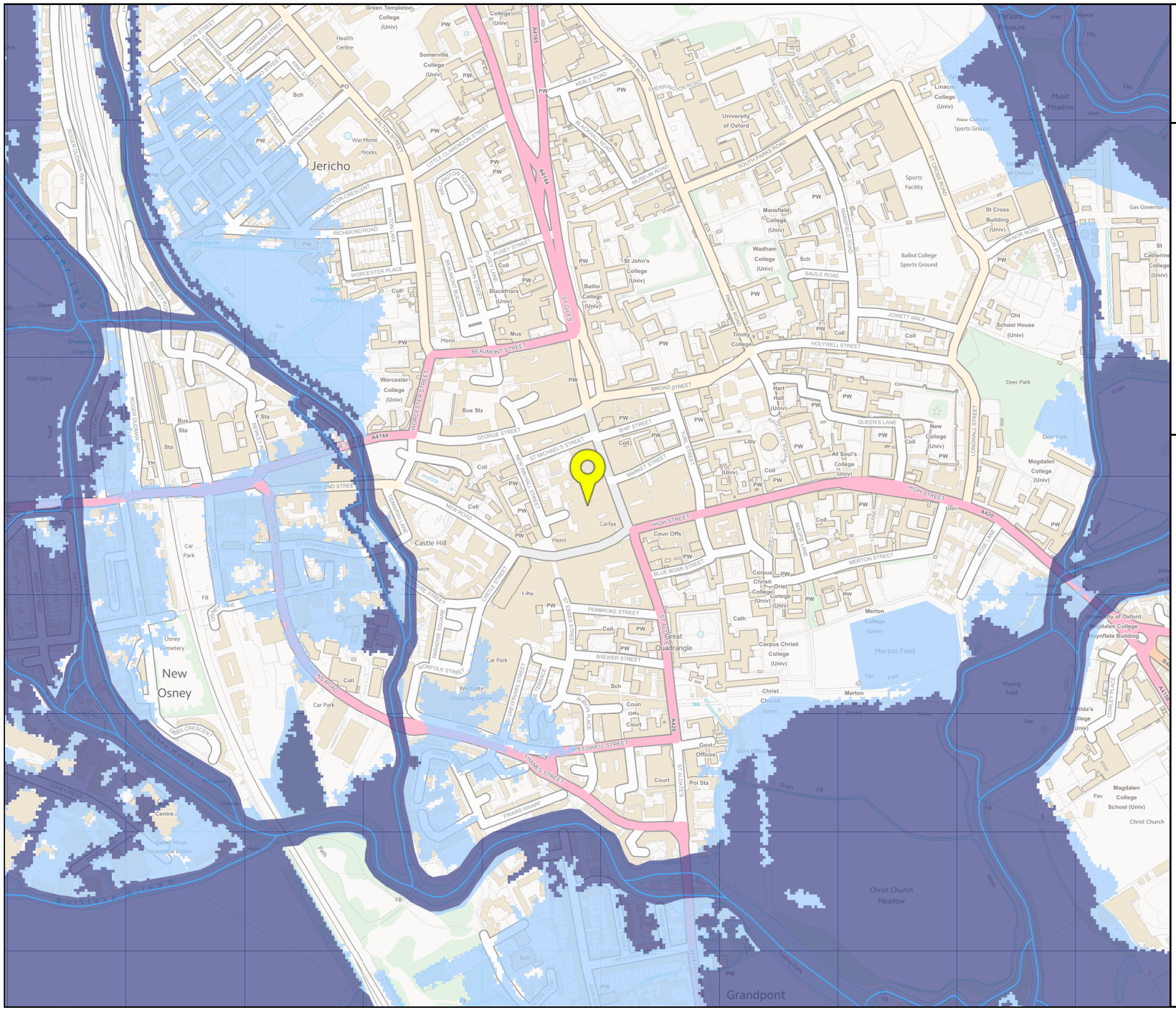
This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

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)
451257/206227

Scale
1:10000

Created
8 Dec 2020 10:23

- ◉ Selected point
- ■ Flood zone 3
- ▨ Flood zone 3: areas benefitting from flood defences
- 🟦 Flood zone 2
- □ Flood zone 1
- — Flood defence
- — Main river
- ▦ Flood storage area

0 100 200 300m