

Total Bathrooms

Old Town Bridge Garage, Trowbridge

Flood Risk Assessment & Drainage Strategy



QM

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EXECUTIVE SUMMARY

Tumu Consulting Ltd have been appointed by Total Bathrooms to undertake a Flood Risk Assessment (FRA) & Drainage Strategy to accompany a partial redevelopment of the former retail/garage unit to flexible commercial floor space at the Town Bridge Site, Trowbridge. This report provides a qualitative assessment of the potential sources and effects of flooding in accordance with the guidelines set out in the National Planning Policy Framework (NPPF).

Item	Response
Site location	The site is located within Trowbridge town centre along Wicker Hill at approximate National Grid Reference 385350, 158050.
Size and Current Land Use	The brownfield site currently comprises derelict commercial buildings that have previously been used a car dealership, a workshop and a bathroom showroom. The site is approximately 0.062ha in size.
Fluvial (rivers) Flood Risk	Medium to High risk from the River Biss.
Tidal Flood Risk	Low risk.
Surface Water Flood Risk	Low to High Risk but not due to a detriment as a result of the proposed development.
Groundwater Flood Risk	Low Risk.
Sewer Flood Risk	Low Risk.
Reservoirs, canals & other artificial sources	Low Risk.
Historical Flooding	The UK Government's Historic Flooding data indicates that the site has had one historical flood in 2007. Flood defence work along the River Biss have been incorporated to the area since and no known flood events have taken place since their implementation.
Proposed Development	The site is to be redeveloped to comprise commercial units, indoor food stalls with associated seating area on the ground floor and a rooftop bar above.
NPPF Flood Risk Vulnerability	More Vulnerable and Less Vulnerable.

The risk of flooding to the proposed development has been assessed in accordance with the NPPF. It is concluded that the development can be undertaken in a sustainable manner without increasing the flood risk to the proposed development or to existing properties/systems within the downstream catchment and is therefore compliant.

1 INTRODUCTION

Tumu Consulting Ltd have been appointed by Total Bathrooms to undertake a Flood Risk Assessment (FRA) & Drainage Strategy to accompany a partial redevelopment of the former retail/garage unit to flexible commercial floor space at the Town Bridge Site, Trowbridge. This report provides a qualitative assessment of the potential sources and effects of flooding in accordance with the guidelines set out in the National Planning Policy Framework (NPPF).

The purpose of this FRA is to demonstrate that the site can be developed safely, without exposing the development to an unacceptable degree of flood risk or increasing the flood risk to third parties.

1.1 Site location

The site is located along Wicker Hill adjacent to Town Bridge at approximate National Grid Reference 385350, 158050. Approximately 0.062ha in size, the brownfield site currently comprises derelict commercial buildings that have previously been used as a car dealership, a workshop and a bathroom showroom.



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Figure 1-1 Site Location Plan

1.2 Topography

A topographical survey of the site was undertaken by Malcolm Hughes in May 2018, with this provided as Appendix A. The survey was undertaken to Ordnance Datum and OS National Grid, confirmed by the Local Grid benchmark located on the corner of Brewer Wall on Back Street.

The topographical survey indicates that the site is relatively flat but there is a fall from west to east. There is an existing high point of 34.8m in the west falling towards a low point of 34.0m in the east at the site entrance.

1.3 Geology & Hydrogeology

British Geological Survey (BGS) mapping indicates that the underlying bedrock comprises Forest Marble Formation – Mudstone overlain by Alluvium – clay, silt, sand and gravel superficial deposits.

The site is not located within an Environment Agency (EA) Source Protection Zone for groundwater.

1.4 Hydrology

The River Biss is located along the western boundary of the site. This is classed as a Main River and is therefore the responsibility of the EA.

1.5 Existing Drainage

Sewer Records have been obtained from Wessex Water and are provided as Appendix B. This shows there to be strategic foul water sewers within the vicinity of the site.

Foul Water

The topographic survey identifies inspection chambers which appear to convey flows towards the foul sewer within Wicker Hill to the east of the development.

Surface Water

There are existing surface water rainwater downpipes on the buildings. The western side of the warehouse drains directly into the River Biss, as shown in Figure 1-2. The remainder of the site falls towards the public sewer network within Wicker Hill.



Figure 1-2 Existing Downpipes on building

1.6 Existing Surface Water Runoff Rates

Runoff rates for the existing site have been estimated in accordance with current best practice and with consideration to the existing hard surfacing, identified in the topographic survey.

Brownfield Runoff Rates

As the existing site is entirely hardstanding, the pre-development surface water runoff has been calculated using the Modified Rational Approach (Wallingford Procedure). This has been based upon the average rainfall intensity derived from a 15-minute storm for each return period, which is appropriate given the time of concentration that would be anticipated for the area associated with the site. The parameters used in the calculation and results are summarised in Table 1.

Parameter	Value	Units
AREA	0.062	ha
1-year rainfall intensity, i_1	31.665	mm
30-year rainfall intensity, i_{30}	77.720	mm
100-year rainfall intensity, i_{100}	100.94	mm
Q_1	5.45	l/s
Q_{30}	13.39	l/s
Q_{100}	17.40	l/s

Table 1 Modified Rational Approach calculation for runoff from existing hardstanding areas

The calculation shows that the total pre-development runoff response for a 100-year return period storm event would be approximately 17.40 l/s.

2 DEVELOPMENT PROPOSALS

2.1 Description of proposed works

The proposals for the site are for the change of use from retail (Class E) and garage (sui generis) to a mixed use of comprising ground floor retail and ancillary storage (Class E) and with drinking establishment (sui generis) at first floor) with operational development comprising: rear first floor extension and balcony; sedum roof and roof mounted solar PV to rear commercial buildings; replacement roof to Units 5 and 6; new shopfront to ground floor with associated replacement windows and doors and ground floor balcony; and associated hard and soft landscaping including formation of service vehicle set down and disabled parking spaces.

The proposed development is shown at Appendix C.

The existing site is entirely hardstanding, therefore there will be no increase in impermeable area as part of the proposals. There will be a betterment as part of the proposals as there is no landscaping or planting currently, whereas the proposals include for green roofs, a green wall and rain planters which are discussed further in Section 6.

2.2 Flood risk vulnerability classification

In accordance with Table D2 of the NPPF the development is predominantly classified as Less Vulnerable as it comprises *Buildings used for; restaurants, cafes and hot food takeaways and general industry*.

The rooftop bar is classified as More Vulnerable as it comprises *Buildings used for drinking establishments*.

2.3 Design Life

It is anticipated that the design life of the development will be approximately 60 years.

3 ASSESSMENT OF FLOOD RISK

This Section outlines the risk of flooding to the site from various sources. The Wiltshire Council (WC) Strategic Flood Risk Assessment (SFRA) has been reviewed to supplement this section and is referred to at relevant points.

3.1 Historical flooding

The UK Government's Historic Flooding Outline data (which is available for download online, and an extract of which is provided as Figure 3-1) indicates that the site is within an area of historic flooding. The SFRA recorded flood outline map also shows these extents, which relate to the channel capacity of the River Biss being exceeded in 1932, 1960 and 1979.

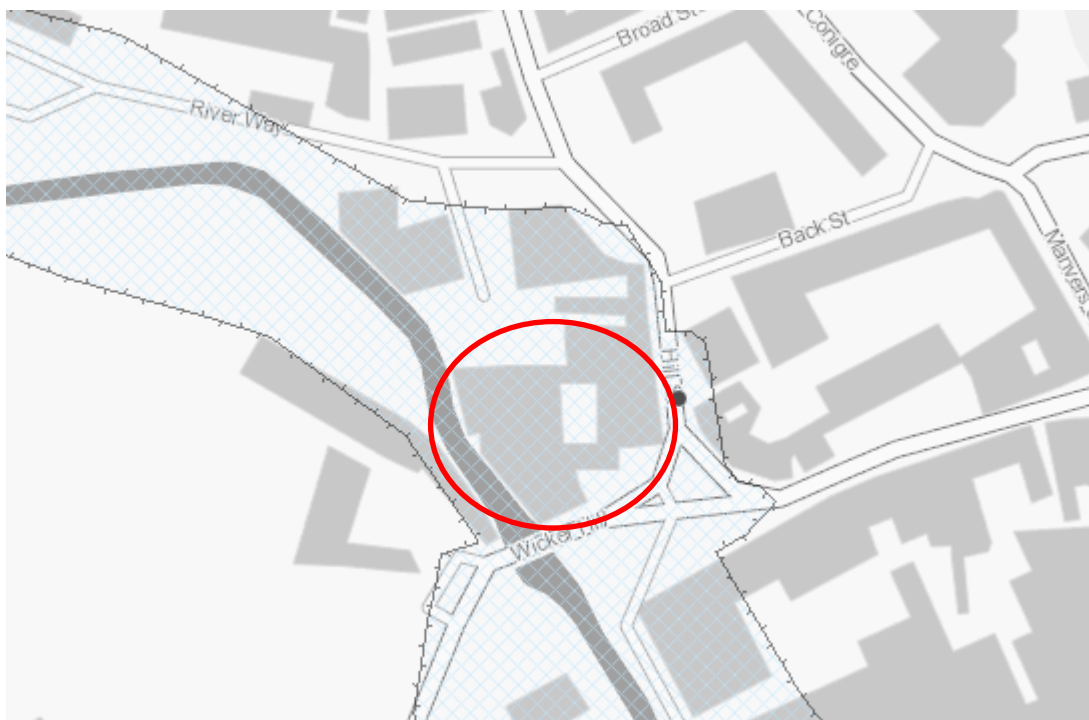


Figure 3-1 Historical flooding map

The EA product 4 data confirmed additional historic fluvial flooding incidences on their records in 1925, 1947 and from an unconfirmed source in 2014.

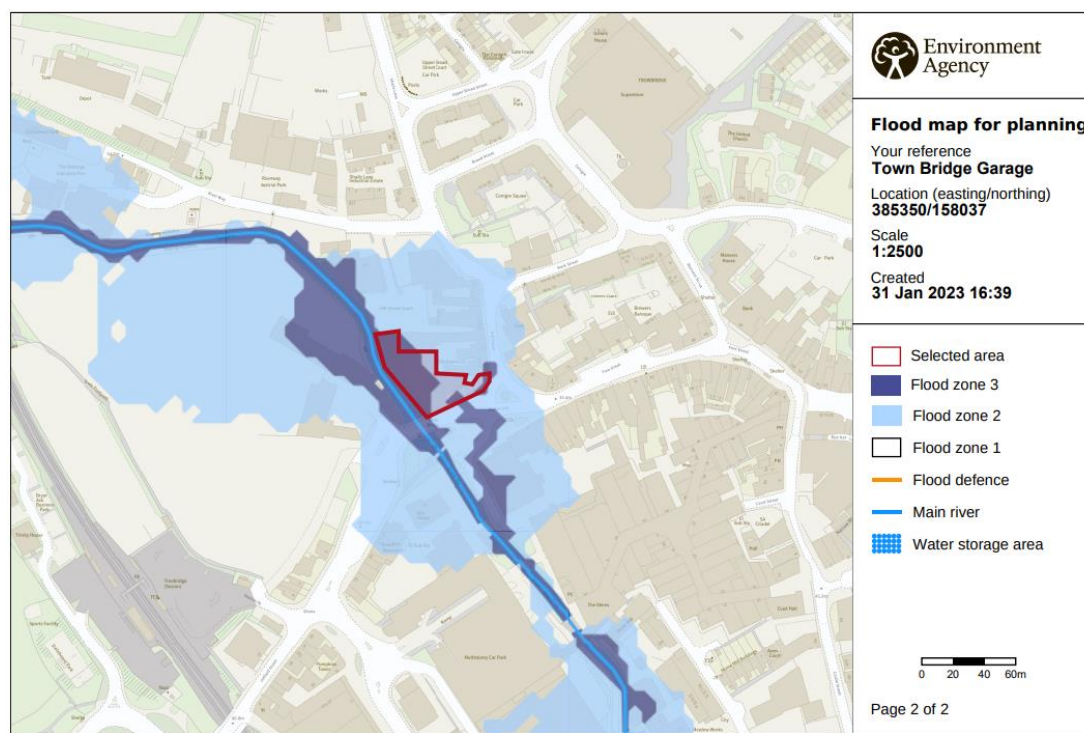
Since these flood events, mitigation measures have been put in place with this discussed further within this section. There is no record of the site flooding following the implementation of these mitigation measures.

3.2 Flood Map for Planning

The UK Government's Flood Risk for Planning mapping, which refers to the probability of river and sea flooding is provided in figure 3-2, with this identifying that the site is within Flood Zone 3 and Flood Zone 2.

Flood Zone 3 is defined as a high probability of flooding with a chance greater than 1 in 100 of river flooding, or a 1 in 200 or greater probability of flooding from the sea in any year. Flood Zone 2 is defined as a medium probability of flooding with a chance of between 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.

The Flood Map for Planning does not take local flood defences into account. The flood zones refer to land at risk of flooding and do not refer to individual properties. It is possible therefore for properties to be built at a level above the floodplain but still fall within a flood risk area. The flood map for planning is therefore considered to be conservative.



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Figure 3-2 Flood Map for Planning

The proposals show that the commercial units will be located within Flood Zone 2, with the ground floor of the warehouse conversion where the food market is proposed partially within Flood Zone 2 and partially within Flood Zone 3.

In accordance with table 3 of the NPPF – flood risk vulnerability and flood zone compatibility, less vulnerable development is considered to be appropriate within Flood Zone 2 and 3. More Vulnerable development is considered to be appropriate within Flood Zone 2, and is acceptable within Flood Zone 3 subject to the exception test being applied. The More Vulnerable development will be on the first floor and will therefore be outside of the risk of flooding.

In order to more accurately assess the risk of flooding, a request for Product 4 data was made with the EA, with this provided as Appendix D. This refers to both fluvial and tidal flooding which is discussed in further in this section.

3.3 Fluvial (rivers) flood risk

The site is shown to be at risk of fluvial flooding from the River Biss, which lies directly west of the site.

The EA have provided a set of maps containing the modelled fluvial flood levels and locations for River Biss at Trowbridge. The nodes closest to the site are XS_13, which is downstream of the site and XS_14, upstream of the site. The interpolated levels between these two cross sections, provided within the product 4 data, are summarised in Table 2.

Return Period	Fluvial Level
2% AEP (50year event)	33.85m AOD
1.3% AEP (75 year event)	33.97m AOD
1% AEP (100yr event)	34.29m AOD
1% AEP (100yr event) + 20% climate change	34.46m AOD
0.1% AEP (1000yr event)	34.83m AOD

Table 2 Modelled fluvial flood levels for the River Biss at the site

Since the production of the EA model, the government have issued updated climate change guidance. The current recommendations associated with this latest guidance, which was updated in May 2022, is to use climate change specific to catchments.

The site is located in the Avon Bristol and North Somerset Streams management catchment which is within the Severn river basin district. The EA guidance recommends using the central allowance for up to 2080s as the design allowance, with the higher central to be considered to test the impacts of higher scenarios of climate change and any extra mitigation and the extreme allowance to be considered for exceedance events.

The existing hydraulic model has used a climate change allowance of 20%. In the absence of modelled 26% and 39% events, these have been interpolated and extrapolated from the data available using a stage-discharge rating curve shown in Figure 3-3 and the results summarised in Table 3.

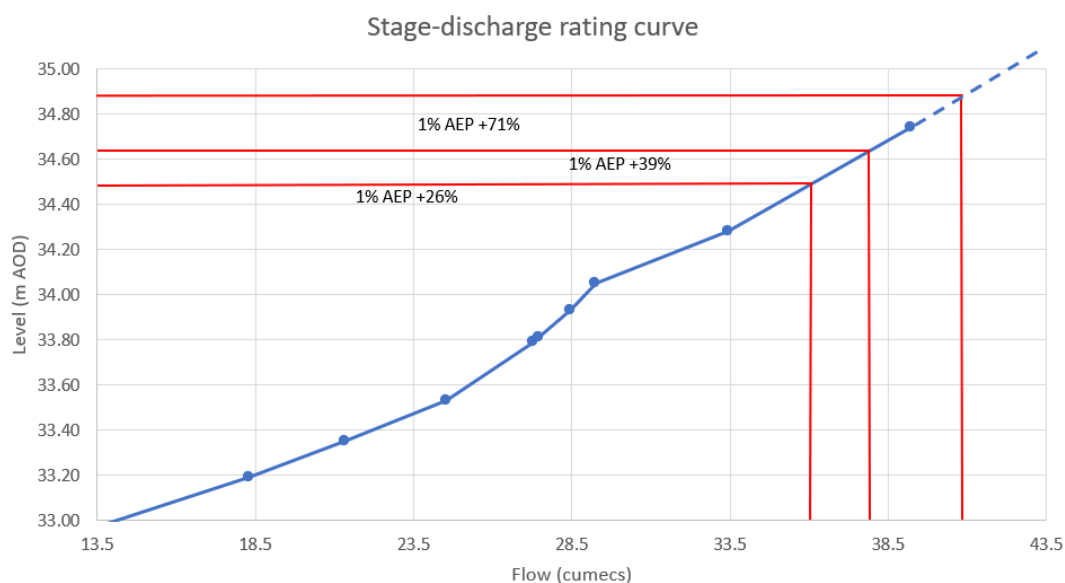


Figure 3-3 Stage-discharge rating curve

Model Node	1.0% AEP plus 26% cc (central allowance)	1.0% AEP plus 39% cc (higher central allowance)	1% AEP plus 71% (extreme allowance)
XS_15c1	34.47	34.62	34.89

Table 3 Interpolated flood levels

Levels in the vicinity of the proposals are 34.60, which is above the 1% AEP including an allowance for the central and upper climate change events. During an exceedance event (71% climate change), flood depths of approximately 400mm could be expected.

River Biss flood defences

The flood map for planning does not take into account flood defences. Whereas there are no raised flood defences in the area, a flood defence scheme along the River Biss in Trowbridge has been undertaken since the historic flood incidences. This consisted of works along the River Biss, including alongside the site, where the channel area was increased by building sheet piles with concrete capping to increase the channel area. These works are shown in Figure 3-4 and details have been provided along with the product 4 data.



Figure 3-4 Flood Defences along River Biss

Due to the potential for small flood depths during an extreme event, a flood evacuation plan is proposed for the site with this outlined in Section 4.

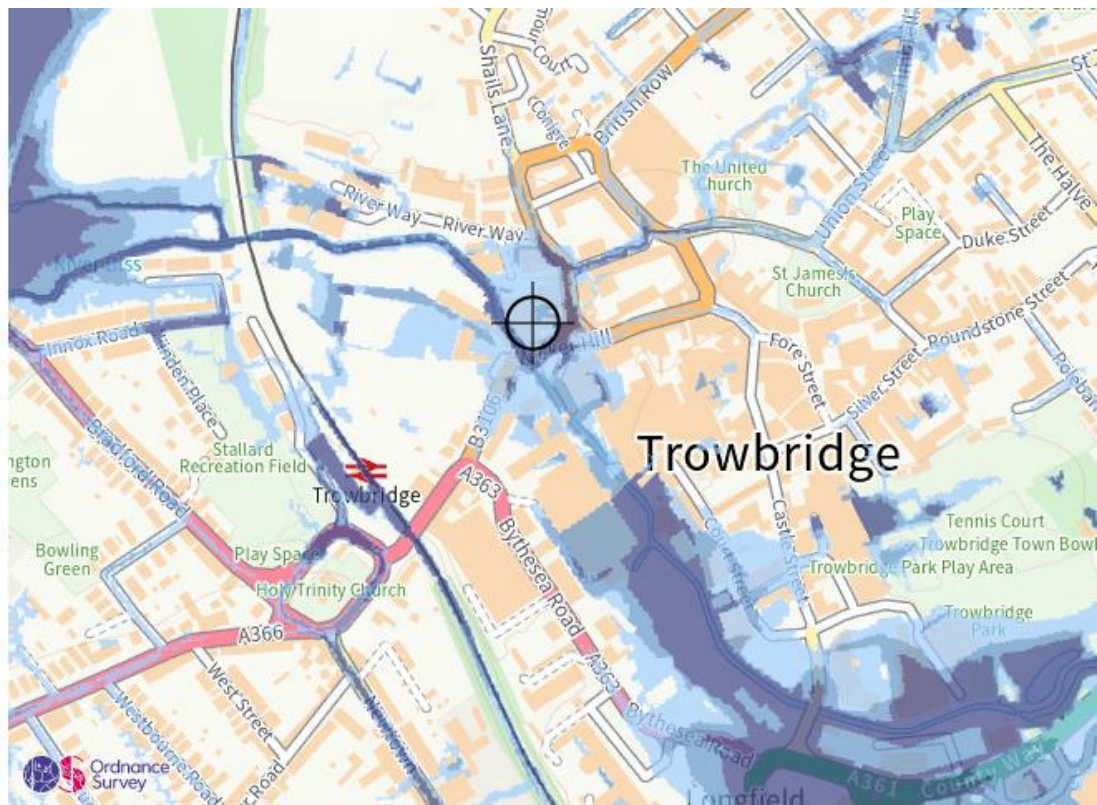
Given that the location of the proposals are 0.471m above the projected fluvial extents for the design flood (1% AEP), the site is considered to be at a **low** risk of fluvial flooding from the River Biss for the development lifetime.

3.4 Tidal flood risk

Given that the site is inland in excess of 34.0m it is not considered to be at risk of tidal flooding. It is therefore that the site is at **low** risk of tidal flooding for the lifetime of the development.

3.5 Surface water flood risk

The UK Government's Surface Water Flood Risk Mapping, available online, identifies the site to be at a low risk (corresponding to a chance of flooding of between 0.1% and 1%) medium risk (corresponding to a chance of flooding of between 1% and 3.3%) and a high risk of flooding (corresponding to a chance of more than 3.3%) from surface water.



Extent of flooding from surface water

● High
 ● Medium
 ● Low
 Very low
 ⊕ Location you selected

Figure 3.3 Surface water flood risk map

The methodology used to derive the surface water flood maps does not take into account underground drainage systems, therefore the extents shown are conservative and in reality the surface water flows will be intercepted by the existing positive drainage arrangement within the site.

Considering the above, and that there will be no change in impermeable area, there will be no increase in surface water flood risk as part of the proposals.

3.6 Groundwater flood risk

Mapping from the Wiltshire Council SFRA indicates that the site is located within in area considered to be at no risk of groundwater flooding. The risk of groundwater flooding is therefore considered to be **low**.

3.7 Sewers: combined, foul or surface water flood risk

The SFRA does not indicate that the area has previously been subject to sewer flooding. It is therefore considered that the site is at **low** risk of flooding from this source.

3.8 Reservoirs, canals & other artificial sources

The site is shown to be in an area at risk of flooding from reservoir failure when there is also flooding from rivers. There are no other artificial sources that could pose a risk to the site.

4 PROPOSED MITIGATION MEASURES

4.1 Finished Floor Levels (FFLs)

The climate change guidance advises that FFLs should be set no lower than the central allowance corresponding to 34.47m AOD. The ground level in the vicinity of the proposed commercial units are approximately 34.60m AOD which are therefore 130mm above the design event and also ensures the buildings remain compliant with Part M of the Building Regulations in terms of allowing level access for personnel and visitors.

The FFL of the More Vulnerable elements of the development proposals are restricted to the first floor and will therefore be above the flood level for all events up to and including the 1 in 1000 year event.

4.2 Flood Resilient Design

In order to provide further betterment, the proposed development will provide additional protection measures through flood resilient design. The following measures will be provided up to the extreme flood event (71% cc event), correlating to 34.89m AOD:-

- Non-carpeted floors
- Door and window materials waterproof and seals will be suitably robust.

In accordance with best practice the building will also include the following measures so that in the event of flooding occurring there will be minimal disruption and the building can be cleared of floodwater as quickly as possible:

- Where there are low points within the ground floor these will be provided with sealed sumps with adjacent floors laid to falls. In the event of flooding, mobile sump pump units can be placed within these sumps to aid in the process of draining away flood water.
- Sensitive equipment will be raised as high as is feasible above floor level on plinths within the plant room. Vulnerable services will be brought in from a high level and non-return valves fitted as required to waste water services.
- The internal layout will ensure there's access to all spaces to enable drying and cleaning.

5 FLOOD EVACUATION PLAN

Flooding as a result of channel capacity exceedance or defences overtopping is forecastable by flood warnings which are issued by the EA. The SFRA shows that the site is covered by the EA flood warning service.

The EA provides an early flood warning service in England and Wales and supports the public taking action to prepare and respond when these warnings are issued. Warnings are issued through the media on TV and radio weather bulletins and on its website (www.environment-agency.gov.uk/floodline). In areas of particular risk, the EA send a warning message direct to people at home or at work by telephone, mobile, email, SMS text message, fax or pager using an Automatic Voice Messaging (AVM) system. The EA's Floodline 0845 988 1188 service for England and Wales carries recorded information on flood warnings in force anywhere in England and Wales. The information is regularly updated and is available 24 hours a day.

The EA flood warning system is divided into four categories, depending on the stage of flooding and the predicted severity of flooding as shown overleaf. The fourth stage of flooding warning is 'Flood Warning No Longer in Place'.

 FLOOD ALERT	What it means - Flooding is possible. Be prepared. When it's used - Two hours to two days in advance of flooding. What to do - Be prepared to act on your flood plan. - Prepare a flood kit of essential items. - Monitor local water levels and the flood forecast on our website.
 FLOOD WARNING	What it means - Flooding is expected. Immediate action required. When it's used - Half an hour to one day in advance of flooding. What to do - Move family, pets and valuables to a safe place. - Turn off gas, electricity and water supplies if safe to do so. - Put flood protection equipment in place.
 SEVERE FLOOD WARNING	What it means - Severe flooding. Danger to life. When it's used - When flooding poses a significant threat to life. What to do - Stay in a safe place with a means of escape. - Be ready should you need to evacuate from your home. - Co-operate with the emergency services. - Call 999 if you are in immediate danger.

Figure 5-1 Stages of Environment Agency Flood Warning

The proposed development would sign up to the EA flood warning system, if they have not already, to ensure as far as possible that sufficient warning is provided to staff and site users. Appropriate signage would be provided, and a formal flood evacuation plan would be prepared and adopted by the management of the proposed development. This would allow staff and other site users to evacuate the site, either on foot or by driving their vehicles out of the site into Flood Zone 1.

The closest area located within Flood Zone 1 is 30m east on Wicker Hill, towards the town centre. A safe access route from the site during a flood warning is illustrated in Appendix E.

Staff should be trained to understand the requirements of the flood evacuation plan and the methods and timing for evacuation.

Once the site has been evacuated, staff and other site users should not be allowed to return to the site until it has been declared safe to do so, advice from emergency services should be sought where required.

6 DRAINAGE STRATEGY

6.1 Surface water drainage

In accordance with the Non-Technical Standards for SuDS (NTS) peak runoff should never exceed rate of discharge of the development prior to the redevelopment. Similarly, runoff volume rates and should not exceed the runoff volume of the development prior to redevelopment. Given that there is no increase in post-development impermeable area the post-development discharge rates will be the same as pre-development rates stated in Section 1, this is therefore in accordance with the NTS.

Nevertheless, in order to provide a betterment over the existing drainage regime and in accordance with Wiltshire SuDS guidance, it is proposed to reduce runoff rates as far as is practicable through retrofitting SuDS. There are no external changes proposed as part of the development and no change in the built layout which reduces the feasibility of larger SuDS features, however features have been selected that can manage routine rainfall and offer wider site benefits as far as is practicable for this brownfield site.

It is proposed to provide green roofs on all existing and new flat roof areas and a green wall on the east elevation of the existing buildings, which will reduce runoff for the majority of small-scale rainfall events and will provide landscaping within the site which the existing brownfield site does not benefit from at all.

Rain planters will also be provided on the forecourt. These will be in the form of rain gardens and raised planters which will route downpipes into planters filled with engineered soils and vegetation. Runoff will pond temporarily on the surface before filtering through vegetation and underlying soils before discharging into the existing drainage network, though part of the runoff will be removed through evapotranspiration and infiltration.

In addition to managing flood risk by reducing runoff rates and volume, the proposed SuDS features will improve water quality into the sewer network, provide biodiversity benefits and improve the image and attractiveness of the area.

The proposed drainage arrangements are shown on Tumu Consulting Drawing 19653-D-01-C, included at Appendix F.

All proposed surface water drainage will be designed and constructed in accordance with the requirements of Building Regulations Part H.

Overland Flow Routes

There are no changes proposed to the external levels as part of the development, therefore the overland flow routes will remain as existing. As stated in section 3, the majority of the overland flow routes shown on the surface water flood maps will be intercepted by the onsite drainage network.

6.2 Maintenance arrangements

All surface water drainage pipework, green roof and rain gardens will be privately managed and maintained by the developer or by a third-party management company to be appointed by the developer.

Operation and maintenance will be undertaken in accordance with the recommendations outlined in the SuDS Manual (CIRIA C753), provided in Tables 6 to 8.

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Inspect surface structures, removing obstructions and silt as necessary. Check there is no physical damage.	Monthly
	Remove cover and inspect, ensuring water is flowing freely and that the exit route for water is unobstructed. Remove any debris and silt. Undertake inspection after leaf fall in autumn.	Annually
	Jet the pipes leading from overflow structures and check water is going through the overflow	Annually
Remedial actions	Repair physical damage	As required

Table 6 Maintenance requirements for inlets, outlets, controls and inspection chambers

Maintenance schedule	Required action	Typical frequency
Regular inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly
Regular Maintenance	Remove litter and surface debris and weeds	As required, based on inspections
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
Occasional maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
Remedial actions	Repair minor accumulation of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
	Remove and replace filter medium and vegetation above	As required (likely to be >20 years)

Table 7 Maintenance requirements for bioretention systems (including rain gardens)

Maintenance schedule	Required action	Typical frequency
Regular inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structures	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 drain system	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
	During establishment (i.e year one), replace dead plants as required	Monthly (but usually responsibility of the manufacturer)
	Post establishment, replace dead plants	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation	Six monthly or as required
Remedial maintenance	Mow grasses, prune shrubs and manage other planting – clippings should be removed and not allowed to accumulate	Six monthly or as required
	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

Table 8 Maintenance requirements for green roofs

6.3 Foul Water Strategy

The Wessex Water sewer records (Appendix B) and Topographic Survey (Appendix A) confirm that there is an existing foul drainage connection within the site. It is proposed to maintain this connection.

7

CONCLUSIONS

Tumu Consulting Ltd have been appointed by Total Bathrooms to undertake a Flood Risk Assessment (FRA) & Drainage Strategy to accompany a partial redevelopment of the former retail/garage unit to flexible commercial floor space at the Town Bridge Site, Trowbridge.

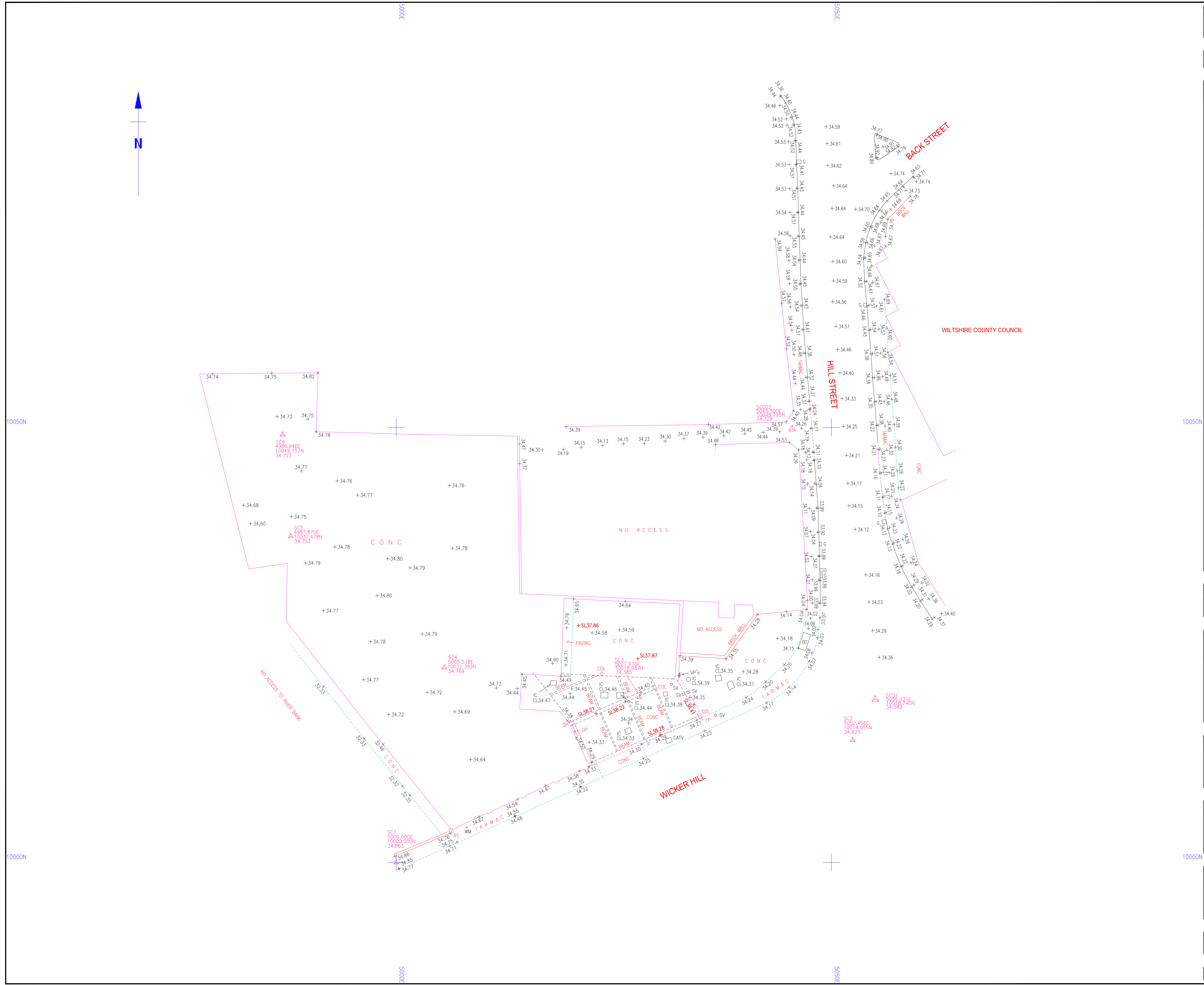
The risk of flooding to the proposed development has been assessed in accordance with the NPPF. The potential consequences from all sources have been considered and found to be acceptable for the development lifetime for Less Vulnerability uses, with mitigation measures proposed for the More Vulnerable uses.

The proposed development is on brownfield land. There will be no increase in impermeable area as part of the proposals and therefore there will be no increase in runoff rates or volume. Nevertheless, it is proposed to provide green roofs, a green wall and rain planters within the site which will reduce runoff rates and volumes into the existing networks, as well as provide water quality, biodiversity and aesthetic benefits.

It is concluded that the development can be undertaken in a sustainable manner without increasing the flood risk to the proposed development or to existing properties/systems.

Appendix A

Topographic Survey



Survey Notes

Grid: Local Plane Metric (Related to previous survey 8595)

Levels: Related to OSBM 35.62m

Located on corner of Brewery wall on Back Street

Notes

Topographical Survey Legend

BUILDINGS AND WALLS	GENERAL INFORMATION
Building	Petrol Pump
Open Sided	Basement Light
Ruin	Footbridge
Passage	Dish Type Channel
Wall with Height	Slot Type Channel
Retaining Wall	Gate Type Channel
	Tactile Paving
	Crash Barrier
	Column
	Stanchion
	Car Vacuum
	Offset Fill
	Air Valve
	Through
	CHY
	Telephone Call Box

FENCE STYLES AND DESCRIPTIONS	OVERHEAD FEATURES
Close Boarded	Electricity Pylon
Corrugated Iron	Electricity
Chastnut Paling	Telephone
Chimney	
Handrail	
Interwoven	
Iron Railings	
Lattice	
Miscellaneous	
Palisade	
Post & Chain	
Post & Rail	
Post & Wire	
Post & Barbed Wire	
Wire mesh	
Slate	
Gate	
Fence Instyle	

ROADS	STREET FURNITURE
Kerbs	Beltina Beacon
Edge of Surfacing	Bus Stop
Pedestrian Crossing	Ballard
Track	Cash Eye
Footpath	Cool Chute
	Closest Circuit TV
	Drain
	Electricity Pole
	Flood Light
	Flag Staff
	Lamp Post
	Letter Box
	Name Plate (street)
	Moving Ring
	Mail Post or Mooring Post
	Service Marker
	Mail Stone
	Post
	Parking Meter
	Reflector Post
	Road Sign
	Speed Sign
	Information Sign
	Stop Sign
	Traffic Light
	Traffic Light Push Button Post
	Traffic Light Control
	Control Box
	British Telecom Box
	Electric Box
	Gas Box

INSPECTION CHAMBERS AND PIPES	LEVEL AND HEIGHT INFORMATION
Inspection Cover	Standard Spot Height
Inspection Cover (Elec)	Precision Spot Height
Manhole	Bed Level
British Telecom Cover	Water Level
Inspection Cover (Comms)	Soil Level
Inspection Cover Traffic Signs	Threshold Level
IC	Cover Level
IC/EL	Level Level
IC/EL	Pipe Surface Level
IC/EL	Finished Floor Level
IC/EL	Top of Tank Level
IC/EL	Eave Level
IC/EL	Ridge Level
IC/EL	Roof Hip Level
IC/EL	Flat Roof Level
IC/EL	Top of Canopy Level
IC/EL	Underneath of Canopy Level
IC/EL	Window Sill Level
IC/EL	Window Head Level
IC/EL	Sprinkling Level
IC/EL	Arch Level
IC/EL	Cable Level
IC/EL	Top of Wall Level
IC/EL	Underneath of Beam Level
IC/EL	General Height

SURVEY INFORMATION SIGNS	GEOTECHNICAL INFORMATION
Permanent Ground Marker	Borehole
O.S. Trig Station	Test Pit
O.S. Bench Mark	Monitor Pin
	Probe Hole
	Window Sample

Rev.	Date	Description

MALCOLM HUGHES

CHARTERED LAND SURVEYORS

65 Cross Street, Sale, Manchester
M33 7HF, Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mhhs.co.uk

Accreditations

RICS

THE SURVEY ASSOCIATION

ICES

Client

PLANNINGSPHERE LTD

COWORKING BATH, THE GUILD

HIGH STREET, BATH, BA1 5EB

Project

TOWN BRIDGE SITE

HILL STREET TROWBRIDGE, BA14 8LD

(Extension to existing survey 8595)

Drawing Title

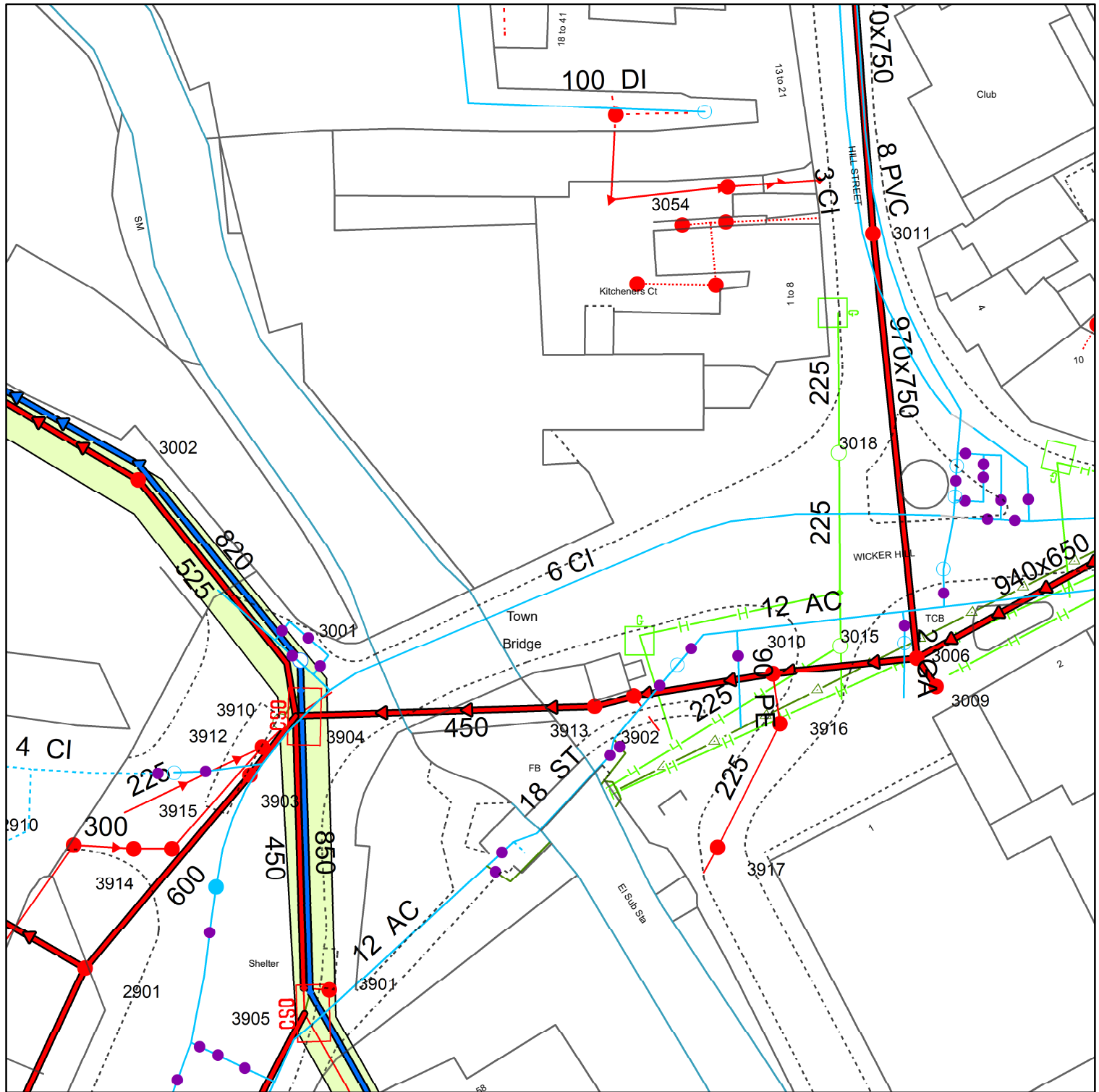
TOPOGRAPHICAL SURVEY

Drawn By	AS	30/05/18	Survey Date	May 2018 / July 2004
Checked by	CT	30/05/18	Scale	1 : 200
Drawing No	51864/1			Revision

Appendix B

Sewer Records

Wessex Water Network Map



Reproduced from the Ordnance Survey map by permission on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright . Licence 100019539.

WATER MAINS	SEWERS	STRATEGIC	PUBLIC	PRIVATE	SECTION 104	OTHER WESSEX PIPES	NON-WESSEX / UNKNOWN
Distribution	Foul					Rising Mains	Private Rising Mains
Washout	Surface					Standby Rising Mains	Culverted Watercourse
Raw Water	Combined					EDM Effluent Disposal	Highway Drain
Abandoned	Abandoned					Overflow	Use Unknown
Private	Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow). Some styles of line and symbol are shown on the key in sample/typical colours.					Syphon	Status Unknown
FITTINGS	STRUCTURES						
Hydrant	Manhole - Foul	Pumping Station - Surface					
Other	Manhole - Surface	Pumping Stn - Foul/Combined					
	Manhole - Combined	Gully					
	Inlet	Vent Column					
	Outfall	Rodding Eye					
	Lamphole	Catchpit					
	Bifurcation - Foul	Flushing Chamber					
	Bifurcation - Surface	Soakaway					
	Bifurcation - Combined	Non Return Valve					
	Combined Sewage Overflow	Air Valve					
		Hatch Box					
		Washout					
OTHER STRUCTURES							Chamber
Attenuation Tank							Tunnel
Storage Tank							Interceptor
Wessex Water YTL GROUP							

Information in this map is provided for identification purposes only. No warranty as to accuracy is given or implied. The precise route of pipe work may not exactly match that shown. Wessex Water does not accept liability for inaccuracies. Sewers and lateral drains adopted by Wessex Water under the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011 are to be plotted over time and may not yet be shown. In carrying out any works, you accept liability for the cost of any repairs to Wessex Water apparatus damaged as a result of your works. You are advised to commence excavations using hand tools only. Mechanical digging equipment should not be used until pipe work has been precisely located. If you are considering any form of building works and pipe work is shown within the boundary of your property or a property to be purchased (or very close by) a surveyor should plot its exact position prior to commencing works or purchase. If you are proposing to build over or near Wessex Water's apparatus you should contact the Developer Services Team, tel: 01225 526633 or e-mail: developer.enquiries@wessexwater.co.uk to discuss your proposals. Details of assets within Wessex Water's land ownership are unavailable through this service.

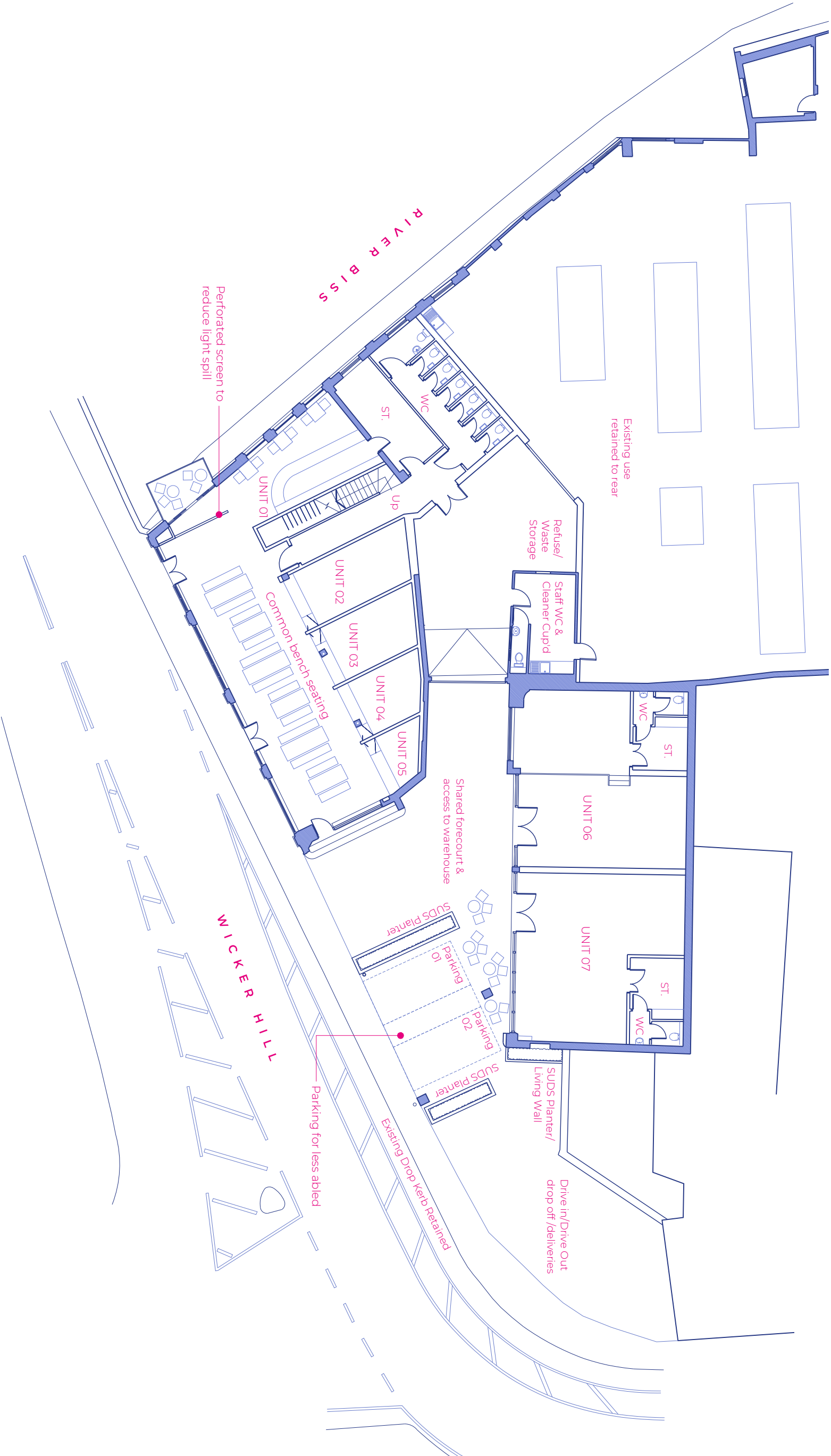
Centre: 385354.158016

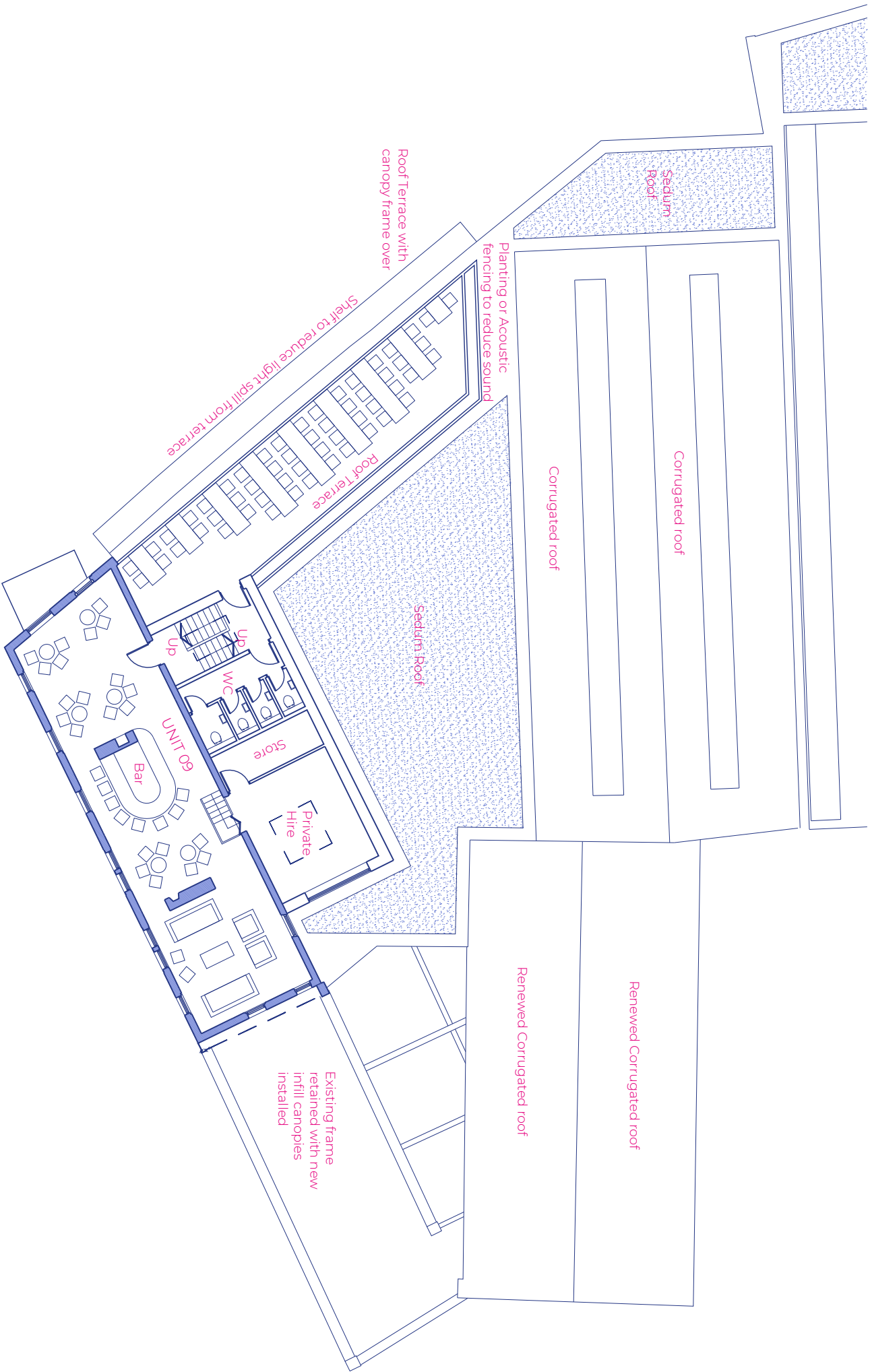
(when printed at A4 size)



Appendix C

Proposed Development

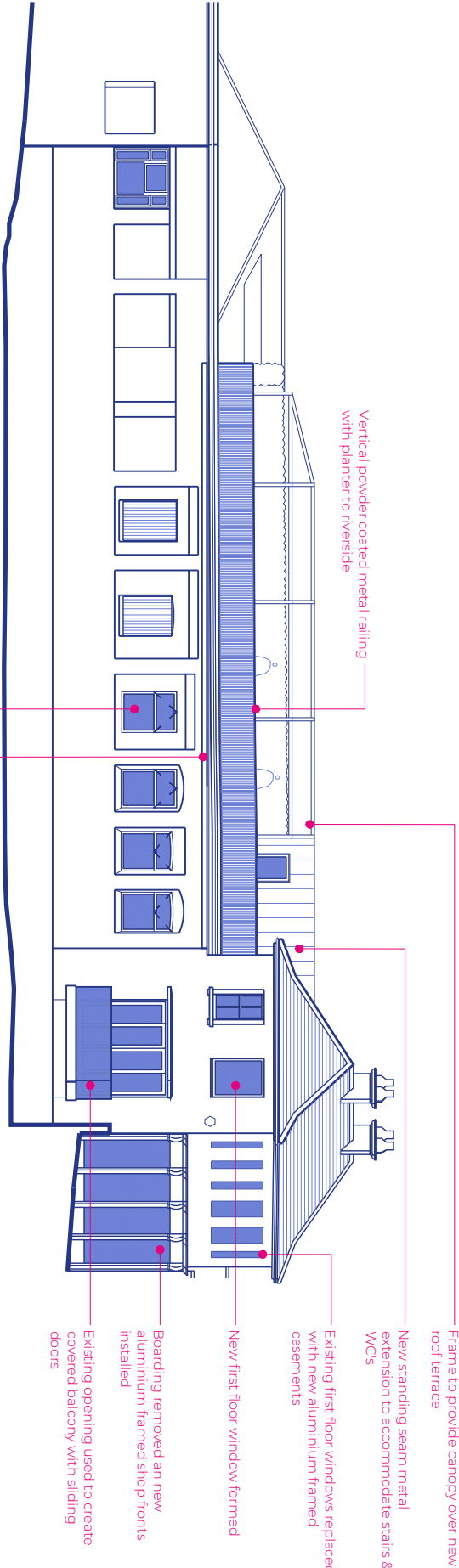




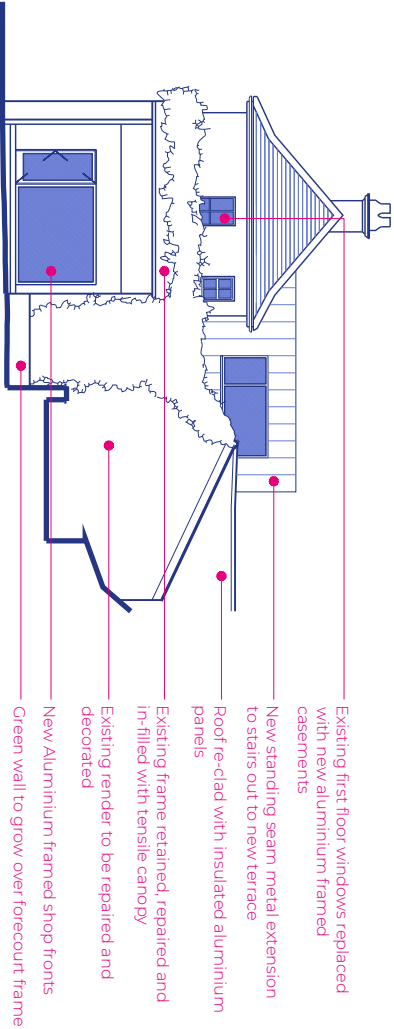


Boarding removed an new aluminium framed shop fronts installed

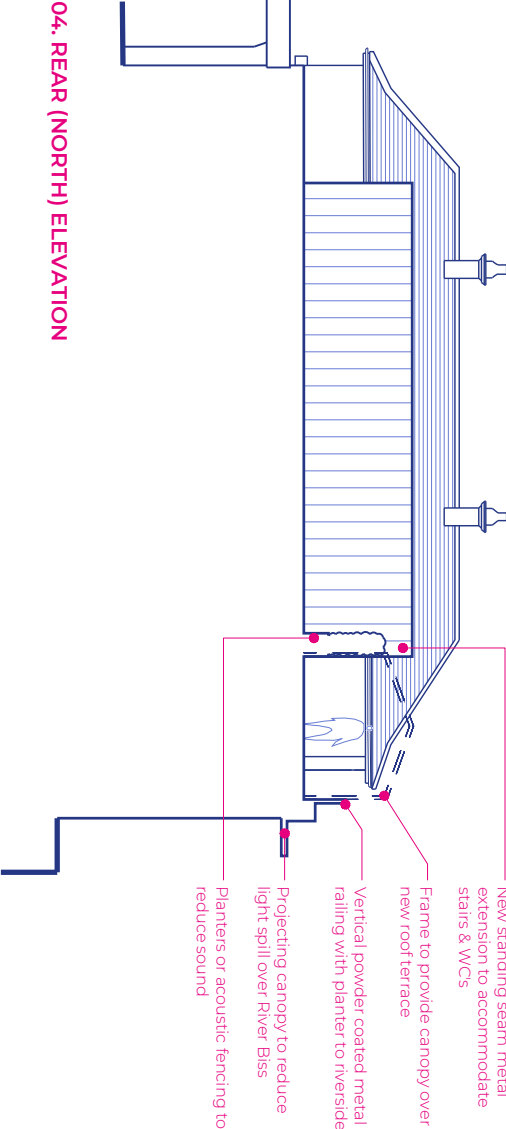
01. FRONT (SOUTH) ELEVATION



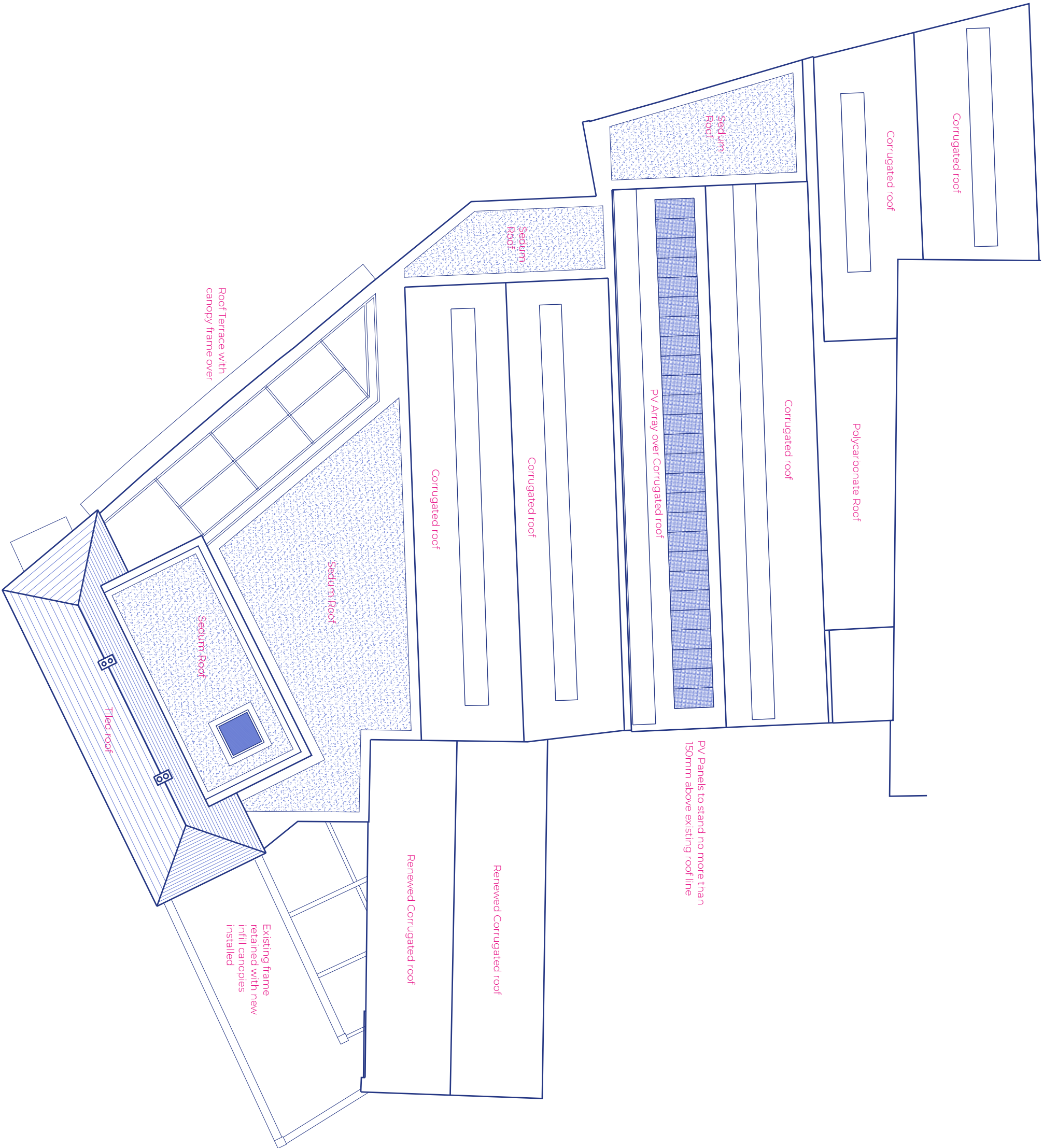
02. SIDE (WEST) ELEVATION



03. SIDE (EAST) ELEVATION



04. REAR (NORTH) ELEVATION



www.bibostudio.com

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better@bibostudio.com
RIBA Chartered Practice 20052178
Company No. 1141297
Registered in England & Wales as
BIBO Studio Ltd

Project Former Town Bridge Garage
Client HG Ventures Ltd
Location Wicker Hill
 Trowbridge

Title Proposed Roof Plan
Date March 2023
Scale 1:200 @ A3
Drawn By CM
Drwg No. 2122-BIBO-XX-00-DR-A-2105-02

Dimensions to be checked on site

Any discrepancies, errors or omissions to be reported to BIBO Studio Ltd

Appendix D

EA Product 4 data

Current Flood Defences centered on NGR ST 85350 58037 Created 03/02/2023 Ref: 297468-WX



Scale: 1:5,000



Legend

Defences

- Barrier Beach
- Beach
- Bridge Abutment
- Cliff
- Demountable Defence
- Dunes
- Embankment
- Engineered High Ground
- Flood Gate
- Natural High Ground
- Promenade
- Quay
- Spillway
- Wall

Culverts

- Simple Culvert
- Complex Culvert

This data has been extracted from the Asset Information Management System (AIMS OM) which was created to draw various data sources into one database and has been populated with information of varying quality.



Product 4 - AIMS Information

297468-WX

Date:

03/02/2023

Map Ref	Asset ID	Asset Type	Right or left bank	Asset Description	Approx length (m)	Actual fluvial downstream crest level (mAOD)	Actual fluvial downstream crest level accuracy	Actual fluvial upstream crest level (mAOD)	Actual fluvial upstream crest level accuracy	Actual fluvial coastal crest level (mAOD)	Actual fluvial coastal crest level accuracy	NGR	Most recent inspection	Overall condition
3	1790	Natural High Ground	Right	(Trowbridge FAS) Sheet Piling	170.51	DNR	DNR	DNR	DNR	DNR	DNR	ST85315805	02/08/2022	3 - Fair
4	1791	Natural High Ground	Right	(Trowbridge FAS)Walled Bank	73.34	35.77	1 - +/- 0.01m to 0.05m vertical accuracy (Typically on site survey)	35.74	1 - +/- 0.01m to 0.05m vertical accuracy (Typically on site survey)	DNR	DNR	ST85475784	02/08/2022	3 - Fair
5	1792	Natural High Ground	Left	(Trowbridge FAS)Natural Bank	64.26	DNR	DNR	DNR	DNR	DNR	DNR	ST85475780	02/08/2022	3 - Fair
6	1793	Natural High Ground	Right	Natural Bank	139.52	DNR	DNR	DNR	DNR	DNR	DNR	ST85905765	02/08/2022	3 - Fair
10	1924	Natural High Ground	Left	(Trowbridge FAS)Concrete Wall	36.72	DNR	DNR	DNR	DNR	DNR	DNR	ST85135811	02/08/2022	3 - Fair
12	39938	Natural High Ground	Right	Masonry Wall	84.17	35.79	1 - +/- 0.01m to 0.05m vertical accuracy (Typically on site survey)	35.85	1 - +/- 0.01m to 0.05m vertical accuracy (Typically on site survey)	DNR	DNR	ST85895768	22/12/2022	2 - Good
13	40052	Natural High Ground	Left	(Trowbridge FAS) Stone Lined Bank	77.43	DNR	DNR	DNR	DNR	DNR	DNR	ST85095812	02/08/2022	3 - Fair
14	40053	Natural High Ground	Left	(Trowbridge FAS)Sheet Piling	162.48	DNR	DNR	DNR	DNR	DNR	DNR	ST85315804	02/08/2022	3 - Fair
15	40054	Natural High Ground	Right	Natural Bank	70.97	DNR	DNR	DNR	DNR	DNR	DNR	ST84785845	02/08/2022	3 - Fair
16	40055	Natural High Ground	Right	(Trowbridge FAS) Natural Bank	326.79	DNR	DNR	DNR	DNR	DNR	DNR	ST84845806	02/08/2022	3 - Fair
17	40056	Natural High Ground	Right	(Trowbridge FAS)Masonry Wall	166.71	DNR	DNR	DNR	DNR	DNR	DNR	ST85375795	02/08/2022	2 - Good
18	40057	Natural High Ground	Left	(Trowbridge FAS)Walled Bank	76.32	34.51	1 - +/- 0.01m to 0.05m vertical accuracy (Typically on site survey)	34.91	1 - +/- 0.01m to 0.05m vertical accuracy (Typically on site survey)	DNR	DNR	ST85545770	02/08/2022	3 - Fair
19	40058	Natural High Ground	Left	Natural Bank	134.09	DNR	DNR	DNR	DNR	DNR	DNR	ST85915764	02/08/2022	3 - Fair
20	40059	Natural High Ground	Right	Walled Bank	219.69	DNR	DNR	DNR	DNR	DNR	DNR	ST85745760	02/08/2022	3 - Fair
21	40059	Natural High Ground	Right	Walled Bank	219.69	DNR	DNR	DNR	DNR	DNR	DNR	ST85745760	02/08/2022	3 - Fair
23	40242	Natural High Ground	Right	Regraded Bank	134.58	DNR	DNR	DNR	DNR	DNR	DNR	ST84865844	02/08/2022	3 - Fair
27	4598	Natural High Ground	Left	(Trowbridge FAS)Stone Lined Bank	98.38	DNR	DNR	DNR	DNR	DNR	DNR	ST85215812	02/08/2022	3 - Fair
28	4599	Natural High Ground	Left	(Trowbridge FAS)Masonry Wall	166.03	DNR	DNR	DNR	DNR	DNR	DNR	ST85355798	02/08/2022	2 - Good
29	4600	Natural High Ground	Left	(Trowbridge FAS)Natural Bank	79.67	DNR	DNR	DNR	DNR	DNR	DNR	ST85475783	02/08/2022	3 - Fair
32	519811	Engineered High Ground	DNR	Overflow channel	370.19	DNR	DNR	DNR	DNR	DNR	DNR	ST84815815	02/08/2022	3 - Fair
33	519830	Engineered High Ground	DNR	Overflow channel	371.73	DNR	DNR	DNR	DNR	DNR	DNR	ST84835816	02/08/2022	3 - Fair
34	52619	Natural High Ground	Right	Natural Bank	839.20	DNR	DNR	DNR	DNR	DNR	DNR	ST85185888	02/08/2022	3 - Fair
64	56795	Natural High Ground	Left	(Trowbridge FAS) Natural Bank	277.65	DNR	DNR	DNR	DNR	DNR	DNR	ST84855808	02/08/2022	3 - Fair
65	56796	Natural High Ground	Right	(Trowbridge FAS) Masonry Lined Bank	215.26	DNR	DNR	DNR	DNR	DNR	DNR	ST85135812	02/08/2022	3 - Fair
66	57215	Natural High Ground	Left	(Trowbridge FAS)Walled Bank	154.50	34.91	1 - +/- 0.01m to 0.05m vertical accuracy (Typically on site survey)	35.59	1 - +/- 0.01m to 0.05m vertical accuracy (Typically on site survey)	DNR	DNR	ST85615763	02/08/2022	3 - Fair
67	57397	Natural High Ground	Left	Paxcroft Brook Masonry Wall	81.60	DNR	DNR	DNR	DNR	DNR	DNR	ST85895768	22/12/2022	2 - Good
68	57522	Natural High Ground	Right	(Trowbridge FAS)Regraded Bank	257.47	DNR	DNR	DNR	DNR	DNR	DNR	ST85555769	02/08/2022	2 - Good
69	57540	Natural High Ground	Left	Stone Lined Bank	185.23	DNR	DNR	DNR	DNR	DNR	DNR	ST85795762	02/08/2022	3 - Fair
71	72489	Natural High Ground	Left	Natural Bank	1049.67	DNR	DNR	DNR	DNR	DNR	DNR	ST85085874	02/08/2022	3 - Fair

Map Ref	Asset ID	Asset Type	Right or left bank	Asset Description	Approx length (m)	Actual fluvial downstream crest level (mAOD)	Actual fluvial downstream crest level accuracy	Actual fluvial upstream crest level (mAOD)	Actual fluvial upstream crest level accuracy	Actual fluvial coastal crest level (mAOD)	Actual fluvial coastal crest level accuracy	NGR	Most recent inspection	Overall condition
73	96853	Natural High Ground	Left	Natural Bank	525.04	DNR	DNR	DNR	DNR	DNR	DNR	ST84725831	02/08/2022	3 - Fair

Map Ref	Asset ID	Asset Type	Right or left bank	Asset Description	Approx length (m)	Actual fluvial downstream crest level (mAOD)	Actual fluvial downstream crest level accuracy	Actual fluvial upstream crest level (mAOD)	Actual fluvial upstream crest level accuracy	Actual fluvial coastal crest level (mAOD)	Actual fluvial coastal crest level accuracy	NGR	Most recent inspection	Overall condition
1	5345	Simple Culvert	DNR	Paxcroft Brook Culverts Culvert	26.77	DNR	DNR	DNR	DNR	DNR	DNR	ST85845764	22/12/2022	1 - Very Good

Notes

* Overall Condition has been taken from the most recent inspection

* Inspections are of a purely visual nature and do not necessarily reflect the true condition of the asset

* Condition: 1 = very good, Condition 2 = good, Condition 3 = fair, Condition 4 = poor, Condition 5 = very poor

* Crest level accuracy: 1 = ± 0.01 to 0.05m, 2 = ± 0.05 to 0.15m, 3 = ± 0.15 to 0.75m, 4 = ± 0.75 or greater

Jessica Evans
Tumu Consulting
jessica.evans@tumuconsulting.com

Our ref: 297468-WX
Date: 28 February 2023

Dear Jessica, thank you for your enquiry which was received on 31st January 2023. We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

Abstract

Name	Product 4
Description	Flood Risk Information for land at Town Bridge, Trowbridge, BA14 8LA NGR: ST8535058037
Licence	Open Government Licence
Information Warnings	<i>The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply.</i>
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2020 Ordnance Survey 100024198.

Open Data

The following Environment Agency published datasets are now available on the weblink below as part of the Government's 'Open Data' project and are available for you to download free of charge.

Environment Agency published datasets: <https://data.gov.uk/data/search?publisher=environment-agency&unpublished=false>

You will need to search and select the name of the following datasets to take you directly to the weblink to enable you to download the data:

- Flood Map for Planning (Rivers and the Sea) – Flood Zones 2 and 3
- Flood Map for Planning (Rivers and Sea) – Areas Benefiting from Defences
- Flood Map for Planning (Rivers and Sea) Spatial Flood Defences
- Flood Map for Planning (Rivers and Sea) Flood Storage Areas
- Recorded Flood Outlines
- Historic Flood Map
- Risk of Flooding from Surface Water Extent for:
 - 3 percent annual chance
 - 1 percent annual chance
 - 0.5 percent annual chance

You can also access the Flood Map for Planning here: <https://flood-map-for-planning.service.gov.uk/>

You can also access the Risk of Flooding from Surface Water maps and Risk of Flooding from Reservoirs information here: <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>

Recorded Historic Flood Events

We no longer produce pdf copies of the Historic Flood Map. This information is available to search, select, and download free of charge as part of the Government's 'open data' as

- Recorded Flood Outlines
- the Historic Flood Map

Our historic records indicate that there was fluvial (main river) flooding in the area in **1925, 1932, 1947, 1960 and 1979**. Furthermore, we have a record of flooding from an unconfirmed source in **2014**.

Additionally, our historic records show a record of possible flooding pre 2012 for the area, however we are currently unable to confirm the date and source of this.

Please note - we cannot guarantee that this is an exhaustive list of all past flood events in this location. All reasonable care has been taken to ensure that the historical flood event data is as accurate as possible. The Environment Agency will update its records if new evidence emerges.

Modelled Fluvial Water Levels

The attached map contains a set of modelled (within the river channel) fluvial flood level node locations/unique identifiers, for the Biss. The modelled data is taken from the Biss FRA (2012) - Stephens Place - Trowbridge model. A sheet is also attached providing the associated flood levels, flood flows if available and NGRs relating to each of these nodes.

Please note: Modelled water levels and flows are in channel values only. There may be a variation in water levels and flows across the flood plain in the 2D domain.

2D Modelled Flood Plain Water Levels

Please see below for maximum 2D level information for your site for a range of return periods. This information is taken from the Biss FRA (2012) - Stephens Place - Trowbridge model.

Maximum 2D modelled water levels for the investigation area:

Undefended Levels

50% AEP (2yr) undefended:	33.01 mAOD
20% AEP (5yr) undefended:	33.22 mAOD
10% AEP (10yr) undefended:	33.37 mAOD
5% AEP (20yr) undefended:	33.57 mAOD
5% AEP (20yr) with 20% increase in flow – undefended:	33.82 mAOD
2% AEP (50yr) undefended:	33.85 mAOD
1.3% AEP (75yr) undefended:	33.97 mAOD
1% AEP (100yr) undefended:	34.29 mAOD
1% AEP (100yr) with 20% increase in flow - undefended:	34.46 mAOD
0.5% AEP (200yr) undefended:	34.41 mAOD
0.1% AEP (1000yr) undefended:	34.83 mAOD

N.B. 0.00 (m or mAOD) indicates the data does not reach the site

N.B. Levels and depths have been extracted based upon the site boundary plan provided

N.B. Please note not all models contain climate change runs.

For more information on climate change allowances please see the guidance on the Gov.UK website here: [Flood risk assessments: climate change allowances - GOV.UK](#). Please be aware that this information is subject to change, please check the guidance regularly.

Environmental Permit for Flood Risk Activities

In addition to any other permission(s) that you may have already obtained e.g. planning permission, you may need an environmental permit for flood risk activities (formerly known as Flood Defence Consent prior to 06 April 2016) if you want to do work:

- in, under, over or near a main river (including where the river is in a culvert)
- on or near a flood defence on a main river
- in the flood plain of a main river
- on or near a sea defence

For further information and to check whether a permit is required please visit:
<https://www.gov.uk/guidance/flood-risk-activities-environmental-permits>.

For any further advice, please email Blandford.frap@environment-agency.gov.uk.

Flood Asset Information

Please find enclosed details of Flood Assets within the area. This information has been taken from our Asset Information Management System database (AIMS).

Please note that flood defences can increase water levels elsewhere eg through channels being restricted by defences, or because defences prevent flood water flowing back into the river channel.

Planning

If you have questions regarding the planning nature of your enquiry, or require advice on floor levels, please contact our Sustainable Places team on SWX.SP@environment-agency.gov.uk.

Please be aware that we now charge for planning advice when consulted on pre-application enquiries. This new approach provides advice to developers in two ways. Firstly, there is the provision of 'free' advice available to everyone where we give a preliminary opinion on a proposed development. This sets out the environmental constraints together with any issues this raises for us.

Should you wish us to review in detail any of these issues then we can do this through a chargeable scheme aimed at recovering our costs.

Strategic Flood Risk Assessment (SFRA)

When preparing a FRA to support a development proposal in this location you should refer to Wiltshire Council's SFRA Reports Level 1 which is available to download via the following link:

https://www.wiltshire.gov.uk/media/5691/Strategic-Flood-Risk-Assessment-Level-1/pdf/Wiltshire_Council_Level_1_SFRA_v5.0.pdf?m=637459765054370000

The Wiltshire Council Local Plan is available via this link: <https://www.wiltshire.gov.uk/planning-policy-local-plan-review-consultation>

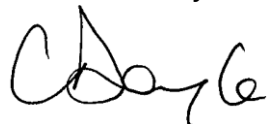
Further Information

We advise that you also contact the drainage engineer/ flood risk management team at Wiltshire Council by email: drainage@wiltshire.gov.uk, or by phone: 0300 456 0105, based at: Bythesea Road, Trowbridge, Wiltshire, BA14 8JN, as they may be able to provide further advice with respect to localised flooding and drainage issues.

Further details about the Environment Agency information supplied can be found on our website:
<https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather>

We hope you find this information helpful. It is provided subject to the attached notice 'Use of Environment Agency Information for Flood Risk Assessments', which we strongly recommend you read.

Yours sincerely



Chris Doyle

Customer & Engagement, Wessex

Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS

Email: wessexenquiries@environment-agency.gov.uk

Telephone number: 03708 506 506

Enc: Use of Environment Agency Information for Flood Risk Assessments (below)
297468-WX Node Location Map
297468-WX Node Data
297468-WX Defence Map and Data

Use of Environment Agency Information for Flood Risk Assessments (FRAs)

Important

Use of Environment Agency data: you should note that

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment (FRA) where one is required, but the use of Environment Agency information does not constitute such an assessment on its own.
2. As part of your data request, we have provided all of the modelled data we hold for your location. Please note that some of our modelled information may have been produced for purposes other than for flood zone generation. This may mean that some of the modelled data you have been provided with has a lower confidence level, and has not been used in producing our flood map, nor definitively reflects the predicted flood water level at the property/development site scale. To check the suitability of the use of this information in your FRA please contact your local Partnership & Strategic Overview (PSO) team.
3. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or surface water runoff. The information produced by the Local Planning Authority and the Lead Local Flood Authority (LLFA) may assist in assessing other sources of flood risk.
4. Where a planning application requires a FRA and this is not submitted or deficient, the Environment Agency may well raise an objection.
5. For more significant proposals in higher flood risk areas, we would be pleased to discuss details with you ahead of making any planning application, and you should also discuss the matter with your Local Planning Authority.

Pre-Planning Advice from the Environment Agency

If you have requested this information to help inform a development proposal, then we recommend that you undertake a formal pre-application enquiry using the form available from our website:

Pre-application Preliminary Opinion:

<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

Pre-application Charged Service:

<https://www.gov.uk/government/publications/planning-advice-environment-agency-standard-terms-and-conditions>

Depending on the enquiry we may also provide advice on other issues related to our responsibilities, including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

Flood Risk Assessment (FRA) Guidance

You should refer to the Planning Practice Guidance of the National Planning Policy Framework (NPPF) and the Environment Agency's Flood Risk Standing Advice for information about Flood Risk Assessment (FRA) for new development in the different Flood Zones. These documents can be accessed via:

National Planning Policy Framework Planning Practice Guidance:

<http://planningguidance.planningportal.gov.uk/>

Environment Agency advice on FRAs:

<https://www.gov.uk/flood-risk-assessment-for-planning-applications#when-to-follow-standing-advice>

<https://www.gov.uk/government/publications/planning-applications-assessing-flood-risk>

TITLE Trowbridge SoP Study 2013
MODEL DATE 19/07/2013
SOFTWARE Estry-TUFLOW

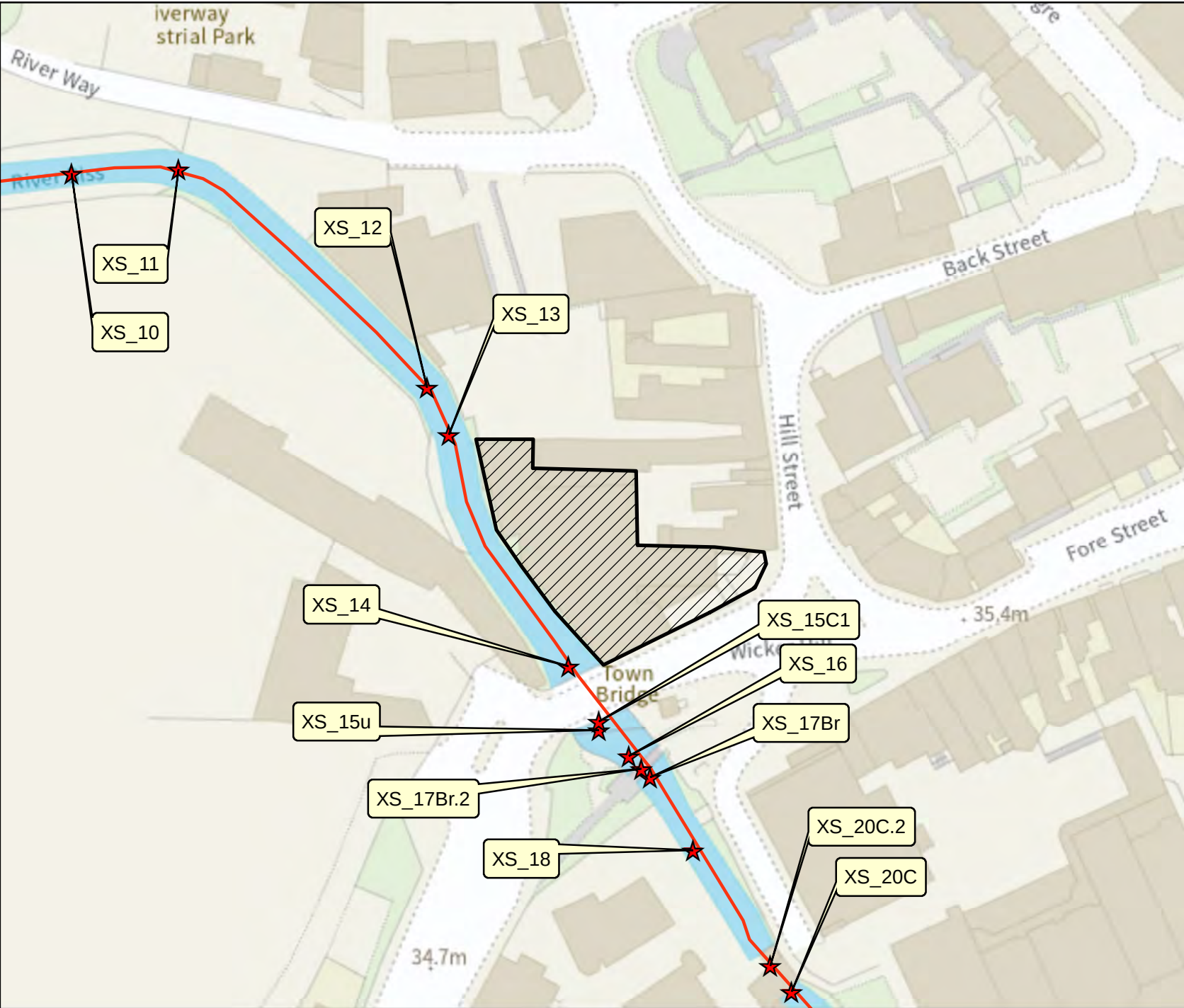
SCENARIO Undefended

NODE	XS_10	XS_11	XS_12	XS_13	XS_14	XS_15C1	XS_15u	XS_16	XS_17Br	XS_17Br.2	XS_18	XS_20C	XS_20C.2
WATERCOURSE	Biss	Biss	Biss	Biss	Biss	Biss	Biss	Biss	Biss	Biss	Biss	Biss	Biss
2YR Level	32.86	32.89	32.97	32.98	33.01	33.02	33.02	33.16	33.18	33.16	33.20	33.25	33.24
2YR Flow	13.72	13.72	13.72	13.72	12.73	5.67	13.75	13.73	13.76	NMD	13.71	13.75	NMD
5YR Level	33.03	33.06	33.17	33.19	33.22	33.23	33.23	33.41	33.42	33.41	33.44	33.51	33.50
5YR Flow	18.42	18.42	18.42	18.31	16.45	7.63	18.44	18.44	18.44	NMD	18.44	18.44	NMD
10YR Level	33.17	33.21	33.33	33.35	33.38	33.39	33.40	33.59	33.60	33.60	33.63	33.71	33.69
10YR Flow	22.07	22.07	22.07	21.33	19.24	9.17	22.10	22.10	22.10	NMD	22.10	22.10	NMD
20YR Level	33.34	33.38	33.52	33.53	33.57	33.59	33.59	33.81	33.82	33.82	33.85	33.95	33.92
20YR Flow	26.41	26.41	26.41	24.54	22.43	11.01	26.45	26.45	26.45	NMD	26.45	26.45	NMD
20YR 20%CC Level	33.59	33.64	33.77	33.79	33.82	33.86	33.86	34.11	34.12	34.11	34.15	34.25	34.21
20YR 20%CC Flow	31.82	31.82	31.60	27.30	26.28	13.73	32.12	31.97	31.84	NMD	31.86	31.85	NMD
25YR Level	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
25YR Flow	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
30YR Level	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
30YR Flow	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
50YR Level	33.62	33.66	33.80	33.81	33.84	33.88	33.89	34.14	34.15	34.14	34.17	34.27	34.24
50YR Flow	32.15	32.19	31.88	27.45	26.52	14.08	32.85	32.26	32.61	NMD	32.27	32.23	NMD
75YR Level	33.75	33.79	33.92	33.93	33.97	34.01	34.02	34.28	34.30	34.29	34.32	34.42	34.38
75YR Flow	34.35	34.35	33.42	28.47	28.01	15.51	35.91	35.00	35.09	NMD	34.70	34.58	NMD
100YR Level	33.88	33.92	34.04	34.05	34.08	34.13	34.13	34.42	34.43	34.42	34.46	34.56	34.52
100YR Flow	36.31	36.31	34.67	29.26	29.21	16.33	39.50	36.36	36.36	NMD	36.35	36.32	NMD
100YR 20%CC Level	34.10	34.14	34.26	34.28	34.31	34.38	34.38	34.73	34.74	34.73	34.76	34.86	34.81
100YR 20%CC Flow	43.43	43.35	39.98	33.45	33.92	18.56	50.71	39.48	39.42	NMD	39.90	40.72	NMD
100YR 30%CC Level	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
100YR 30%CC Flow	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
100YR 40%CC Level	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
100YR 40%CC Flow	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
100YR 85%CC Level	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
100YR 85%CC Flow	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
200YR Level	34.02	34.06	34.19	34.20	34.23	34.30	34.30	34.63	34.65	34.64	34.67	34.78	34.73
200YR Flow	41.36	41.36	38.60	32.45	32.62	18.10	47.92	39.40	39.33	NMD	39.76	40.14	NMD
200YR 20%CC Level	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
200YR 20%CC Flow	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
500YR Level	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
500YR Flow	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
1000YR Level	34.57	34.61	34.73	34.74	34.77	34.84	34.85	35.22	35.23	35.22	35.25	35.16	35.04

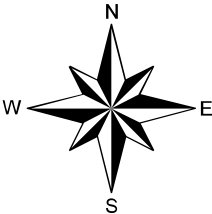
297468-WX selected nodes data extract

1000YR Flow	55.88	53.61	49.10	39.21	41.33	19.72	60.20	39.86	39.80	NMD	40.30	51.83	NMD
1000YR 20%CC Level	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
1000YR 20%CC Flow	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
TIDE 200YR	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
TIDE 1000YR	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
Eastings	385221	385246	385304	385309	385337	385344	385344	385351	385356	385354	385366	385389	385384
Northings	158126	158127	158076	158065	158011	157998	157996	157990	157985	157987	157968	157935	157941

Level of confidence	Moderate	The model was produced to assess our flood risk management assets and the results are fit for this purpose. We have MODERATE confidence in its input data, and subsequently its results. The reason that we have MODERATE confidence in the model and its results is because the model requires verification against a known flood event. You will need to contact our Partnership and Strategic Overview Team to discuss whether the flood levels from this model are suitable for your FRA or whether they require you to carry out further work to update the modelling.
NMD	No Modelled Data	
UNITS	LEVELS:	mAOD
	FLOW:	cumecs



Scale:1:1,250 At A3



Legend

NODE_TYPE

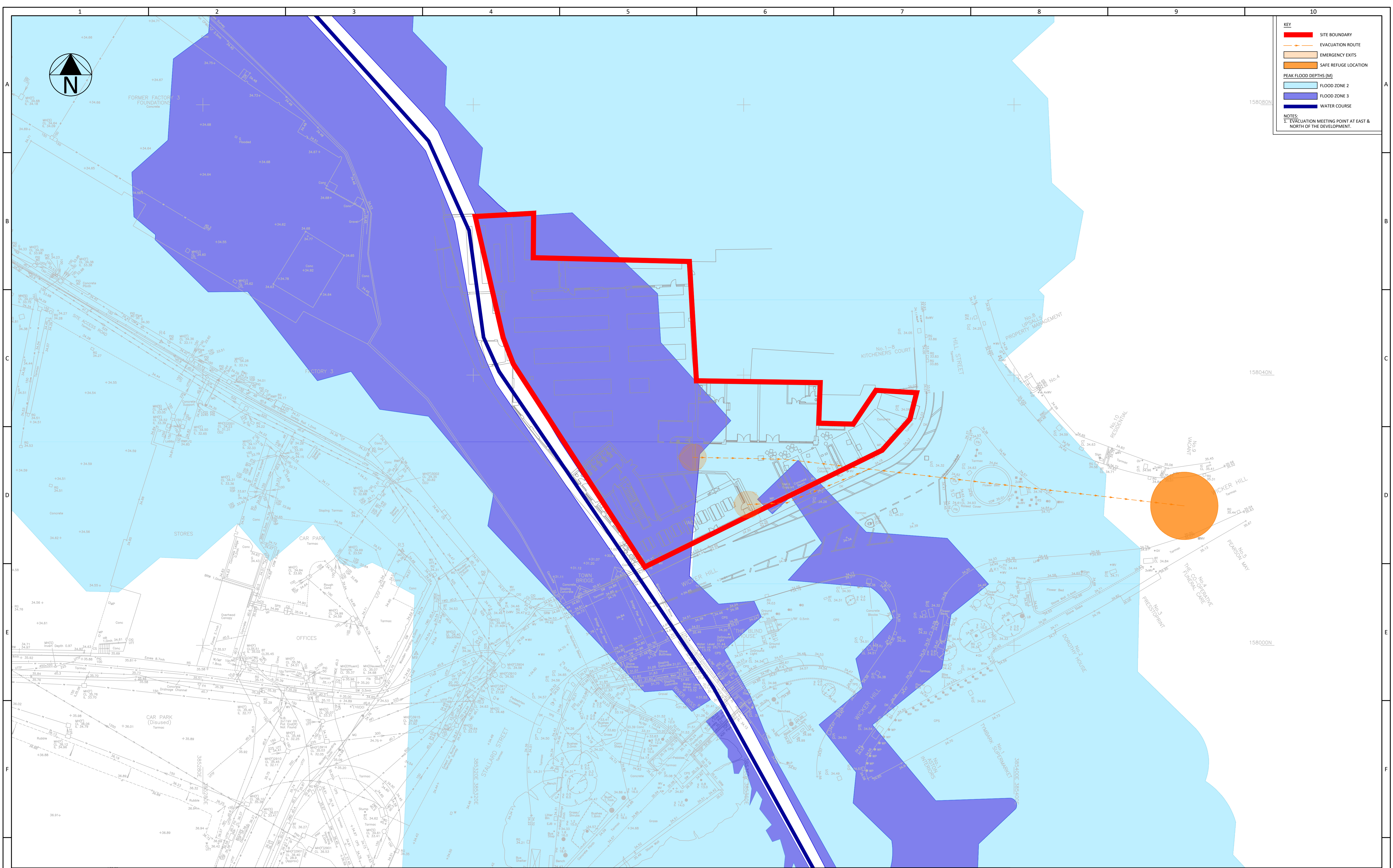
- ★ 1D_RiverSection
- ★ 2D_RiverSection
- ★ Interpolate
- ★ Replicate
- Reservoir
- Statutory_Main_Rivers
- ▨ 297468-WX_site_boundary

Modelled Flood Level Nodes

A table that references the node locations/unique identifiers is also attached, giving associated flood levels, NGRs and further information for the river channel and model.

Appendix E

Safe Access Route



KEY

SITE BOUNDARY

EVACUATION ROUTE

EMERGENCY EXITS

SAFE REFUGE LOCATION

PEAK FLOOD DEPTHS (M)

FLOOD ZONE 2

FLOOD ZONE 3

WATER COURSE

NOTES:
1. EVACUATION MEETING POINT AT EAST & NORTH OF THE DEVELOPMENT.

					DESIGN BY:				PROJECT:				TOWN BRIDGE SITE TROWBRIDGE																												
									TOTAL BATHROOMS																																
									ARCHITECT:				TITLE:																												
									BIBO STUDIO LTD				EVACUATION PLAN																												
				A FIRST ISSUE				24/03/23		TS		AB		DRAWING STATUS:				SCALE @ A1:				0		1:250		12.5		metres		PROJECT No:		19653		DRAWING No:		D02		REV:		A	
				REV.				DESCRIPTION				Date		BY		CHK		DISCHARGE OF PLANNING CONDITIONS																							
1				2				3				4				5				6				7				8				9				10					

Proposed Drainage Strategy



EXISTING DRAINAGE

- PUBLIC SURFACE WATER SEWER (SHOWN INDICATIVELY AS PER SEVERN TRENT WATER MAPPING)
- PUBLIC FOUL WATER SEWER (SHOWN INDICATIVELY AS PER SEVERN TRENT WATER MAPPING)
- ASSUMED ROUTE OF PRIVATE NETWORK TBC BY CONTRACTOR

PROPOSED PRIVATE DRAINAGE

- FOUL WATER DRAIN
- SURFACE WATER DRAIN
- 900mm DEEP 4500 PPIC
- INDICATIVE SOIL VENT PIPE
- CHANNEL DRAIN
- INDICATIVE RAINWATER PIPE
- GREEN ROOF (TOTAL 0.023Ha)
- RAINWATER PLANTERS (TOTAL 0.002Ha)

- NOTES:**
- ALL BUILDING DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT BRITISH/EUROPEAN STANDARDS BS752, THE CURRENT BUILDING REGULATIONS AND THE LOCAL AUTHORITY BUILDING CONTROL SPECIFICATIONS AND REQUIREMENTS.
 - IN THE ABSENCE OF PROPOSED LEVELS FOR THE SITE THE DRAINAGE STRATEGY HAS BEEN BASED UPON EXISTING GROUND LEVELS. DESIGN LEVELS ARE TO BE PROVIDED BY THE ARCHITECT. ALL DRAINAGE COVER LEVELS AND INVERT LEVELS ARE INDICATIVE ONLY AND SUBJECT TO CHANGE.
 - EXACT LOCATION OF RAINWATER DOWNPIPES AND ALL INTERNAL DRAINAGE POINTS TO BE CONFIRMED BY ARCHITECT. RAINWATER PIPE OUTLETS TO BE ROAD-ABLE.
 - ALL EXISTING WESSEX WATER MANHOLE DATA HAS BEEN PLOTTED FROM ASSET RECORDS AND IS INDICATIVE ONLY. ALL OUTFALL CHAMBERS COVER AND INVERT LEVELS TO BE CHECKED BY THE CONTRACTOR PRIOR TO COMMENCEMENT. WHERE PROPOSED CONNECTIONS CROSS EXISTING SEWERS THESE SHOULD ALSO BE SURVEYED.
 - ALL DRAINAGE WORKS TO BE CONSTRUCTED FROM THE OUTFALL TOWARDS THE HEAD OF RUN TO ENSURE THE OUTFALL CAN BE ACHIEVED.
 - CONTRACTOR TO VERIFY LOCATION & LEVEL OF RECEIVING SEWER PRIOR TO COMMENCEMENT AND ANY ANOMALIES REPORTED TO THE ENGINEER IMMEDIATELY.
 - CONTRACTOR TO VERIFY LOCATIONS OF ALL EXISTING SERVICES PRIOR TO COMMENCEMENT & ARRANGE FOR ANY NECESSARY PROTECTION, DIVERSION/LOWERING WORKS AS REQUIRED.
 - ALL FOUL PRIVATE PIPES TO BE 100mm DIAMETER UNLESS OTHERWISE SHOWN. MIN GRADIENT 1:80 WHERE CONNECTED TO A MINIMUM OF 1 WC, OTHERWISE MIN 1:40. ALL SURFACE PRIVATE DRAINAGE PIPES TO BE 100mm DIAMETER UNLESS OTHERWISE STATED WITH A MIN GRADIENT OF 1:100 UNLESS OTHERWISE STATED.
 - PIPE SIZES SHOWN ARE INDICATIVE ONLY AND SUBJECT TO DETAILED DESIGN.
 - INTERNAL ROUTING TO BE CONFIRMED BY OTHERS.
 - THIS DRAWING IS FOR PLANNING PURPOSES ONLY AND INFORMATION IS SUBJECT TO CHANGE AT DETAILED DESIGN STAGE.

B	LAYOUT UPDATED	23/02/23	TH	JE
A	FIRST ISSUE	10/02/23	JE	AB
REV.	DESCRIPTION	Date	BY	CHK
DESIGN BY:				
CLIENT:				
TOTAL BATHROOMS				
ARCHITECT:				
BIBO STUDIO LTD				
DRAWING STATUS:				
PLANNING APPLICATION				
SCALE @ A1:				
PROJECT:				
TOWN BRIDGE SITE TROWBRIDGE				
TITLE:				
DRAINAGE STRATEGY				
PROJECT No:	19653	DRAWING No:	D01	REV:
				B