FLOOD RISK ASSESSMENT

Asda Gloucester

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Asda Gloucester
3
3rd March 2022

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Quality Management

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[redacted]	3 March 2022

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Prepared for:

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1 INTRODUCTION

1.1 RPS was commissioned to prepare a Flood Risk Assessment (FRA) for a site located within the car park of Asda Gloucester, Bruton Way, Gloucester, GL1 1DS in relation to a proposed development of a restaurant with a drive thru.

1.2 The aim of the FRA is to outline the potential for the site to be impacted by flooding, the impacts of the proposed development on flooding in the vicinity of the site, and the proposed measures which could be incorporated into the development to mitigate the identified risk. The report has been produced in accordance with the guidance detailed in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG). Reference has also been made to the Gloucestershire County Council Level 1 and Gloucester City Council Level 1 & 2 Strategic Flood Risk Assessment (SFRA).

1.3 This report has been produced in consultation with the Environment Agency (EA) and the Lead Local Flood Authority (LLFA). The site is not located within an Internal Drainage Board (IDB) District.

1.4 The desk study was undertaken by reference to information provided / published by the following bodies:

- Environment Agency (EA);
- Gloucester City Council (GC);
- Gloucestershire County Council (GCC);
- Centre for Ecology and Hydrology;
- British Geological Survey (BGS);
- Ordnance Survey (OS); and
- Severn Trent Water (STW).

2 PLANNING POLICY CONTEXT

National Planning Policy

2.1 The National Planning Policy Framework (NPPF) was released in March 2012 and was updated in July 2021. The document advises of the requirements for a site-specific Flood Risk Assessment (FRA) for any of the following cases (Planning and Flood Risk paragraph 167 (footnote 55)):

- All proposals (including minor development and change of use) located within the EA designated floodplain, recognised as either Flood Zone 2 (medium probability) or Flood Zone 3 (high probability);
- All proposals of 1 hectare (ha) or greater in an area located in Flood Zone 1 (low probability);
- All proposals within an area which has critical drainage problems (as notified to the Local Planning Authority by the EA);
- Land identified in a strategic flood risk assessment as being at increased flood risk in future; and
- Where proposed development may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

2.2 Paragraph 169 of the updated NPPF identifies that major developments (developments of 10 homes or more and to major commercial development) should incorporate Sustainable Drainage Systems unless there is clear evidence that this would be inappropriate. The systems used should:

a. *Take account of advice from the Lead Local Flood Authority;*
b. *Have appropriate proposed minimum operational standards;*
c. *Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and*
d. *Where possible, provide multifunctional benefits.*

2.3 Defra published their 'Non-statutory technical standards for sustainable drainage systems' in March 2015. These are supported by the revised NPPF.

Local Planning Policy

2.4 The Gloucester City Council Core Strategy contains Policy INF2 relating to Flood Risk Management:

a. *Development proposal must avoid areas at risk of flooding, in accordance with a risk- based sequential approach. Proposals must not increase the level of risk to the safety of occupiers of a site, the local community or the wider environment either on the site or elsewhere. For sites of strategic scale, the cumulative impact of the proposed development on flood risk in relation to existing settlements, communities or allocated sites must be assessed and effectively mitigated.*
b. *Minimising the risk of flooding and providing resilience to flooding, taking into account climate change, will be achieved by:*

- Requiring new development to, where possible, contribute to a reduction in existing flood risk;
- Applying a sequential test for assessment of applications for development giving priority to land in Flood Zone 1, and, if no suitable land can be found in Flood Zone 1, applying the exception test;
- Requiring new development that could cause or exacerbate flooding to be subject to a flood risk assessment which conforms to national policy and incorporates the latest available updates

to modelling and climate change data and historic data and information and guidance contained in the authorities' Strategic Flood Risk Assessments and Supplementary Planning Documents, in order to demonstrate it will be safe, without increasing flood risk elsewhere;

- Requiring new development to incorporate suitable Sustainable Drainage Systems (SuDS) where appropriate in the view of the local authority to manage surface water drainage: to avoid any increase in discharge into the public sewer system; to ensure that flood risk is not increased on-site or elsewhere; and to protect the quality of the receiving watercourse and groundwater. Where possible, the authorities will promote the retrofitting of SuDS and encourage development proposals to reduce the overall flood risk through the design and layout of schemes which enhance natural forms of drainage. Developers will be required to fully fund such mitigation measures for the expected lifetime of the development including adequate provision for ongoing maintenance;
- Working with key partners, including the Environment Agency and Gloucestershire County Council, to ensure that any risk of flooding from development proposals is appropriately mitigated and the natural environment is protected in all new development.

2.5 The Gloucestershire County Council and the Gloucester City Council SFRAs identify and map flood risk from all sources at a borough-wide scale as well as providing guidance on producing site specific FRAs. Relevant information from the SFRA has been referenced throughout this FRA report.

3 CONSULTATION

Environment Agency

3.1 The FRA has been prepared in consultation with Diane Edwards, Customers and Engagement Officer – West Midlands Area at the EA. Modelled flood data has been requested at the site location, as well as details of historic flooding and flood defences within the vicinity of the site. The information provided by the EA is included as Appendix A and is summarised in Section 6.

Lead Local Flood Authority and Local Planning Authority

3.2 The site is within the administrative boundary of Gloucester City Council. Consultation has been undertaken with the flood risk department. Data has been requested with regards to historic flooding, flood defences, modelled flood levels, hazard mapping and information on groundwater flooding issues in the area. At the time of writing, a response is pending.

3.3 The LLFA is Gloucestershire County Council.

Internal Drainage Board

3.4 The site is not located within an IDB District.

4 SITE DESCRIPTION

Site Description

4.1 The site is located at National Grid Reference SO 83769 18402 and is irregular in shape and occupies an area of approximately 0.22 hectares (ha). The site location is presented in Figure 4-1.

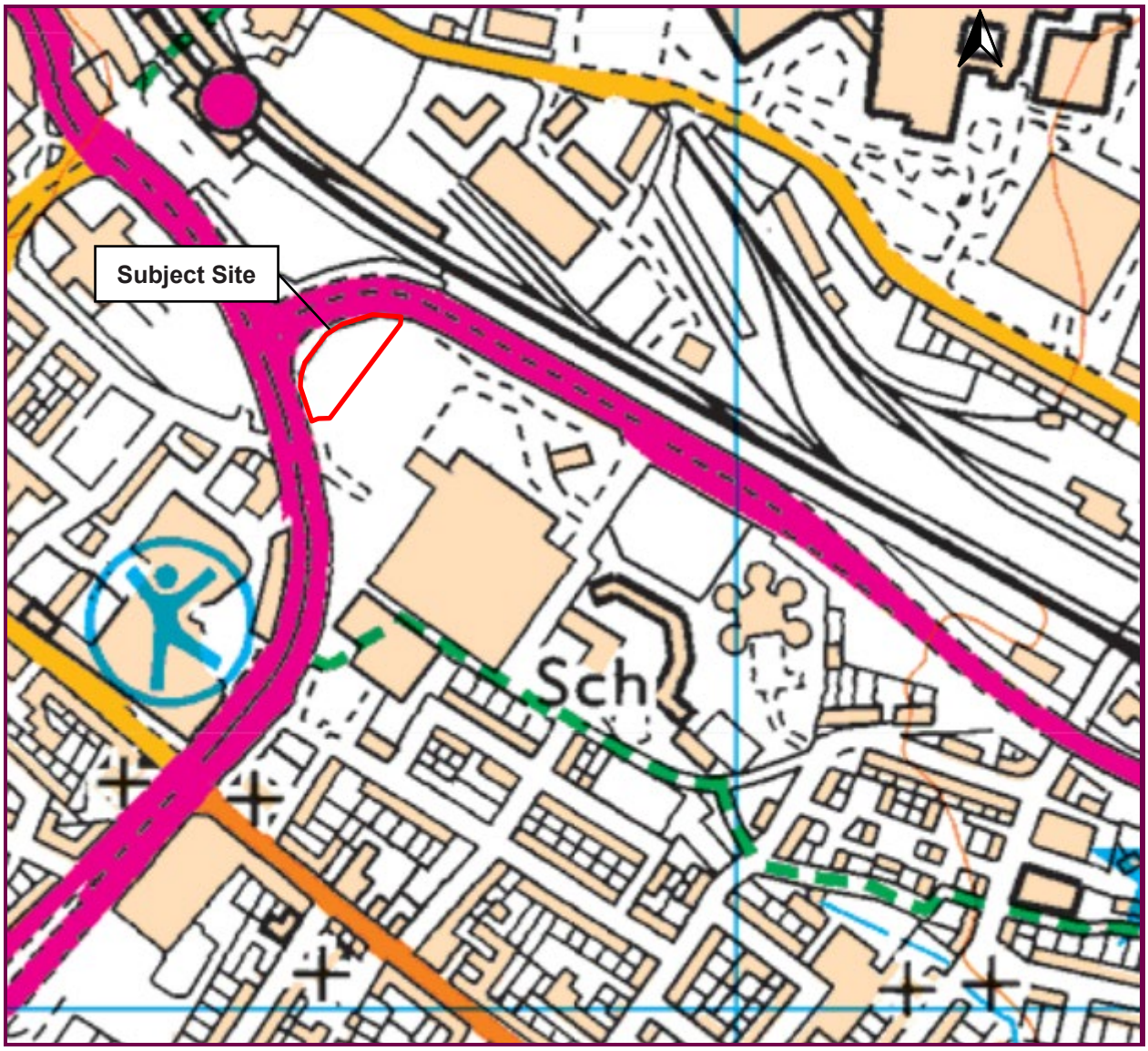


Figure 4-1. Site Location

4.2 The site is currently part of the car park of Asda Gloucester.

4.3 Vehicular access is through the main access of the Asda carpark off Metz Way to the east of the site.

4.4 The entire site currently surfaced with low permeability hardstand.

Surrounding Land Uses

4.5 The surrounding land uses are predominately commercial to the west and to the north of the site with some mixed-use buildings comprising of commercial ground floors and residential upper floors. Gloucester train station is located to the north-west of the site and the railway line runs from the north of the site to the east. Gloucester Royal Hospital is located to the north of the site just across the railway line.

4.6 There are no designated sensitive areas (e.g. Special Area of Conservation (SAC), Special Protection Area (SPA) or Site of Special Scientific Interest (SSSI)) within close proximity to the site.

Topography

4.7 A topographic survey was completed by West Coast Geomatics in October 2021, reference WCG 21 - 1669, and indicates that the site is predominately flat with levels ranging from 17.44m AOD in the south west to 17.87m AOD in the west. At the proposed location of the building, the ground level ranges between 17.58m AOD to 17.77m AOD. The topographic survey is located in Appendix B.

5 PROPOSED DEVELOPMENT

5.1 The proposal is for a drive thru restaurant within the Asda car par in the north west. Development plans are shown in Appendix C.

5.2 Access to the site will be available from the main entrance of the car park off Metz Way.

5.3 The proposal will not impact the impermeable area at the site as the existing site comprises of 100% hardstanding cover; however, the development will increase the building footprint at the site as it proposes the erection of a commercial restaurant building. The proposed building footprint accounts for approximately 220m^2.

5.4 The proposed use of the site is classified as ‘less vulnerable’ within the PPG.

5.5 The potential to provide surface water attenuation, including the use of Sustainable Drainage Systems (SuDS), has not been considered as part of this flood risk assessment as it was not in the scope of this report.

6 HYDROLOGICAL SETTING

Nearby Watercourses

6.1 OS Mapping indicates that the nearest surface water feature is the River Twyver which runs in culvert in the vicinity of the site as shown in Figure 6-1 below.

6.2 The River Severn and the Gloucester and Sharpness Canal also are located in the vicinity of the site, at approximately 1Km to the west-southwest.

6.3 The River Severn is Britain's longest river from source to tidal waters – about 290km long, with the Severn estuary adding some 64km to its total length. It drains an area of 11,266 km^2 with an average discharge at Bewdley of 61.5m^3/s. At Gloucester, the Severn becomes tidal and meanders to the sea.

6.4 No reservoirs have been identified within 1km of the site.

Fluvial / Tidal Flood Risk Classification

6.5 The EA Flood Map for Planning, which is available online, indicates that the majority of the site lies within Flood Zone 1 with the area along the eastern boundary falling within Flood Zone 2 and 3. The annual probability of flooding from fluvial or tidal sources is classified as less than 0.1% in Flood Zone 1 and between 0.1% and greater than 1% in the areas in Flood Zone 2 and 3 respectively. The EA Flood Map for Planning is provided in Figure 6-1. .

6.6 The EA was contacted to provide site-specific data to clarify the flood risk at the site. They have provided 1D and 2D fluvial flood levels in the vicinity of the site. The node closer to the site is reference no. 2D 01 as shown in the Node Point Map available in Appendix A. The flood level at this location would potentially reach 17.67m AOD during both the 1 in 100-year event and including 20% climate change allowance. The EA's full response is presented in Appendix A.

6.7 Given that the levels at the site ranges between 17.44m AOD to 17.79m AOD, the site would potentially be impacted by flood depths up to 230mm during the 1 in 100-year plus 20% climate change event. Part of the site will remain dry during this scenario.

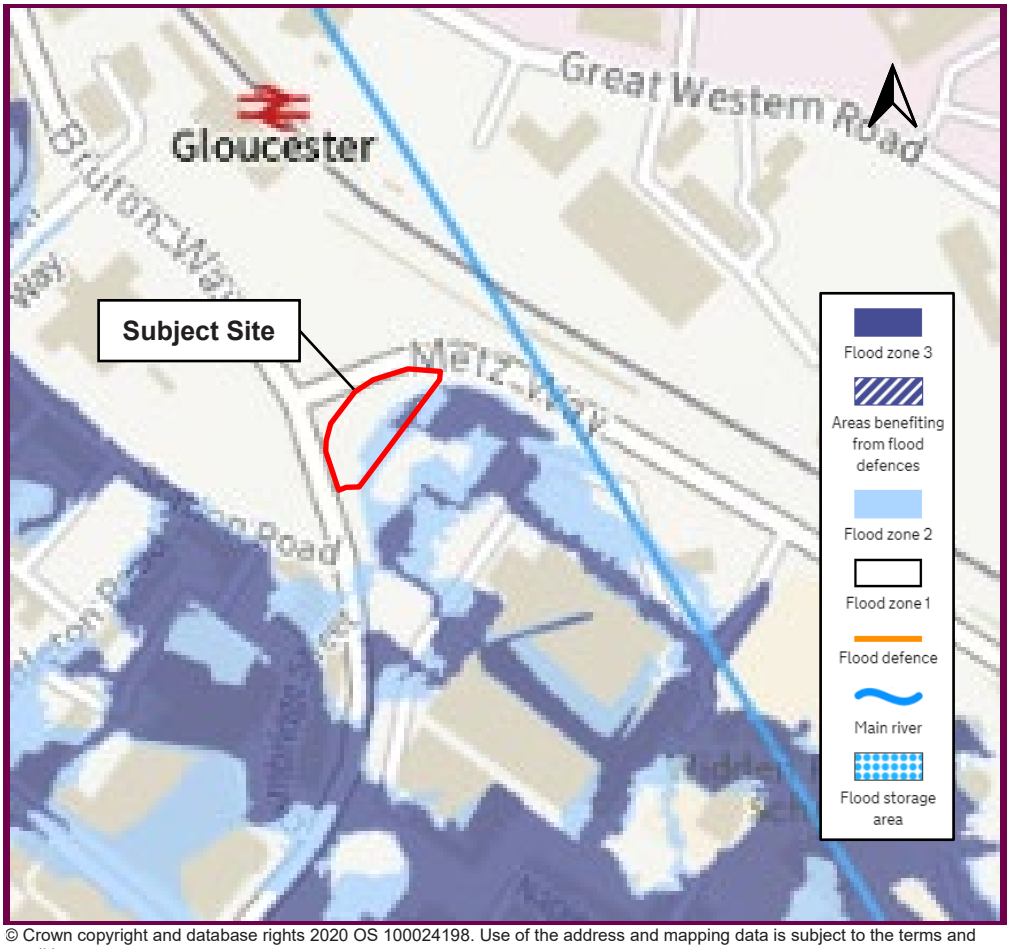


Figure 6-1. EA Flood Map for Planning

6.8 The EA has also provided flood outlines and levels within the site itself. The flood outline during the 1 in 100-year + 20% climate change event would potentially impact part of the proposed building as shown in Figure 6-2 below. The maximum flood level within the proposed building footprint would potentially reach 17.62m AOD. As shown from the topographic survey, the proposed location of the building ranges from 17.58m AOD to 17.77m AOD indicating that the modelled flood outline at the site may be incorrect. This is likely to be linked to the uncertainty of the DTM used within the flood model.

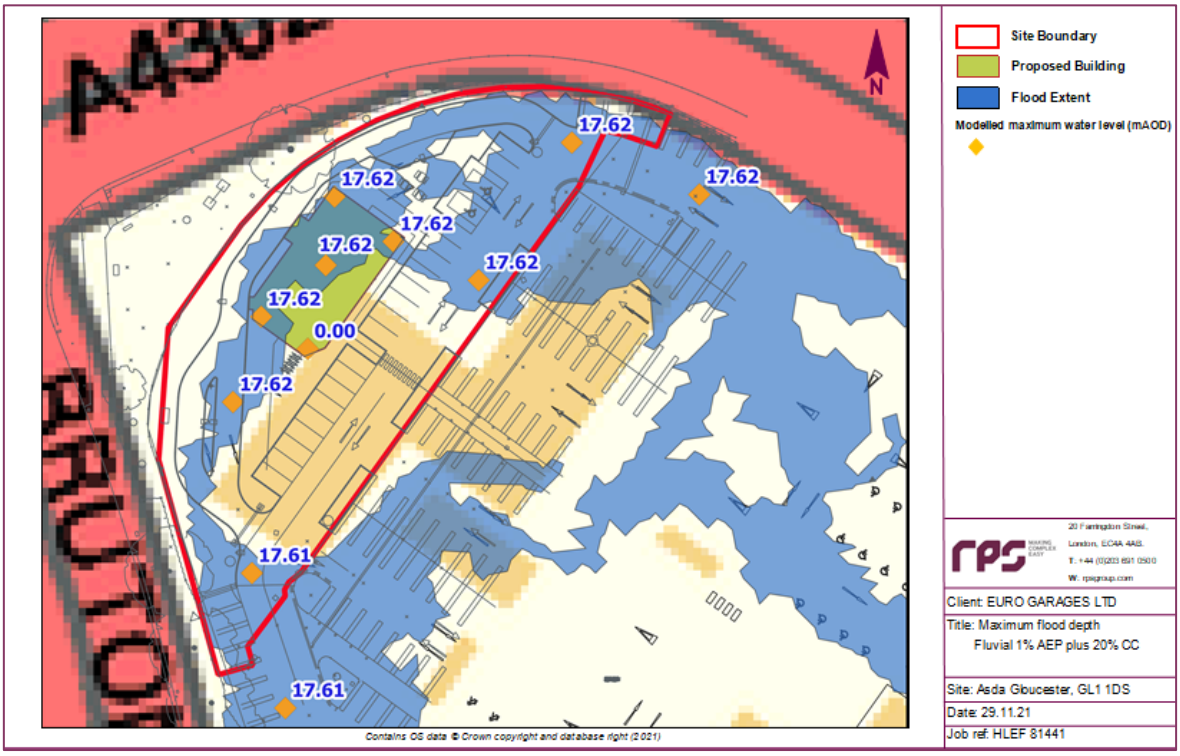


Figure 6-2 - Flood extent and levels during the 1 in 100-year plus 20% climate change event

6.9 With a maximum predicted flood level of 17.62m AOD, only the north east corner of the proposed building is likely to be impacted by flooding during the 1 in 100-year + 20% climate change event. Given that the lowest level at the proposed location of the building is 17.58m AOD, the maximum flood depth at the proposed restaurant would potentially reach only 40mm.

6.10 Flood levels and extents maps during the 1 in 100-year and 1 in 100-year plus 20% climate change event have been prepared for the site location and they are available in Appendix A as well.

6.11 The EA has not provided information on flow velocity nor flood hazard at the site.

6.12 The National Planning Practise Guidance on Climate Change allowances for planning has been updated in August 2021. It indicates that for less vulnerable and water compatible developments, the Central – 2050's allowance should be used. The site lies within the Severn Vale Peak Management Catchment with a Central – 2050's allowance accounting for 19%. It is therefore considered to be reasonable to use the modelled flood level during the 1 in 100-year event plus 20% climate change event as design flood level for mitigation measures recommendations.

6.13 The EA has confirmed that they do not hold any record of flooding in the area.

6.14 The site is unlikely to be impacted by tidal flooding.

EA Flood Warning Area

6.15 The EA defines a Flood Warning Area as "*geographical areas where we expect flooding to occur and where we provide a Flood Warning Service. They generally contain properties that are expected to flood from rivers or the sea and in some areas, from groundwater.*"

6.16 The site is not located within a Flood Warning Area. It is however located in an area which receives flood alerts. Flood alert messages give an early alert of possible flooding. They are sent more often than flood warnings.

Surface Water Flood Risk Classification

6.17 The EA's updated Flood Map for Surface Water, which is available online, indicates that the site is at low risk from surface water flooding. This corresponds with an annual probability of flooding that is between 1 in 100-year (1%) and 1 in 1000-year (0.1%). The updated Flood Map for Surface Water is presented in Figure 6-3.

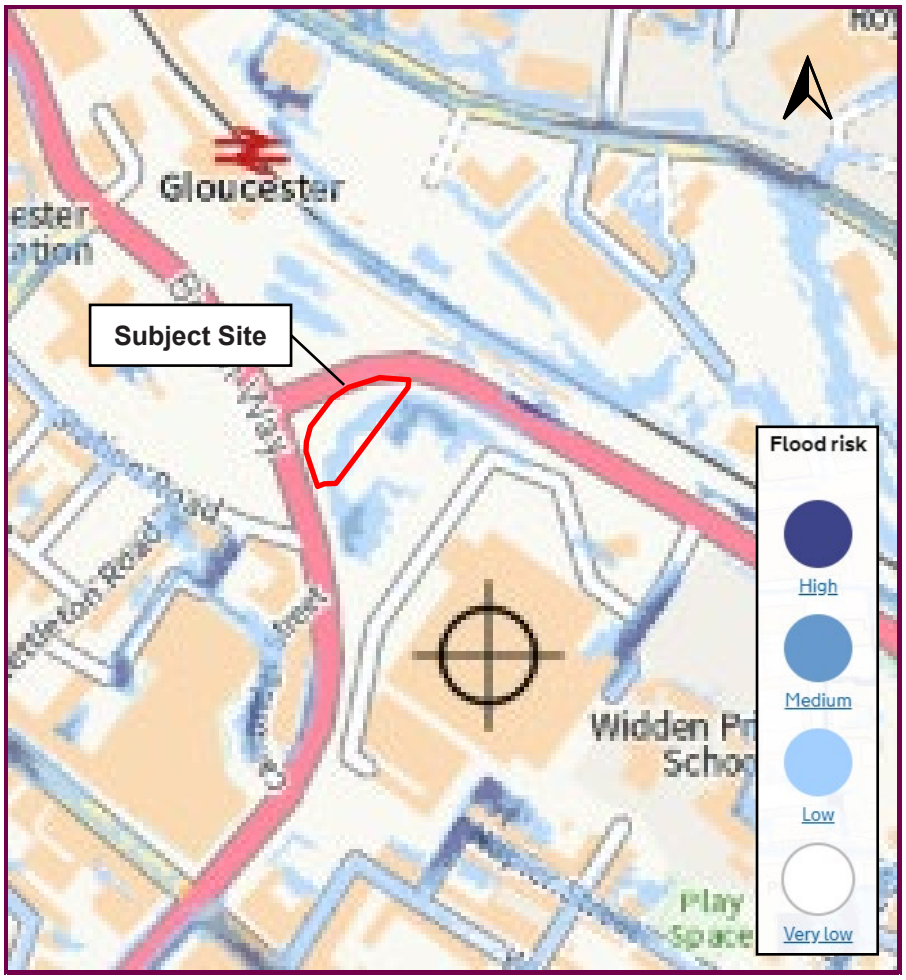


Figure 6-3. Updated Flood Map for Surface Water

6.18 Flood depths during the 'low risk' surface water scenario would not exceed 300mm within the site boundary. Part of the site will remain dry during all modelled surface water flood events.

Reservoir Flood Risk Classification

6.19 EA mapping also indicates that the site is not located within an area potentially at risk from reservoir flooding.

Local Authority Flood Risk Assessment

6.20 The Gloucestershire SFRA was published in September 2008. It provides an overview of flood risk from various sources within the County Council. Information relevant to this assessment is summarised below:

- Gloucester City Council is drained entirely by the River Severn, which has both tidal and fluvial influences in the area;
- The flood risk to Gloucester is predominately fluvial as the River Severn channel becomes narrower, providing a restriction to high tides moving upstream and river flows moving downstream. However, flooding can be a result of a combination of both tidal and fluvial influences;
- While the Severn is capable of coming out of bank and flooding a large area, flood risk is reduced by the presence of defences. Nevertheless, the Severn may contribute to flooding as the effects of high flows in the smaller streams may be worsened by the elevated levels in the Severn, making it difficult for them to discharge;
- In general the level of flood risk from artificial drainage systems within the Borough is medium (6 to 15 flooded properties) to high (greater than 15);
- Surface water flooding in Gloucester tends to be associated with poor urban drainage and backing up within urban drainage systems under high river flows. The abundance of impermeable surface can also contribute to surface water flood risk, especially when local intense rainstorms occur;
- One canal, the Gloucester and Sharpness Canal, is located in Gloucester. There are no recorded incidents of breaches or overtopping, or any other local flood risk instances associated with this canal;
- There are no records of breaching/overtopping of reservoirs within Gloucester;
- There are no records of groundwater flooding in Gloucester;
- The Severn Tidal Tributaries CFMP states that the most significant changes in flood depth and extent due to climate change impacts can be seen in the catchments of the Sud Brook and River Twyver.

6.21 The Gloucester City Council SFRA was publish in 2007 and it includes significant additional information to inform this assessment:

- Along the main River Twyver channel, a number of properties are shown to be at risk from flooding through the city centre including locations by Metz Way, Clarence Street, Wellington Street, Park Road, Brunswick Road and Trier Way, where flood water is known to spill over the culvert entrance at Derby Road (SO 8387 1814).
- The accumulation of silt in the river channel and tide locking are both common problems experienced by the River Twyver and flood relief channel. De-silting of the river channel is conducted by Gloucester City Council every 2 -3 years, but silt blockage continues to be a problem for this watercourse.
- The DG5 data received from STW has been provided at four-digit postcode level, hence no street level information on flooding was available. Postcode areas within the highest level of risk include GL1 1 which has 33 no. of properties affected by sewer flooding.
- There are raised sections of canal within the Gloucester City Council area. There is a residual risk of breach from all raised canals and therefore, residual risk areas have also been mapped. Development should be avoided within these residual risk locations.

7 HYDROGEOLOGICAL SETTING

7.1 British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the site is situated on Cheltenham Sand And Gravel comprising of sand and gravel. This is underlain By Blue Lias Formation and Charmouth Mudstone Formation (undifferentiated) comprising of mudstone.

7.2 The nearest recorded BGS Borehole log with reference no. SO18NW19 is located at approximately 150m to the southeast of the site. Topsoil was encountered underlain by soft sandy brown clay and clean sandy gravel up to 3.6 meters below ground level (mbgl). This was followed by clean sand (1.4m), firm blue clay, hard blue clay, hard blue-black clay and hard black blue clay up to the end of the borehole at 18 mbgl. Water was encountered at approximately 2.15m bgl.

7.3 The soils are described as ‘freely draining lime-rich loamy soils’ by the National Soils Research Institute.

7.4 According to the EA’s Aquifer Designation Mapping, the Cheltenham Sand and Gravel at the surface lies on a Secondary A Aquifer. These formations are formed of permeable layers capable of supporting water supplies at a local scale, in some cases forming an important source of base flow to rivers. The bedrock lies on a Secondary undifferentiated Aquifer which have varying characteristics.

7.5 The site does not lie within a Source Protection Zone (SPZ).

8 FLOOD RISK AND MITIGATION

8.1 The key sources of flooding that could potentially impact the site are discussed below:

Fluvial / Tidal Flooding

8.2 The EA Flood Map for Planning, as seen in Figure 6-1, indicates that the majority of the site lies within Flood Zone 1 with the area along the eastern boundary falling within Flood Zone 2 and 3. The annual probability of flooding is classified to be less than 0.1% at the majority of the site and between 0.1% and greater than 1% in the absence of any defences in Flood Zone 2 and 3 respectively.

8.3 The site does not benefit from flood defences and no historic flooding incidents have been recorded at the site.

8.4 Information provided by the EA is available in Appendix A. It shows that the predicted flood level at the site would potentially reach 17.67m AOD during the 1 in 100-year event plus 20% climate change event. Flood water is known to spill over the culvert entrance of the main River Twyver channel and flow towards the site. Flood depths at the site would potentially range between 0.00m to 0.23m.

8.5 The flood extent and level data show that the maximum predicted flood level at the proposed location of the building would be 17.62m AOD. Given that the proposed location of the restaurant currently sits between 17.58m AOD and 17.77m AOD, only a small area would potentially be impacted by flooding up to 40mm in depth indicating that the flood extent map is likely to be incorrect and that a smaller portion of the proposed building would actually be impacted during this event.

8.6 The impacted building footprint accounts for approximately 170m^2, as shown in Figure 8-1 below. Given that it will be impacted by a maximum of 40mm of flood water during the 1 in 100-year plus 20% climate change event, the development would potentially displace 6.8m^3 of flood volume within the floodplain. Whilst some of this area sits on higher elevations and therefore is unlikely to displace any flood water, a conservatory approach has been applied for the loss of floodplain storage capacity, taking into account the whole area of the building showed to be impacted by the flood extent in Figure 8-1 below.

8.7 As the proposal would potentially impact on local floodplain storage capacity, flood compensatory storage is proposed in an area to the south of the building and hydraulically connected to the floodplain as shown in the Figure 8-1. It is recommended that this area, which accounts for approximately 280m^2, would be levelled to 17.62m AOD thus providing additional floodplain storage capacity. Given that levels at this location range between 17.62m AOD up to 17.77m AOD, by lowering this area by an average of 75mm and levelling it to 17.62m AOD, this would potentially provide 21m^3 of additional floodplain storage capacity. The implementation of flood compensatory storage would provide a betterment in terms of local floodplain storage capacity.

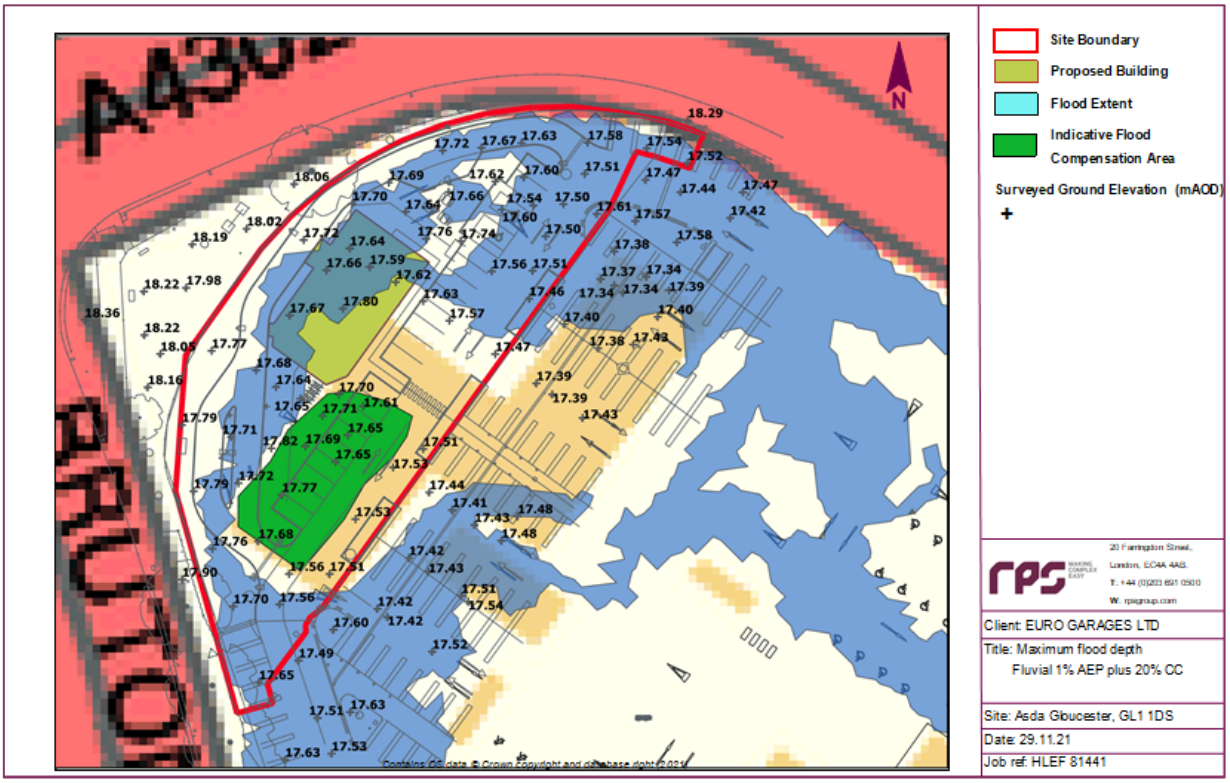


Figure 8-1 - Proposed Flood Compensatory Storage

8.8 The PPG details the suitability of different land uses within each flood zone. The proposed land use is classified as less vulnerable and such uses are generally considered appropriate within Flood Zone 3, subject to the implementation of the Sequential Test.

Proposed Mitigation Measures

8.9 It is not possible to raise finished floor levels to 300mm above the predicted flood level as by raising the finished floor level of the building to this level would require the levels of the drive thru lane to be raised therefore incurring a potential loss of floodplain storage capacity.

8.10 Finished floor levels would be set to 230mm above the predicted flood level during the 1 in 100-year plus 20% climate change event and therefore to a minimum of 17.85m AOD. This is considered to be appropriate given the vulnerability classification and nature of the proposed development. Furthermore, flood resistance and resilience measures will be incorporated up to 600mm above the modelled flood level.

8.11 Site management should sign up to the EA's Flood Warning Direct service, so that appropriate action can be taken in advance of a flood occurring.

8.12 A Flood Evacuation Plan is required and could be conditioned as part of the planning application process.

8.13 Flood resilience and resistance measures are recommended to be incorporated into the construction of the ground floor levels. The following resilient design measures should be considered at the detailed design stage, though some may not be applicable at the site:

- Ensuring that all airbricks are flood proof to prevent water ingress;
- Ground supported floors and concrete slabs of at least 150mm thickness;
- Water resistant grout;
- Non-return valves on the drainage system to prevent back-flow of diluted sewage;

- Water, electricity and gas meters 600mm above the flood level;
- Electrical sockets should be located 600mm above the flood level, with ring mains dropping to ground floor sockets and switches rather than rising to them; and
- Boiler units and heating systems should be located 600mm above the predicted flood level.

Flooding from Sewers

8.14 Sewer flooding can occur during periods of heavy rainfall when a sewer becomes blocked or is of inadequate capacity. The site is currently served by Severn Trent.

8.15 The SFRA indicates that 33 properties have witnessed sewer flooding within the postcode area GL1 1.

Proposed Mitigation Measures

8.16 It is recommended that non-return valves are fitted to all pipes. In addition, it is recommended that the finished ground floor levels are elevated by a minimum of 150mm to help mitigate against the residual risk of sewer surcharging.

Surface Water Flooding (Overland Flow)

8.17 This can occur during intense rainfall events, when water cannot soak into the ground or enter drainage systems.

8.18 The site will only be impacted by surface water flooding during the 'low risk' scenario with flood depths lower than 300mm.

8.19 Given the topography at the site, overland flow will be directed away from the proposed development to the east of the site.

Proposed Mitigation Measures

8.20 It is recommended that ground levels around the proposed buildings will be profiled in a way that surface water pooling would not occur, and surface water runoff would be directed away from the proposed development and into the proposed drainage system.

8.21 Flood proofing is recommended to be incorporated into the design up to 600mm above ground level where feasible. In addition, it is recommended that ground floor level of the building should be elevated by 150mm to help mitigate any residual risk from surface water flooding.

Groundwater Flooding

8.22 This can occur in low-lying areas when groundwater levels rise above surface levels, or within underground structures.

8.23 The SFRA does not identify the site as being within an area at risk from groundwater flooding.

8.24 Additionally, there are no basement levels in the proposed scheme and therefore the vulnerability to groundwater flooding is not considered to be significant.

Proposed Mitigation Measures

8.25 No mitigation is required.

Other Sources

8.26 There is a limited risk of flooding occurring as a result of a break in a water main.

8.27 The risk of flooding associated with reservoirs, canals and other artificial structures is considered to be low given the absence of any such structures in the site vicinity.

Proposed Mitigation Measures

8.28 No mitigation is required.

Event Exceedance

8.29 The mitigation measures proposed as part of the development scheme are considered appropriate to help mitigate against event exceedance scenarios.

9 SEQUENTIAL TEST AND EXCEPTION TEST

Sequential Test

9.1 The NPPF requires the Local Authority to apply the Sequential Test in consideration of new development. The aim of the Test is to steer new development to areas at the lowest probability of flooding. Given that the subject site has not been allocated as one of the Council's proposed future development sites, it has not been specifically assessed within the SFRA. Therefore, the Sequential Test is based on the EA Flood Zones and information contained within the SFRA.

9.2 The site is located within Flood Zone 3 and comprises of a car park which serves a commercial unit. It is therefore classified as 'less vulnerable'. The proposal will not increase the vulnerability classification at the site and flood resilience and resistance techniques will be incorporated into the ground floor level to reduce the impact of fluvial and pluvial flooding, should it occur.

The Exception Test

9.3 According to Table 3 of the PPG to the NPPF, 'less vulnerable' developments are considered appropriate within Flood Zone 3 without the requirement to apply the Exception Test. Therefore, application of the Exception Test is not required for the proposed development.

10 SUMMARY AND CONCLUSIONS

10.1 The aim of the FRA is to outline the potential for the site to be impacted by flooding, the potential impacts of the development on flooding both onsite and in the vicinity, and the proposed measures which can be incorporated into the development to mitigate the identified risks. The report has been produced in accordance with the guidance detailed in the NPPF. Reference has also been made to the SFRAs and following consultation with the EA.

10.2 The potential flood risks to the site, and the measures proposed to mitigate the identified risks, are summarised in Table 1.

Table 1. Proposed mitigation

Source of Flooding	Identified Risk			Mitigation Proposed	Residual Risk		
	L	M	H		L	M	H
Fluvial	✓			➢ Finished floor levels to be set to a minimum of 17.85m AOD. ➢ Provision of flood compensatory storage. ➢ Flood resistance / resilience techniques to be incorporated into the ground floor, where feasible. ➢ Site managers should sign up to the EA's free Flood Warning service. ➢ Production of a Flood Emergency plan.	✓		
Tidal	✓			No mitigation required.	✓		
Sewers	✓			Recommended elevation of ground floor by 150mm.	✓		
Surface Water	✓			➢ Flood resistance / resilience techniques to be incorporated into the ground floor up to 600mm, where feasible. ➢ Recommended elevation of ground level by 150mm.	✓		
Groundwater	✓			No mitigation required.	✓		
Other Sources (e.g. reservoirs, water mains)	✓			No mitigation required.	✓		

10.3 The EA Flood Map for Planning indicates that the majority of the site lies within Flood Zone 1 with the area along the eastern boundary falling within Flood Zone 2 and 3. During the 1 in 100-year plus 20% climate change event, part of the site would potentially be impacted by flooding with depths up to 230mm. The proposed location of the building would partially remain flood free during this event with some areas potentially be impacted by shallow flood depths up to 40mm.

10.4 Finished floor levels will be set to 230mm above the 1 in 100-year plus 20% climate change flood level of 17.62mAOD and therefore to a minimum of 17.85m AOD.

10.5 The implementation of flood compensatory storage would provide a betterment in terms of local floodplain storage capacity.

10.6 The proposed development will not incur in an increase of surface water runoff rates from the site as it will not alter the site impermeable area. Surface water drainage is detailed in a separate report as it is outside the scope of this FRA.

10.7 Overall, it has been demonstrated that the proposed development would be safe for its lifetime and it will not increase flood risk. With the implementation of a suitable SuDS strategy, the proposal could provide a positive reduction in local flood risk.

APPENDICES

Appendix A

EA Detailed Flood Data

Product 4 (Detailed Flood Risk Data) for Asda Gloucester, Bruton Way, GL1 1DS

Reference number: 233298
Date of issue: 30 September 2021

Model Information

The following information and attached maps contain a summary of the modelled information relevant to the area of interest. The information provided is based on the best available data as of the date of issue.

Model Name	Release Date
River Twyver	2006
Caveat	
Please note; the 'Main River' layer as included on the attached 'Node Point Map' is indicative only, it should not be assumed that this shows the detailed culverted route of the River Twyver.	

Flood Map for Planning (Rivers and Sea)

The Flood Map for Planning (Rivers and Sea) indicates the area at risk of flooding, **assuming no flood defences exist**, for a flood event with a 0.5% chance of occurring in any year for flooding from the sea, or a 1% chance of occurring in any year for fluvial (river) flooding (Flood Zone 3). It also shows the extent of the Extreme Flood Outlines (Flood Zone 2) which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater. The Flood Zones refer to the land at risk of flooding and **do not** refer to individual properties. It is possible for properties to be built at a level above the floodplain but still fall within the risk area.

This Flood Map only indicates the extent and likelihood of flooding from rivers or the sea. It should also be remembered that flooding may occur from other sources such as surface water, sewers, road drainage, etc.

To find out which flood zone a location is in please use: https://flood-map-for-planning.service.gov.uk/

Email: Enquiries_Westmids@environment-agency.gov.uk
Website: www.gov.uk/government/organisations/environment-agency

Definition of flood zones

- **Zone 1** - The area is within the lowest probability of flooding from rivers and the sea, where the chance of flooding in any one year is less than 0.1% (i.e. a 1000 to 1 chance).
- **Zone 2** - The area which falls between the extent of a flood with an annual probability of 0.1% (i.e. a 1000 to 1 chance) fluvial and tidal, or greatest recorded historic flood, whichever is greater, and the extent of a flood with an annual probability of 1% (i.e. a 100 to 1 chance) fluvial / 0.5% (i.e. a 200 to 1 chance) tidal. (Land shown in light blue on the Flood Map).
- **Zone 3** - The chance of flooding in any one year is greater than or equal to 1% (i.e. a 100 to 1 chance) for river flooding and greater than or equal to 0.5% (i.e. a 200 to 1 chance) for coastal and tidal flooding.

Note: The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding. Reference should therefore also be made to the Strategic Flood Risk Assessment when considering location and potential future flood risks to developments and land uses.

Areas Benefitting From Defences

Where possible we show the areas that benefit from the flood defences, in the event of flooding:

- from rivers with a 1% (1 in 100) chance in any given year, or;
- from the sea with a 0.5% (1 in 200) chance in any given year.

If the defences were not there, these areas would flood. Please note that we do not show all areas that benefit from flood defences.

The associated Dataset is available here: https://data.gov.uk/dataset/flood-map-for-planning-rivers-and-sea-areas-benefiting-from-defences

Node Data/ Modelled Levels

The attached map will show a selection of 1D & 2D model node points near to your site. The fluvial levels for these node points are shown below.

Fluvial Flood Levels (m AOD)

The modelled levels are given in m AOD (N), m AOD indicates metres Above Ordnance Datum (Newlyn).

The information is taken from the model referenced above and does not include the updated climate change figures.

			Annual Exceedance Probability - Maximum Water Levels (m AOD)							
Node Label	**Easting**	**Northing**	**20% (1 in 5)**	**10% (1 in 10)**	**4% (1 in 25)**	**2% (1 in 50)**	**1.33% (1 in 75)**	**1% (1 in 100)**	**1% (1 in 100) inc. 20% increase in inflows**	**0.1% (1 in 1000)**
C024U	384182	217978	21.48	21.43	21.50	21.54	21.56	21.62	21.62	21.74
C023	384138	218022	20.46	20.39	20.41	20.47	20.51	20.60	20.61	20.86
C022D	384130	218025	20.46	20.39	20.41	20.47	20.51	20.60	20.61	20.86
C020	384108	218039	20.46	20.39	20.41	20.47	20.51	20.59	20.61	20.86
C019	384080	218053	20.45	20.37	20.39	20.45	20.49	20.54	20.59	20.85
C016	384053	218066	20.45	20.37	20.39	20.45	20.49	20.54	20.59	20.85
2D 01	383781	218382	-	-	-	17.66	17.67	17.67	17.67	17.74
2D 02	383821	218368	-	-	-	17.80	17.81	17.81	17.82	17.84
2D 03	383861	218338	-	-	17.86	17.91	17.91	17.91	17.92	17.95
2D 04	383909	218307	18.03	18.07	18.20	18.22	18.23	18.23	18.24	18.25
2D 05	383842	218209	17.28	17.28	17.31	17.58	17.58	17.58	17.54	17.55
2D 06	383802	218236	17.27	17.28	17.30	17.32	17.33	17.33	17.34	17.44
2D 07	383753	218216	-	-	-	17.30	17.31	17.31	17.33	17.40

Modelled Flood Extents

Available modelled flood outlines produced as part of the detailed modelling have been provided to you in GIS format, these show modelled flood extents. Climate change will increase flood risk due to overtopping of defences.

https://ea.sharefile.com/d-se486f3e71b644859

Climate Change

The 'Flood Risk Assessments: Climate Change Allowances' are published on gov.uk. This is in replacement of previous climate change allowances for planning applications. The data provided in this product does not include the new allowances. You will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding. The climate change factors are now more complex and a single uplift percentage across England cannot be justified.

The Environment Agency will incorporate the new allowances into future modelling studies. For now it remains the applicant's responsibility to demonstrate through their proposal and flood risk assessments that new developments will be safe in flood risk terms for its lifetime.

Recorded Flood Outlines

Following examination of our records of historical flooding we have no record of flooding in the area. The absence of coverage for an area does not mean that the area has never flooded, only that we do not currently have records of flooding in this area. It is also possible that the pattern of flooding in this area has changed and that this area would now flood or not flood under different circumstances.

Please note; the records of flooding from between October 2019 and March 2020 and beyond are still being reviewed, the outcomes of which have not yet been published or reflected within this request for information.

You may also wish to contact your Local Authority or Internal Drainage Board, to see if they have other relevant local flood information.

Flood Defences

Flood defences do not completely remove the chance of flooding. They can be overtopped by water levels which exceed the capacity of the defences.

If flood defences are located in your area, you can access this data here:
https://data.gov.uk/dataset/spatial-flood-defences-including-standardised-attributes

Planning developments

If you have requested this information to help inform a development proposal, then you should note the information on GOV.UK on the use of Environment Agency Information for Flood Risk Assessments. You can also request pre application advice:

https://www.gov.uk/planning-applications-assessing-flood-risk
https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Supporting Information

River modelling: technical standards and assessment guidance

The link below contains standards for the flood risk management industry on how to build and review hydraulic models and provide evidence for flood risk management decisions.

https://www.gov.uk/government/publications/river-modelling-technical-standards-and-assessment

Surface Water

Managing the risk of flooding from surface water is the responsibility of Lead Local Flood Authorities. The 'risk of flooding from surface water' map has been produced by the Environment Agency on behalf of government, using information and input from Lead Local Flood Authorities.

You may wish to contact your Local Authority who may be able to provide further detailed information on surface water.

It is not possible to say for certain what the flood risk is but we use the best information available to provide an indication so that people can make informed choices about living with or managing the risks. The information we supply does not provide an indicator of flood risk at an individual site level. Further information can be found on the Agency's website:

https://flood-warning-information.service.gov.uk/long-term-flood-risk

Flood Risk from Reservoirs

The Flood Risk from Reservoirs map can be found on the Long Term Flood Risk Information website:

https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?map=Reservoirs

Flood Alert & Flood Warning Area

We issue flood alert/warnings to specific areas when flooding is expected. If you receive a flood warning you should take immediate action.

You can check whether you are in a Flood Alert/Warning Area and register online using the links below:

https://www.gov.uk/check-flood-risk

https://www.gov.uk/sign-up-for-flood-warnings

If you would prefer to register by telephone, or if you need help during the registration process, please call Floodline on 0345 988 1188.

The associated dataset for flood warning areas is available here: https://data.gov.uk/dataset/flood-warning-areas3

The associated dataset for flood alert areas is available here: https://data.gov.uk/dataset/flood-alert-areas2

Flood Risk Activity Permits

We now consider applications for works, which may be Flood Risk Activities, under Environmental Permitting Regulations. This replaces the process of applying for a Flood Defence Consent. You may need an environmental Permit for flood risk activities if you want to do work:

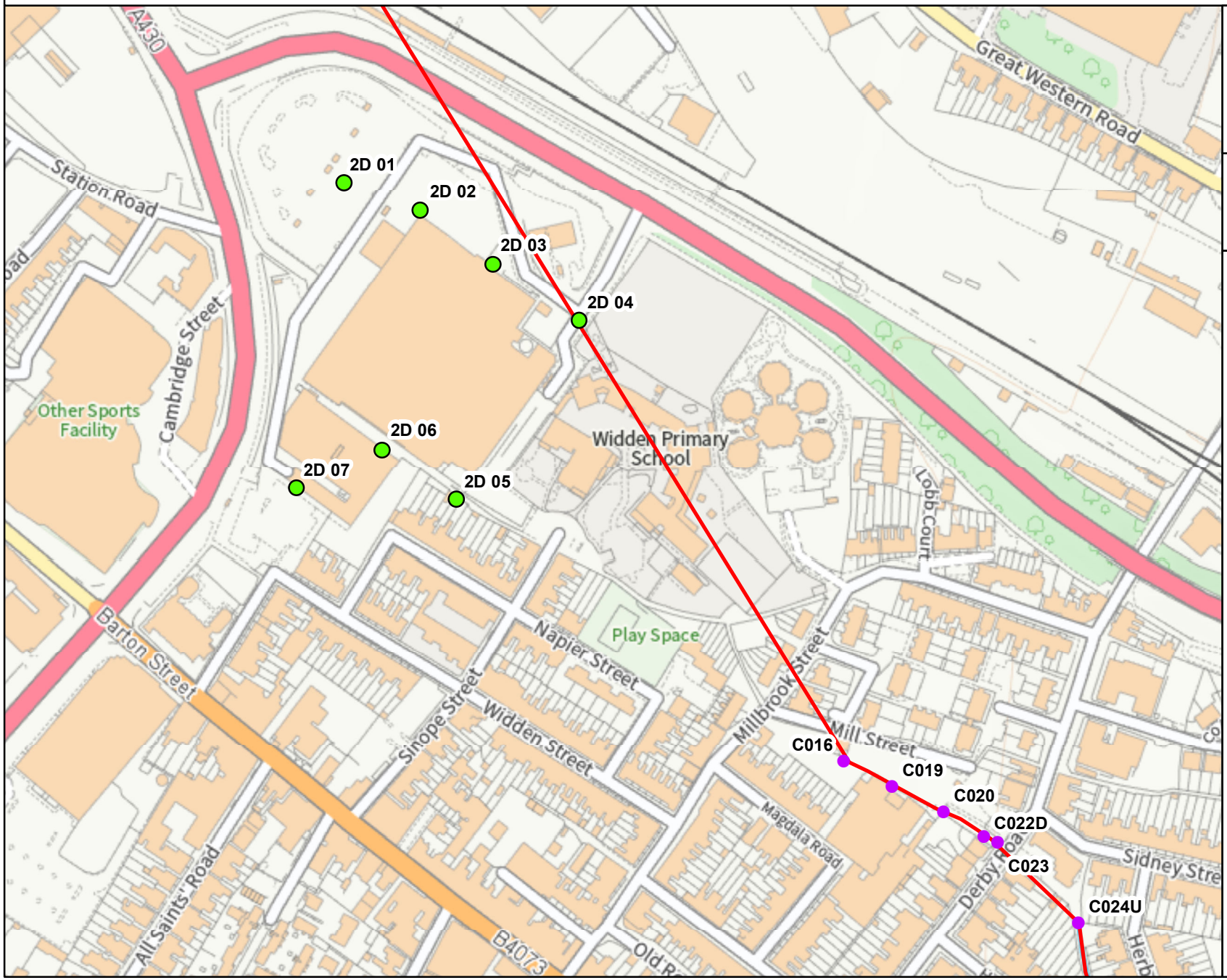
- in, under, over or near a main river (including where the river is in a culvert)
- on or near a flood defence on a main river
- in the flood plain of a main river
- on or near a sea defence

Please go to this website to find out more about how to apply: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits.
Please be aware that Bespoke and Standard Rules permits can take up to 2 months to determine and will incur a charge.

Further details about the Environment Agency information supplied can be found on the GOV.UK website:

https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

River Twyver Model Node Location Map including GL1 1DS - created 28/09/2021 [233298]



Environment Agency

Scale 1: 3000

Legend

- Main River
- River Twyver Model Node Point
- 2D RT Model Node Point

West Midlands Area

Created by Partnerships and Strategic Overview Team, West Midlands

Flood Risk and Coastal Change

Climate Change allowances for planning (SHWG area)

August 2021

The National Planning Practice Guidance refers to Environment Agency guidance on considering climate change in planning decisions which is available online: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

This has been updated and replaces the March 2016 guidance.

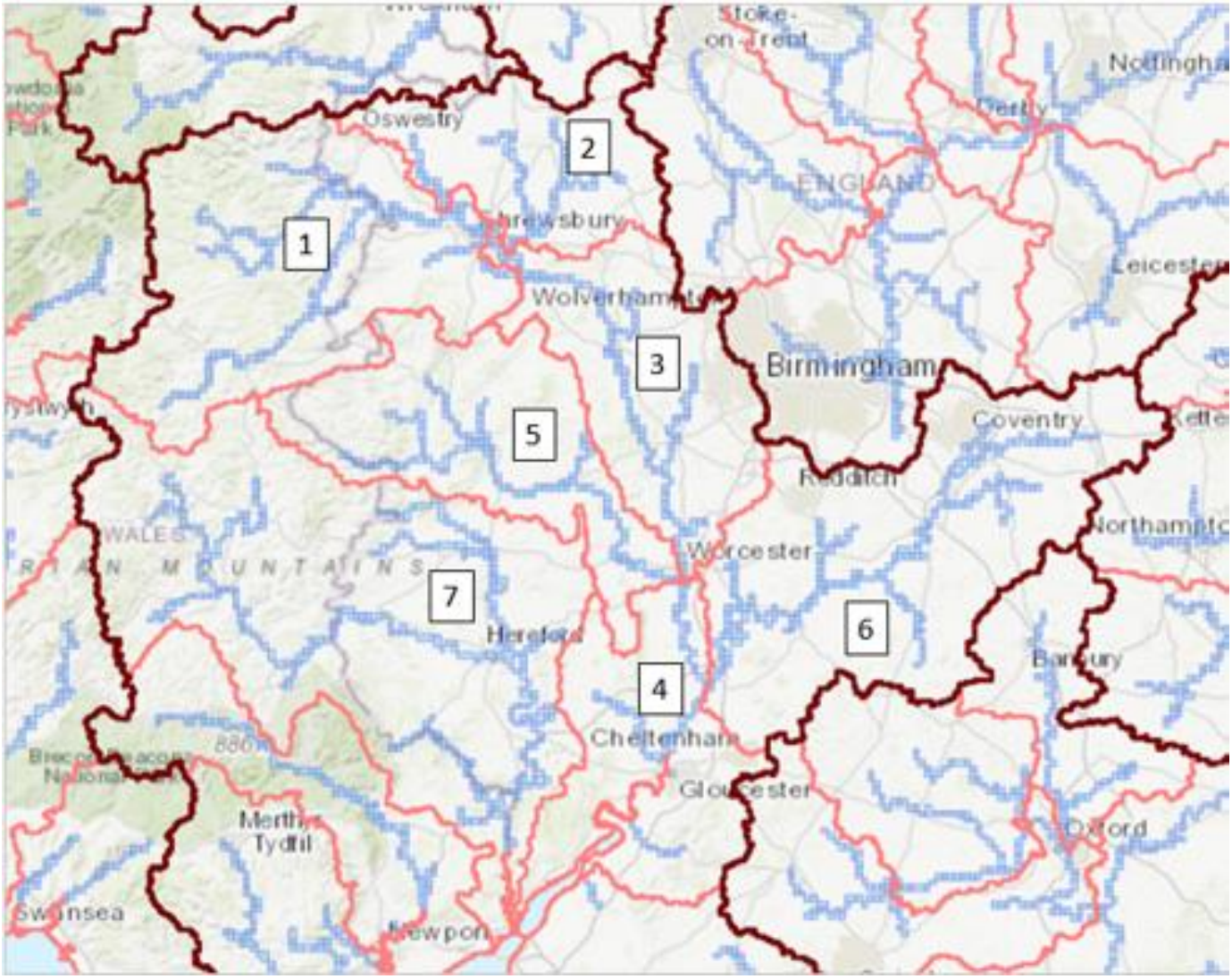
It should be used to help planners, developers and advisors implement the National Planning Policy Framework (NPPF)'s policies and practice guidance on flood risk. It will help inform Flood Risk Assessments (FRA's) for planning applications, local plans, neighbourhood plans and other projects.

Fluvial flooding – peak river flows

NPPG advises that an allowance should be added to 'peak river flows' to account for 'climate change' which should be specific to a 'management catchment' and development type (vulnerability). To work out which management catchment allowances to use, you need to: access the climate change allowances for peak river flow map

In Shropshire, Herefordshire, Worcestershire and Gloucestershire area, we would refer you to the map extract on page 2 below. This outlines the **'peak river flows'** within the specific 'Management catchments' for the Severn River Basin District, and specifies the range of percentage allowances to reflect individual development's vulnerability and lifetime. The following allowances should be used:

Development Vulnerability	Allowance (lifetime)
Essential Infrastructure	Higher Central - 2080's
Highly Vulnerable and More Vulnerable (residential)	Central - 2080's
Less Vulnerable and Water Compatible	Central - 2050's



1. Severn UplandsPeak River Flows	2020's	2050's	2080's
Higher Central	17%	24%	43%
Central	13%	18%	33%

2. Severn Middle Shrops Peak River Flows	2020's	2050's	2080's
Higher Central	20%	25%	44%
Central	15%	18%	33%

3. Severn Middle Worcs River Flows	2020's	2050's	2080's
Higher Central	16%	21%	40%
Central	12%	15%	30%

4. Severn Vale Peak River Flows	2020's	2050's	2080's
Higher Central	20%	28%	53%
Central	14%	19%	37%

5. Teme Peak River Flows	2020's	2050's	2080's
Higher Central	21%	33%	60%
Central	16%	24%	45%

6. Avon Peak River Flows	2020's	2050's	2080's
Higher Central	12%	14%	32%
Central	7%	8%	21%

7. Wye Peak River Flows	2020's	2050's	2080's
Higher Central	19%	27%	49%
Central	14%	20%	37%

Extract: Management Catchments within the Severn River Basin District – refer to interactive peak river flow map for more detail. The Environment Agency also provide these allowances in the peak river flow climate change allowances by management catchment **table** – you have to know your management catchment to get the information you need. (Allowances reflect the latest projections in UKCP18 and subsequent research that models how the latest rainfall projections are likely to affect peak river flows).

Sea Level rise allowances

Table 3 of the guidance (extract below) indicates that net sea level risk is as follows (updated from the 2013 version).

Area of England	Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)
South West	Higher central	5.8 (203)	8.8 (264)	11.7 (351)	13.1 (393)	1.21
South West	Upper end	7 (245)	11.4 (342)	16 (480)	18.4 (552)	1.62

Note - For sites utilising the Severn tidal model the above allowances should be considered and applied. As of August 2020, specific updated flood level data is now available for the 2096 to 2125 epoch based upon the Environment Agency's Tidal Severn model within the West Midlands area and will be provided where relevant as part of our Request For Information service; contact Enquiries_Westmids@environment-agency.gov.uk

Flood Risk Assessment considerations:

The design flood (1% flood level fluvial, or 0.5% tidal, plus climate change allowance) should be used to inform the sequential test, including appropriate location of built development; consideration of flood risk impacts, mitigation/enhancement and ensure 'safe' development.

Vulnerability classification

- Development classed as 'Essential Infrastructure' (as defined within Table 2 - Flood Risk Vulnerability Classification, Paragraph: 066 Reference ID: 7-066-20140306 of the NPPG) should be designed to the 'higher central' climate change allowance (2080).
- For highly vulnerable or more vulnerable development e.g. housing, the FRA should use the 'central' climate change allowance (2080), as a minimum, to inform built in resilience.
- For water compatible or less vulnerable development e.g. commercial, the FRA should use the 'central' climate change allowance (2050), as a minimum, to inform built in resilience.

Assessing off-site impacts and calculating floodplain storage compensation

The appropriate allowance to assess off-site impacts and calculate floodplain storage compensation depends on land uses in affected areas. Use the central 2080 allowance for most cases (including where more vulnerable or highly vulnerable is affected) but apply the higher central allowance when the affected area contains essential infrastructure.

Modelling approach

- **Major Development**:

For 'major' development (as defined within The Town and Country Planning Development Management Procedure (England) Order 2015)*, see definition note below, we would expect a detailed FRA to provide an appropriate assessment (hydraulic model) of the 1% with relevant climate change ranges.
There are two options:

Scenario 1 - Produce a model and incorporate relevant climate change allowances within your Management catchment area location.

Scenario 2 - Re-run an existing model and incorporate relevant climate change allowances as specified in the Management catchment area data.

- **Non Major Development**:

For 'non major' development, we would advise that a model is produced or existing model is re-run, similar to the above approach (Scenario 1 and 2). This would give a greater degree of certainty on the design flood extent to inform a safe development.

However, for 'non major' development only, in the absence of modelled climate change information it may be reasonable to utilise an alternative approach. To assist applicants and Local Planning Authorities we have provided some 'nominal' climate change allowances within the 'Table of nominal allowances' below. These should be considered as appropriate within any FRA. There are three additional options:

Scenario 3 - Where previous modelled data (for a variety of return periods) is available, you could interpolate your own climate change figure (see note iv below).
Scenario 4 - Where the 1% level is available from an existing model add on the relevant 'nominal climate change allowance' provided in the 'Table of nominal allowances' below.
Scenario 5 - Establish the 1% level, for example using topographical levels (including LiDAR) and assessment of watercourse flow and nature and then add on the relevant 'nominal climate change allowances' provided in the 'Table of nominal allowances' below.

– *Note: For definitions of 'major' development see 'Interpretation 2.—(1)', on page 5, at: www.legislation.gov.uk/uksi/2015/595/pdfs/uksi_20150595_en.pdf

Table of Nominal Allowances

Watercourse	Central allowance (2050) Water compatible and Less Vulnerable.	Central allowance (2080) More Vulnerable
Upper Severn	600mm	850mm
River Wye		
River Teme		
River Avon	200mm	400mm
Lower Severn	400mm	600mm
Tributaries and 'ordinary watercourses'	200mm	300mm

Notes to above:-

(i) Watercourse definition:
The "Upper Severn"/"Lower Severn" boundary is taken as Bevere Weir, North of Worcester, (national grid reference SO8376859428). These do not directly relate to management catchments.

Use of the Avon nominal is only valid upstream of the M5 crossing and downstream of that point the Lower Severn nominals should be used.

An 'Ordinary Watercourse' is a watercourse that does not form part of a main river. Main Rivers are indicated on our Flood Map. You can also check the classification of the watercourse with the LLFA, some of which have produced Drainage and Flooding Interactive Maps.

(ii) Where a site is near the confluence of two, or more, watercourses, the FRA should use the larger river climate change allowances.

(iii) We may hold more precise information for some of the "tributaries". We would recommend that you seek this information from us via a 'pre-planning enquiry/data request', to the email address below.

(iv) We would also recommend that you contact us for our modelled '20%' allowances and associated flow data. This is available for some rivers. This data may help inform a more detailed climate change analysis (where necessary), including any interpolation of levels or flow to create a 'stage discharge rating' in order to estimate the required percentage; or be of assistance to inform 'less vulnerable' or 'water compatible' development proposals.

IMPORTANT NOTE
Please note the nominal climate change allowances are provided as a pragmatic approach, for consideration, in the absence of a modelled flood level and the applicant undertaking a detailed model of the watercourse. Use of nominal climate change allowances are not provided/ recommended as a preference to detailed modelling and historical data.

The Local Planning Authority may hold data within their Strategic Flood Risk Assessment (SFRA), or any future updates, which may help inform the above.

FREEBOARD NOTE
It is advised that Finished Floor Levels should be set no lower than '600mm' above the 1% river flood level plus climate change. Flood proofing techniques might be considered where floor levels cannot be raised (where appropriate). This 600mm freeboard takes into account any uncertainties in modelling/flood levels and wave action (or storm surge effects).

Surface Water

Table 2 of the guidance also indicates the relevant increases that surface water FRA should consider for an increase in peak rainfall intensity.

The following table is for **'peak rainfall intensity'** allowance in small and urban catchments. Please note that **surface water (peak rainfall intensity) climate change allowances should be discussed with the Lead Local Flood Authority (LLFA).**

Peak Rainfall Intensity - Applies across all of England	Total potential change anticipated for 2010-2039	Total potential change anticipated for 2040-2069	Total potential change anticipated for 2070-2115
Upper end	10%	20%	40%
Central	5%	10%	20%

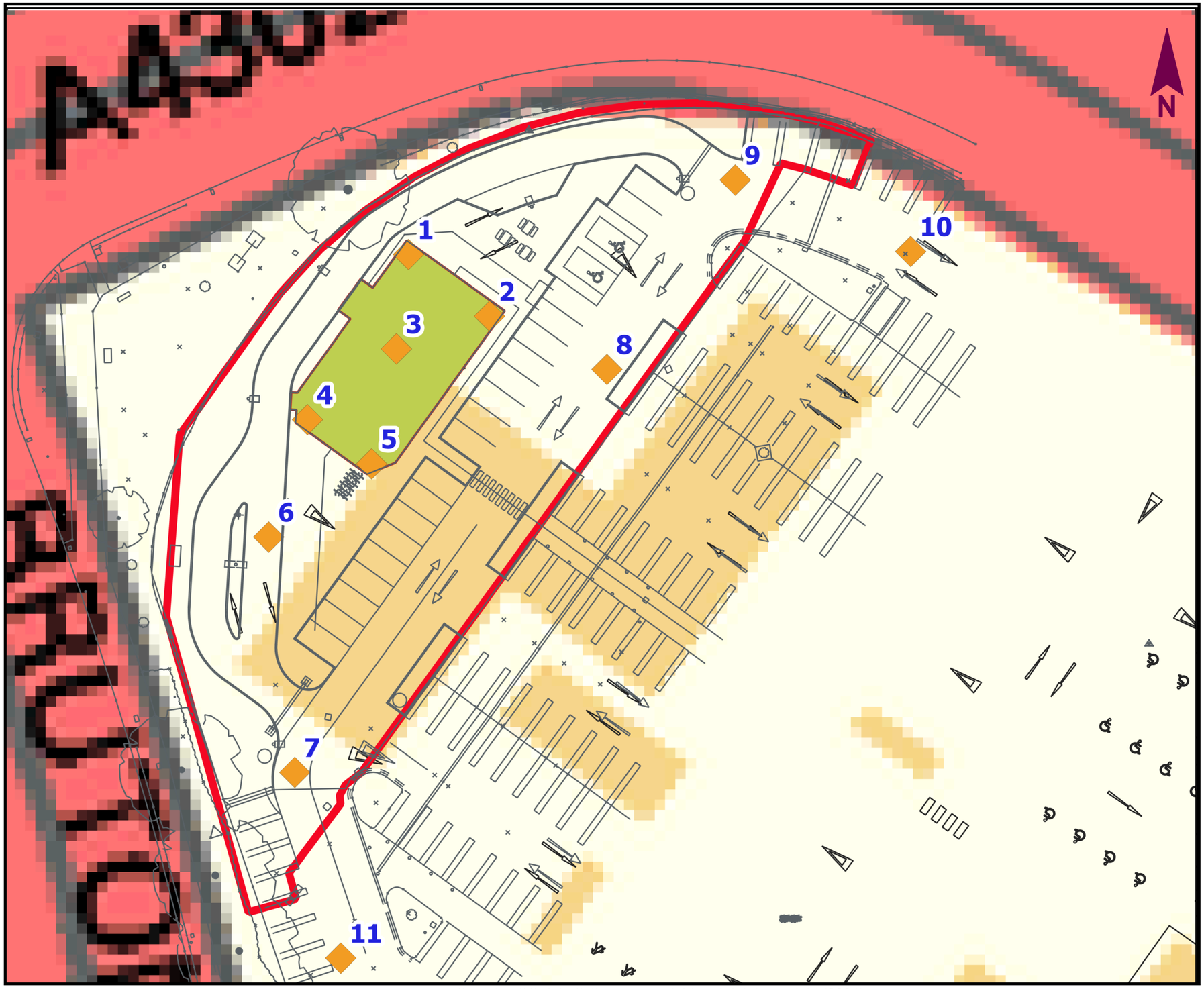
Note to above:-

For river catchments around or over 5 square kilometres, the peak river flow allowances are appropriate.

Produced by: WestMidsPlanning@environment-agency.gov.uk

West Midlands Area -

Shropshire, Herefordshire, Worcestershire and Gloucestershire Sustainable Places Team.



Site Boundary

Proposed Building

Model result node point

rps MAKING COMPLEX EASY
20 Farringdon Street,
London, EC4A 4AB.
T: +44 (0)203 691 0500
W: rpsgroup.com

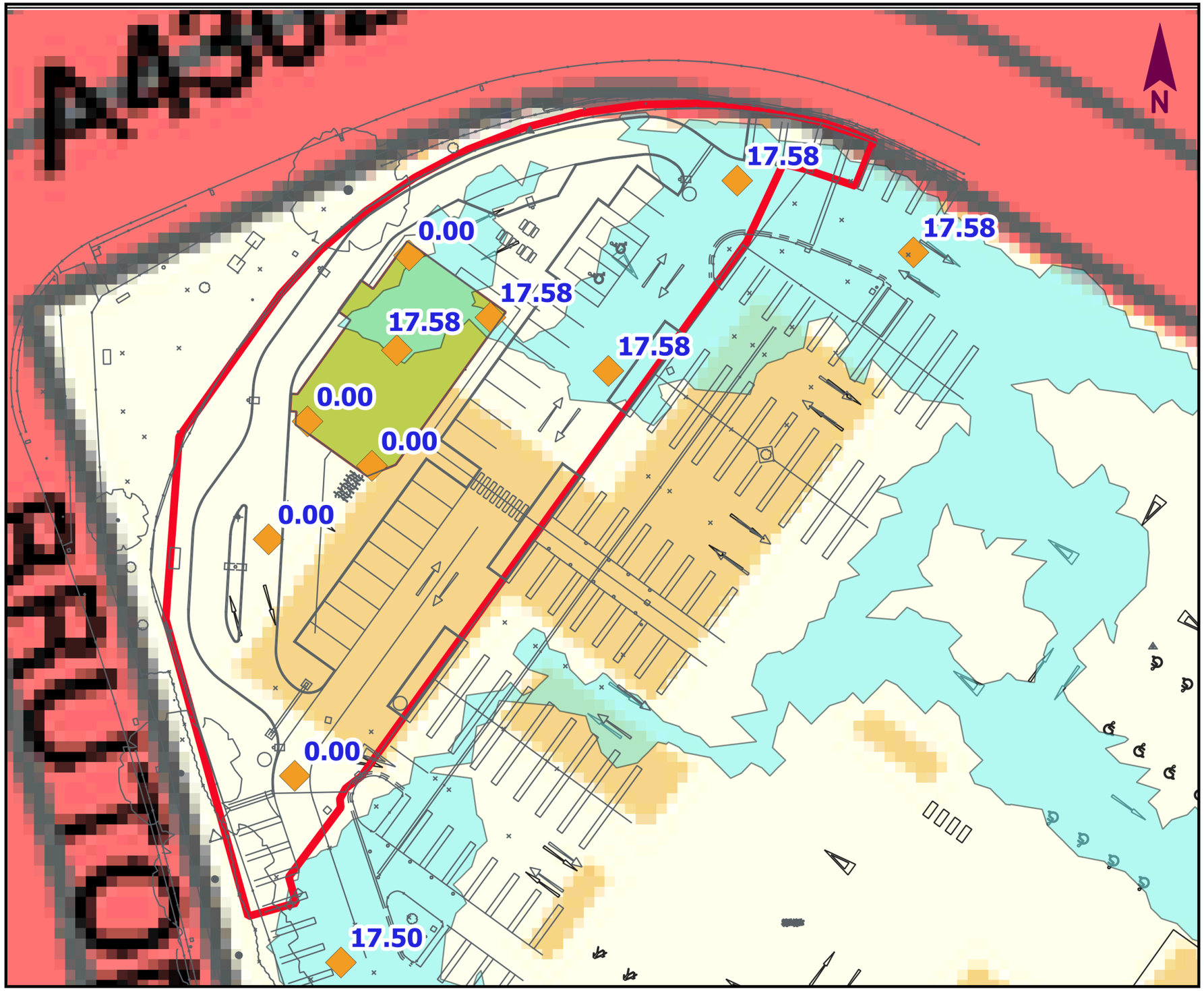
Client: EURO GARAGES LTD

Title: Node Point Location

Site: Asda Gloucester, GL1 1DS

Date: 29.11.21

Job ref: HLEF 81441



Site Boundary

Proposed Building

Flood Extent

Modelled maximum water level (mAOD)

rps MAKING COMPLEX EASY
20 Farringdon Street,
London, EC4A 4AB.
T: +44 (0)203 691 0500
W: rpsgroup.com

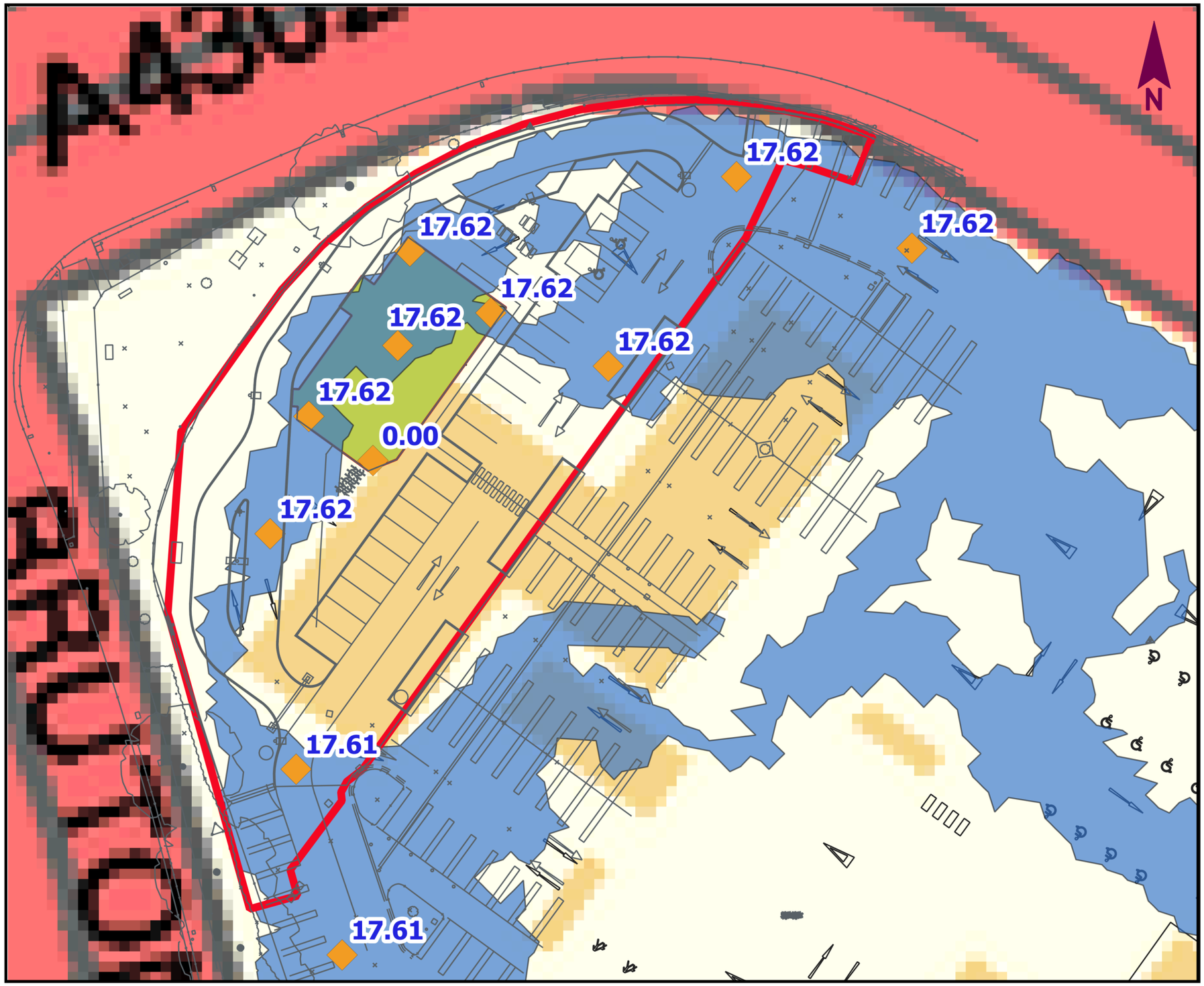
Client: EURO GARAGES LTD

Title: Maximum flood depth
Fluvial 1% AEP

Site: Asda Gloucester, GL1 1DS

Date: 29.11.21

Job ref: HLEF 81441



Site Boundary

Proposed Building

Flood Extent

Modelled maximum water level (mAOD)

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20 Farringdon Street,
London, EC4A 4AB.
T: +44 (0)203 691 0500
W: rpsgroup.com

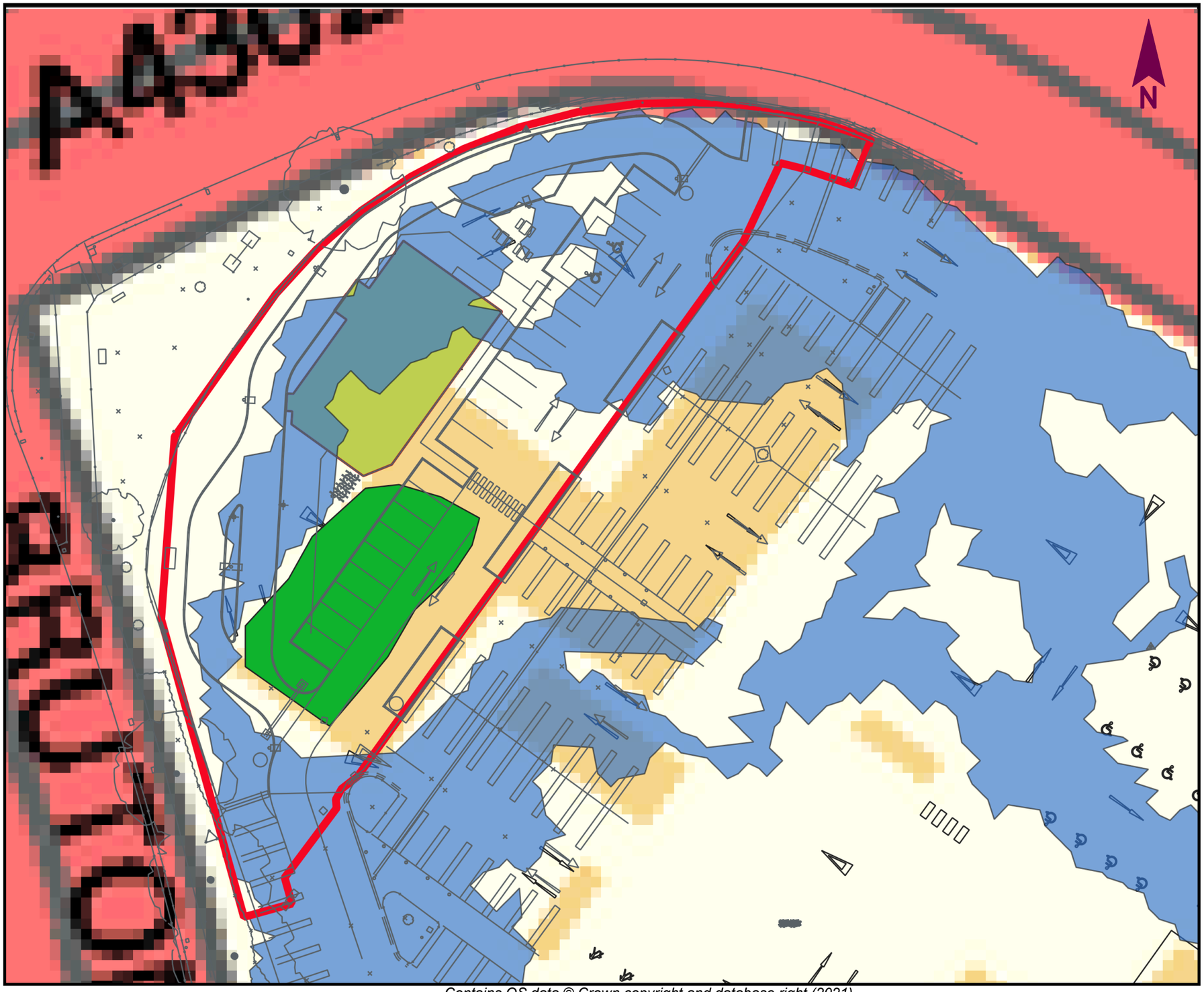
Client: EURO GARAGES LTD

Title: Maximum flood depth
Fluvial 1% AEP plus 20% CC

Site: Asda Gloucester, GL1 1DS

Date: 29.11.21

Job ref: HLEF 81441



Site Boundary

Proposed Building

Flood Extent

Indicative Flood Compensation Area

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20 Farringdon Street,
London, EC4A 4AB.
T: +44 (0)203 691 0500
W: rpsgroup.com

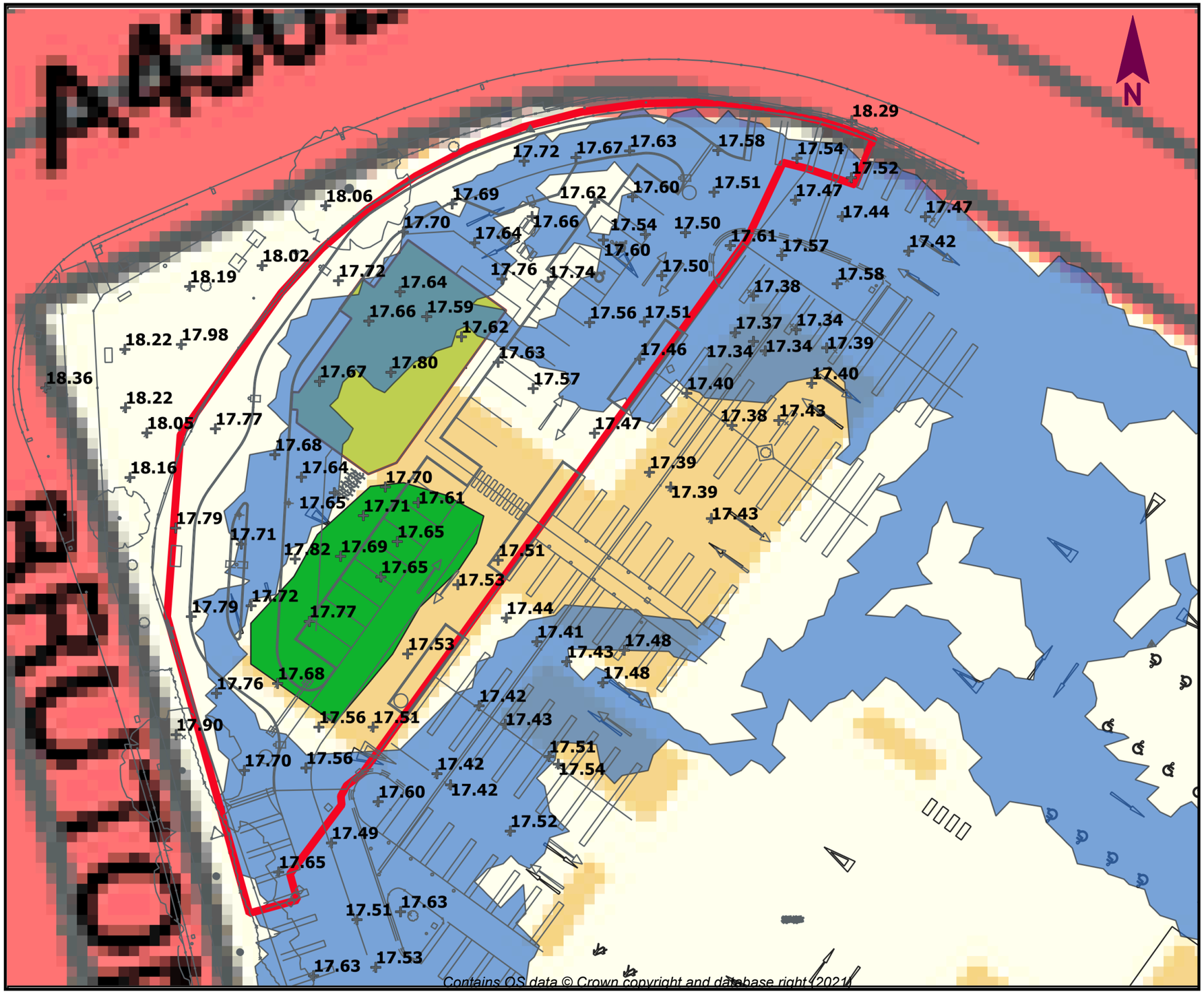
Client: EURO GARAGES LTD

Title: Maximum flood depth
Fluvial 1% AEP plus 20% CC

Site: Asda Gloucester, GL1 1DS

Date: 29.11.21

Job ref: HLEF 81441



Site Boundary

Proposed Building

Flood Extent

Indicative Flood Compensation Area

Surveyed Ground Elevation (mAOD)

+

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20 Farringdon Street,
London, EC4A 4AB.
T: +44 (0)203 691 0500
W: rpsgroup.com

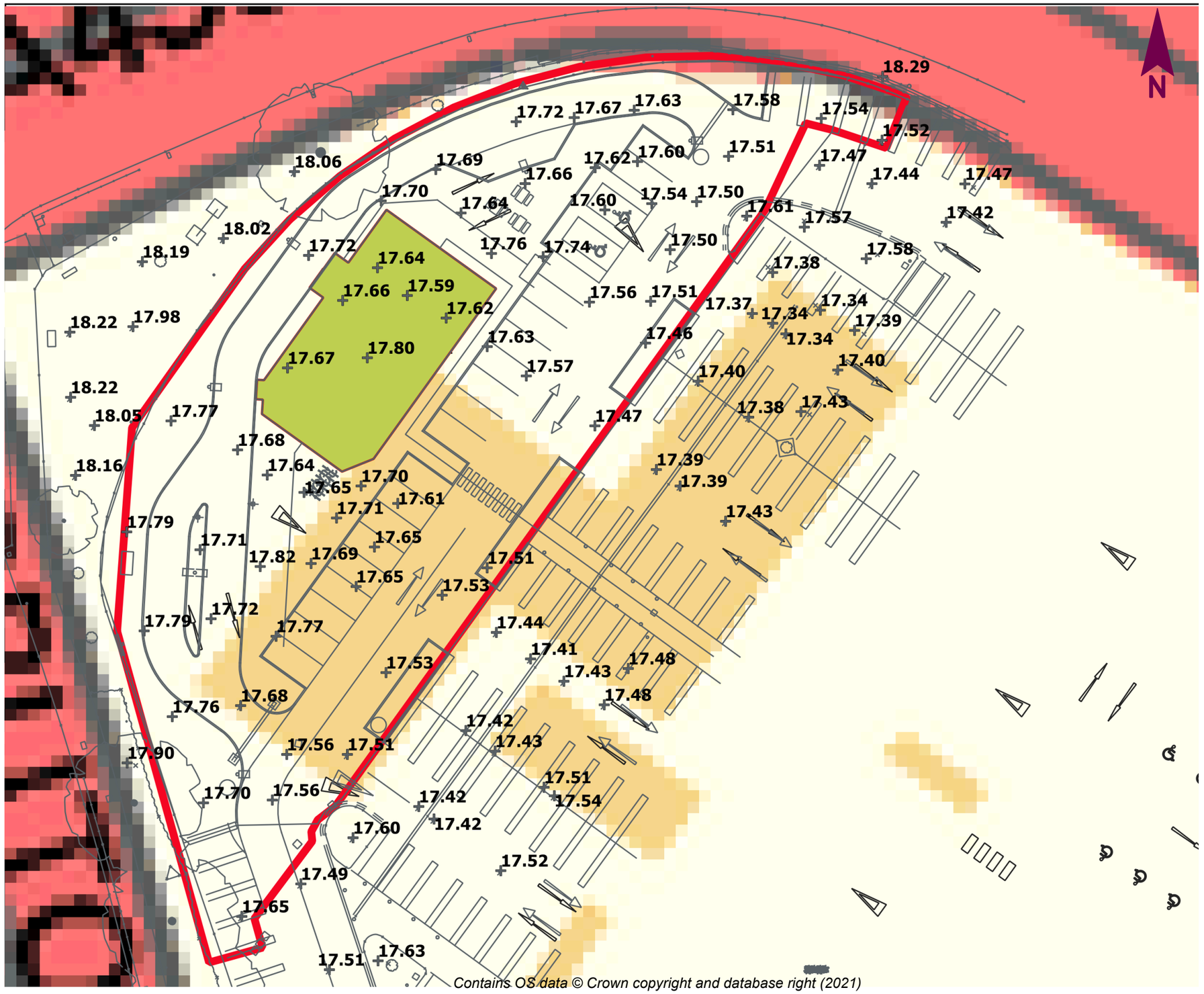
Client: EURO GARAGES LTD

Title: Maximum flood depth
Fluvial 1% AEP plus 20% CC

Site: Asda Gloucester, GL1 1DS

Date: 29.11.21

Job ref: HLEF 81441



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Site Boundary

Proposed Building

Surveyed Ground Elevation (mAOD)

+

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20 Farringdon Street,
London, EC4A 4AB.
T: +44 (0)203 691 0500
W: rpsgroup.com

Client: EURO GARAGES LTD

Title: Surveyed Ground Elevation

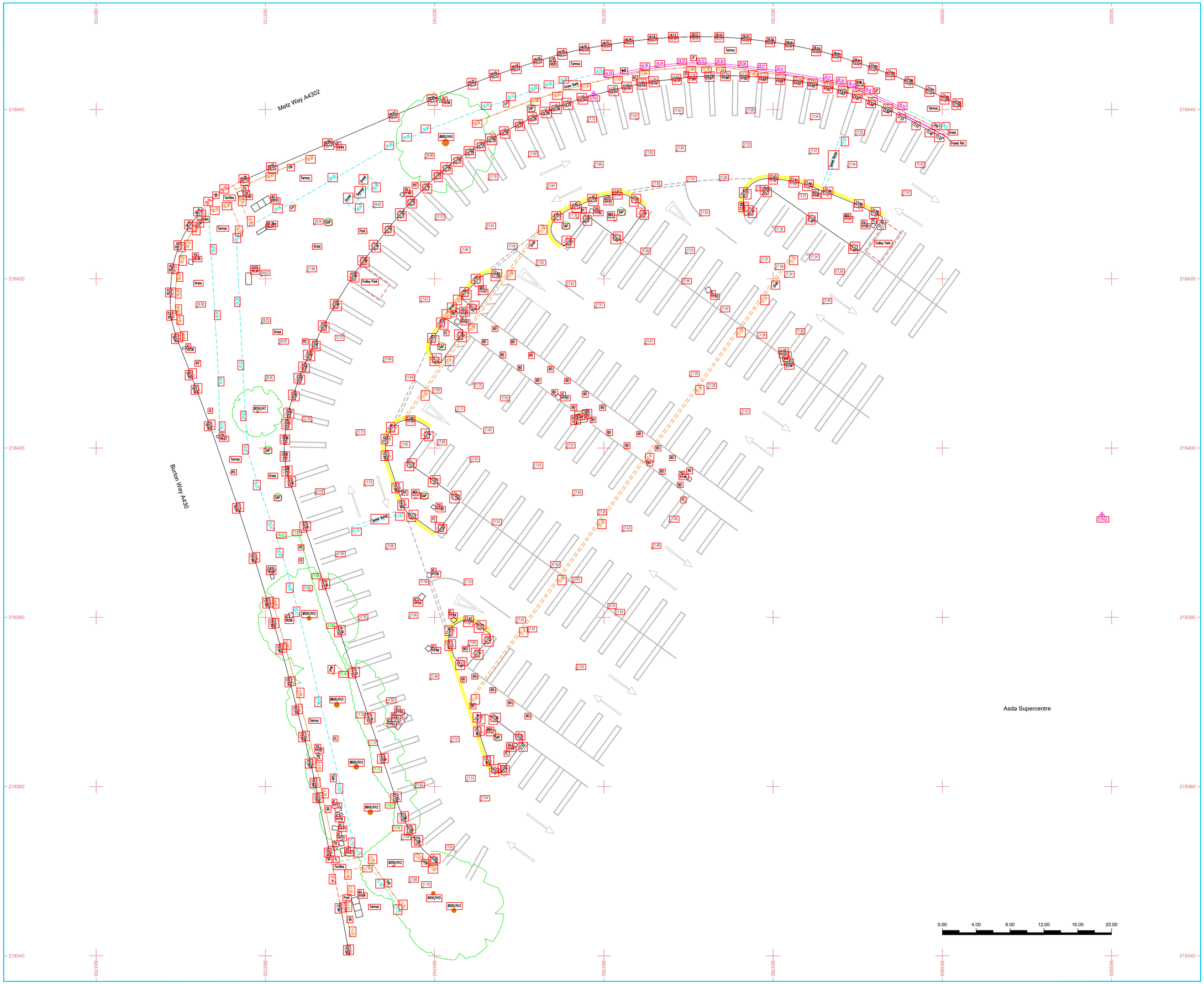
Site: Asda Gloucester, GL1 1DS

Date: 29.11.21

Job ref: HLEF 81441

Appendix B

Topographic Survey



Abbreviations where applicable:

AB	Air Brick	JTN	Junction Box
AV	Air Valve	KL	Keep Left
BB	Bellaha Beacon	KG	Kerb Gulley
BC	Building Canopy	LFB	Lifebuoy
BH	Borehole	LP	Lamp Post
BL	Bed Level	MB	Mooring Bollard
BM	Bench Mark	ME	Meter Manhole
BNDY	Boundary	MH	Manhole
BO	Bollard	MK	Marker
BS	Bi-Stem (Tree)	MS	Multi-Stem (Tree)
BST	Bus Stop	MY	Mercury Manhole
BT	British Telecom Manhole	NP	Notice Board
BW	Brick Wall	NP	Road Name Plate
C	Crest	OB	Out Building
CCTV	Closed Circuit Television	OS	Ordnance Survey
CL	Ceiling Level	PB	Pillar Box
CONC	Concrete	PED	Pedestrian Pad
CP	Concrete Post	PI	Pipe
CR	Cycle Rack	PM	Parking Meter
CTV	Cable Television Manhole	PO	Post Office Manhole
CUL	Culvert	PP	Power Point
DK	Drop Kerb	RE	Rodding Eye
DP	Drain Pipe	RS	Road Sign
DPC	Damp Proof Course	RTW	Retaining Wall
DR	Drain	RWP	Rainwater Pipe
DWB	Dog Waste Bin	SDP	Stand Pipe
EB	Electricity Box	SK	Soakaway
EL	Electricity Manhole	SOF	Soffit Level
EP	Electricity Pole	SMH	Surface Water Manhole
ER	Earthing Rod	ST	Stop Tap
FB	Flower Bed	SU	Stump (Tree)
FBR	Foot Bridge	SV	Stop Valve
FCL	False Ceiling Level	SVP	Soil Vent Pipe
FFL	Finished Floor Level	SW	Surface Water
FIR	Fence Iron Railing	SY	Stay (Eg. Pylon, TP)
FL	Floor Level	TBM	Temporary Benchmark
FMH	Foul Water Manhole	TCB	Telephone Call Box
FP	Flag Pole	TH	Threshold Level
FPC	Fence Post & Chain	TL	Traffic Light
FPP	Fence Post & Panel	TOW	Top of Wall
FPR	Fence Post & Rail	TP	Telegraph Pole
FPW	Fence Post & Wire	TPT	Trial Pit
FSB	Fence Safety Barrier	TS	Tri-Stem (Tree)
FW	Foul Water	TSI	Traffic Signal Manhole
FWM	Fence Wire Mesh	UB	Under Beam
GAS	Gas Valve	UTR	Unable To Raise
GL	Ground Level	VP	Vent Pipe
GP	Gate Post	WB	Waste Bin
GU	Gulley	WCL	Window Cill Level
H	Height	WHL	Window Head Level
HY	Hydrant	WL	Wall Level
IS	Information Sign	WM	Water Meter

General Legend:

Tree Ø0.35/MS/H6 · Survey Station STN · OSBM/TBM · Gate · Hedge · Borehole · Trial Pit

Survey Control:

	-E/X-	-N/Y-	-Ht/Z-
STN1	383758.792	218441.817	17.673
STN2	383818.864	218392.078	17.866

Relative to Ordnance Survey grid via Active Network RTK GPS Plane Table Grid

Sheet Layout:

A1

Disclaimer - West Coast Geomatics Limited 2021:

This survey has been produced with its accuracy consummate with the indicated scale and should only be used for its original intended purpose. Any scaling should only be undertaken using a stable media print produced using the original data. No responsibility is accepted to any third party for the whole or part of its contents. All data remains in the ownership of West Coast Geomatics Limited. Any discrepancies between this survey and any other information should be reported to West Coast Geomatics Limited.

Additional Notes:

N W E S

Amendments:

WEST COAST GEOMATICS
LAND & MEASURED BUILDING SURVEYORS

Address:
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Halsall Business Centre
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Client:

PYE Design

Drawing Title:

Topographical Survey

Rev: -

Site Address / Project Reference:

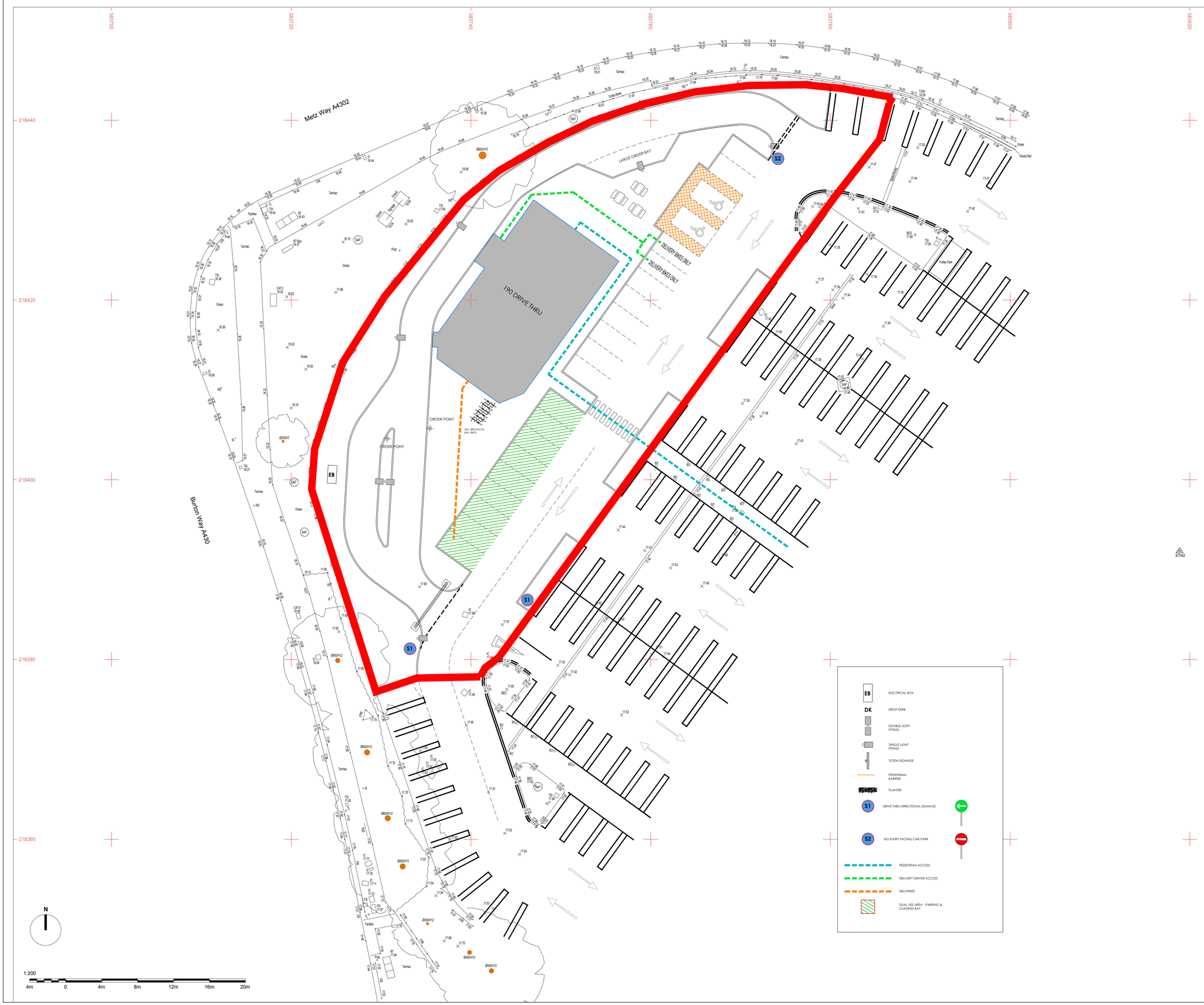
Asda Supercentre
Bruton Way
Gloucester - GL1 1DS

Surveyed:	NF	Document No.	WCG 21-1669-T-1:1
Processed:	JD	Plotted Scale:	ISO_A1_@_1:200
Checked & QA:	SN	Date of Issue	October 2021

Appendix C

Development Plans

NOTE - CAD INFO PROVIDED BY OTHERS.
ALL DIMENSIONS TO BE CHECKED ON SITE.
DO NOT SCALE FROM THIS DRAWING.



EB ELECTRICAL BOX
DK DROP KERB
DOUBLE LIGHT FITTING
SINGLE LIGHT FITTING
TOTEM SIGNAGE
PEDESTRIAN BARRIER
PLANTER
S1 DRIVE THRU DIRECTIONAL SIGNAGE
S2 NO ENTRY FACING CAR PARK
PEDESTRIAN ACCESS
DELIVERY DRIVER ACCESS
DELIVERIES
DUAL USE AREA - PARKING & LOADING BAY

REV	DATE	DESCRIPTION

PLANNING

SITE ADDRESS
ASDA GLOUCESTER SUPERSTORE
BURTON WAY
GLOUCESTER
GL1 1DS

DRAWING TITLE
PROPOSED SITE PLAN

DRAWN BY	CHECKED	DATE
SPO	ARP	NOV 2021
STORE NO.	SCALE @ A1	
	1:200	

DRAWING NO.	REVISION
4145 - PL - 04	-