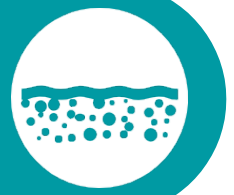


SuDSmart Plus



Sustainable Drainage Assessment

Site Address

1015 Oxford Road
Reading
RG31 6TL

Date

2020-10-29

Report Status

FINAL

Grid Reference

467254E, 175235N

Site Area

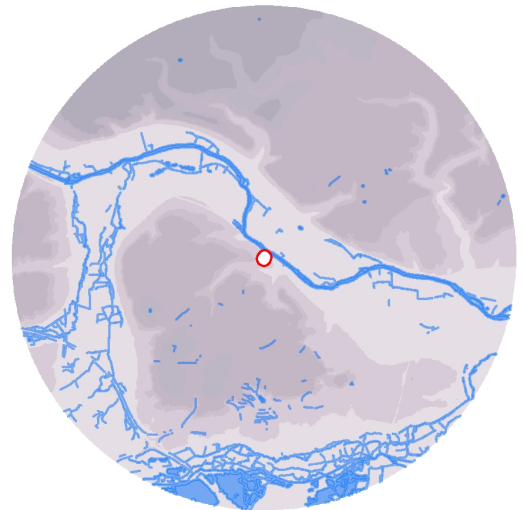
0.16 ha

Report Prepared for

Parkgrove Developments

Report Reference

73808R2



Infiltration to ground

The proposed Sustainable Drainage Scheme (SuDS) strategy is comprised of a permeable paving and geo-cellular storage for surface water runoff. On-site infiltration tests must be carried out (in accordance with BRE 365) to confirm this drainage strategy.

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1 Executive summary



This report assesses the feasibility of a range of Sustainable Drainage Scheme (SuDS) options in support of the Site development process. A SuDS strategy is proposed to ensure surface water runoff can be managed effectively over the lifetime of the development.

SuDS suitability

Risk	Issue	Result
Discharge Location	What is the infiltration potential at the Site?	High
	What is the potential to discharge to surface water features?	Low
	What is the potential to discharge to sewers?	High
	What is the potential to discharge to highway drains?	Low
Flooding	What is the fluvial flood risk at the Site?	Very Low
	What is the pluvial flood risk at the Site?	Very Low
	What is the groundwater flood risk at the Site?	Moderate
Pollution	Is the groundwater a protected resource?	No
	Is the surface water feature a protected resource?	N/A

Summary of existing and proposed development

The Site is currently a residential dwelling. At present there is a single building with a car park and driveway. The development proposals are also residential, an apartment building comprising 12 flats and associated carparking and infrastructure.

Summary of discharge routes

GeoSmart's SuDS Infiltration Potential (SD50) map indicates the Site has a high potential for infiltration, primarily due to the potentially high permeability of the underlying geology (Chalk formation). Infiltration to ground is therefore likely to be feasible. This will be confirmed following on-site infiltration tests (in accordance with BRE 365).

Ordnance Survey (OS) mapping indicates a surface water feature (the River Thames) is located c. 100m northeast of the site. Due to this distance, discharge into this feature will not be considered.

A public surface water sewer is located within 20m of the Site in the adjacent property however it flows into the foul sewer located within the A329. Discharge to sewer is potentially appropriate but the extent of this surface water sewer will need to be confirmed. Existing connections to the public sewer should be confirmed and surveyed on-site prior to detailed drainage design. Should infiltration prove unfeasible, the surface water strategy will need to outfall via the public sewer network. Further correspondence will be required with Thames Water to agree to the connection.

According to Google Streetview, very few highway gullies are located within Oxford Road, suggesting a porous surfacing.

Runoff rate and attenuation requirements

Based on a conservative example infiltration rate of 5×10^{-6} l/s (0.018 m/s) and a proposed impermeable area of 0.08 ha (50% of the total site area), discharging via infiltration would require 68m³ attenuation to ensure there is no flooding as a result of the development in all storm events up to and including the 1 in 100 year (6-hour storm) plus a 40% allowance for climate change. This volume is subject to the results of infiltration testing (to be carried out on-site in accordance with BRE 365) and would ensure runoff is not increased above the greenfield scenario.

Based on a minimum run-off rate of 5 l/s (UK SuDS HR Wallingford), discharging off-Site would require 45m³ of attenuation to ensure there is no flooding within the development in all storm events up to and including the 1 in 100 year plus 40% allowance for climate change.

Proposed SuDS strategy

Infiltration features should be stable and as much at surface level as is practicable to conserve the stability of the underlying chalk. Such SuDS features include permeable surfacing (for the carparking and paths) and a shallow geocellular system (using load bearing shallow crates such as permavoid150 or similar approved). The use of surface level, vegetated or 'green' SuDS is restricted as the open land to the south of the existing dwelling is c. 1m higher than the building, outfalling in this direction would require conveying pipework through the retaining wall which would then result in more excavation requirements within the raised area. It is proposed that rainwater from the roof of the building is conveyed north and downspouts outfall directly onto the adjacent permeable parking. This will not impact the foundations of the building so long as the main attenuation feature is situated within the center of the car park, 10m+ from the building. See Figure 1 for the SuDS strategy schematic.

The SuDS features would provide some water quality benefits (interception and filtration) prior to infiltrating to ground. Focused infiltration features should be sited at least 5m from building foundations and 2-3m from adjacent highways.

The proposed SuDS strategy would ensure surface water runoff is stored on Site in SuDS features for the 1 in 100-year event including a 40% allowance for climate change and will not cause flooding to the proposed development in accordance with DEFRA's non-statutory technical standards (DEFRA, 2015).

SuDS & drainage network maintenance

The management and maintenance of the SuDS features, in line with the details and schedules outlined in Section 11 of this report, will be undertaken by contractors appointed by the owners and occupiers of the new apartment, where payments for the works will form part of the property deeds and/or rental agreements.

Recommendations / Next steps

On-site infiltration tests must be carried out (in accordance with BRE 365) prior to confirming the drainage strategy.

A site investigation will be required to assess the underlying chalk to confirm its suitability and stability for surface water infiltration.

A survey of the existing drainage for the existing dwelling should be carried out to confirm whether at present the site is outfalling to infiltration or to the public sewer network.

Trial pits for both the infiltration testing and site investigation will note the depth of groundwater ingress which will further inform the design approach.

If site investigation confirms the underlying ground conditions are not conducive to infiltration, the capacity of the public sewer network should be confirmed with the utility provider (Thames Water).

2 Proposed SuDS strategy



The most suitable SuDS options are outlined below and a SuDS strategy schematic is shown overleaf. Supporting information is provided in subsequent sections.

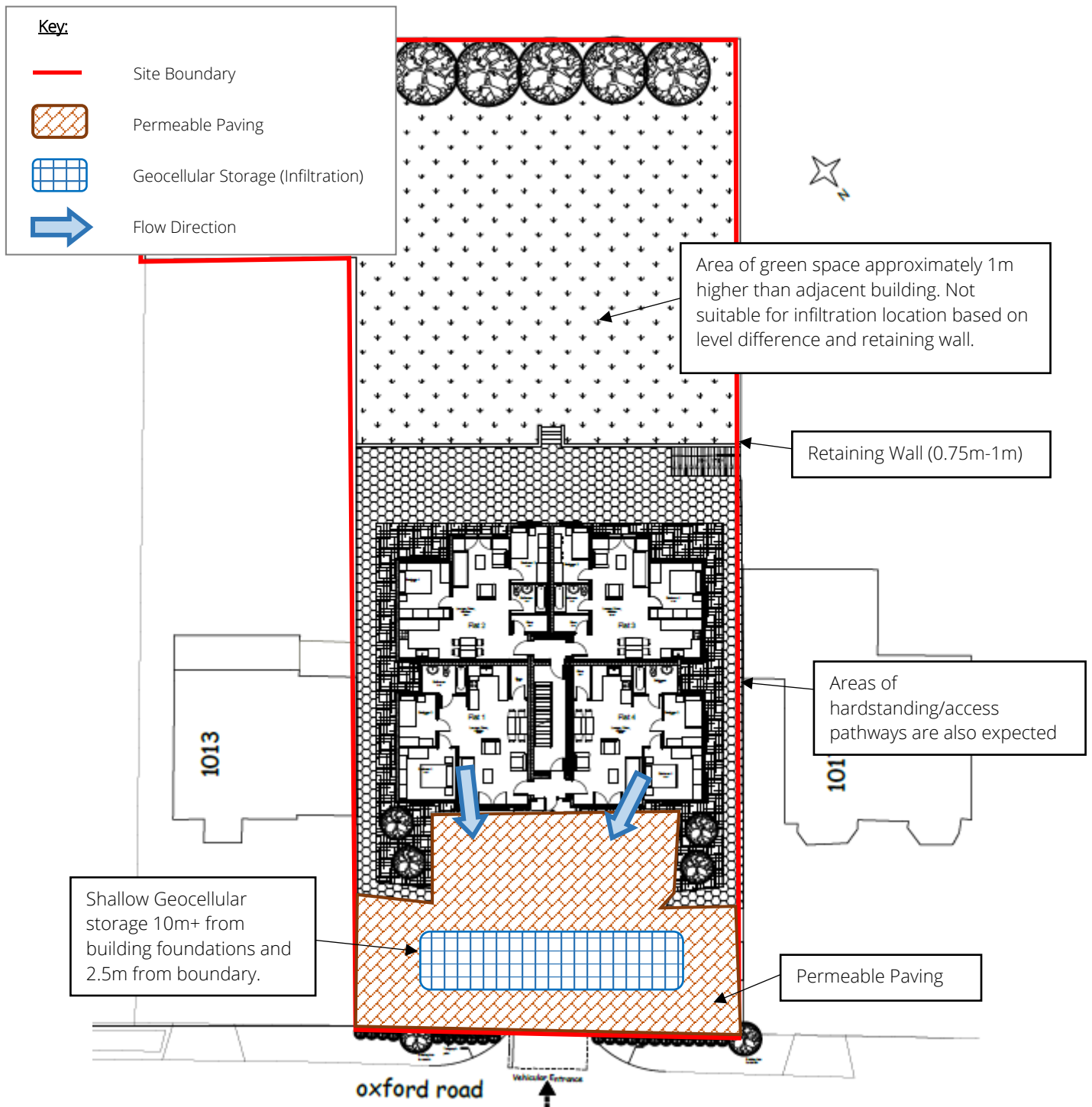
Table 1. Proposed SuDS type, features, discharge location and rate restriction

SuDS type	Source control (interception) and infiltration SuDS.
SuDS features	Permeable paving, and Shallow geocellular storage (permavoid 150 or similar approved)
Discharge location	Infiltration (tbc)
Discharge rate	Conservative example infiltration rate used for calculations is 5×10^{-6} m/s (tbc). If infiltration is not viable the outfall rate will be 5 l/s to surface water sewer.

Table 2. Proposed SuDS sizing (dimensions) and attenuation volumes

Permeable paving	A 250m ² area of permeable paving (underlain with a Type 3 aggregate material) within the proposed driveway areas to a depth of 0.3 m, with a 30% porosity would result in c. 22.5m ³ attenuation.
Shallow Geocellular Storage	A shallow geocellular system (permavoid150 or similar approved) would provide the remaining volume requirements within the centre of the car park 10m+ from building foundations and 2.5m from the site boundary. An additional 45.5m ³ is required to make up the total 68m ³ estimated storage requirement. This can be retained within a 46.25m ² area of double stacked (0.5m depth) load bearing geocellular crates which can be laid beneath and work in tandem with permeable paving. This is based on an example rate only and is subject to infiltration testing.
Total Attenuation Provided	68.75 m ³ (tbc following on-site testing)
Total Attenuation Required	68 m ³ (tbc following on-site testing)
Freeboard Storage Provided	0.75 m ³ (tbc following on-site testing)

Figure 1. SuDS strategy schematic



* Note drawings are schematic only and not to scale

3 Site analysis

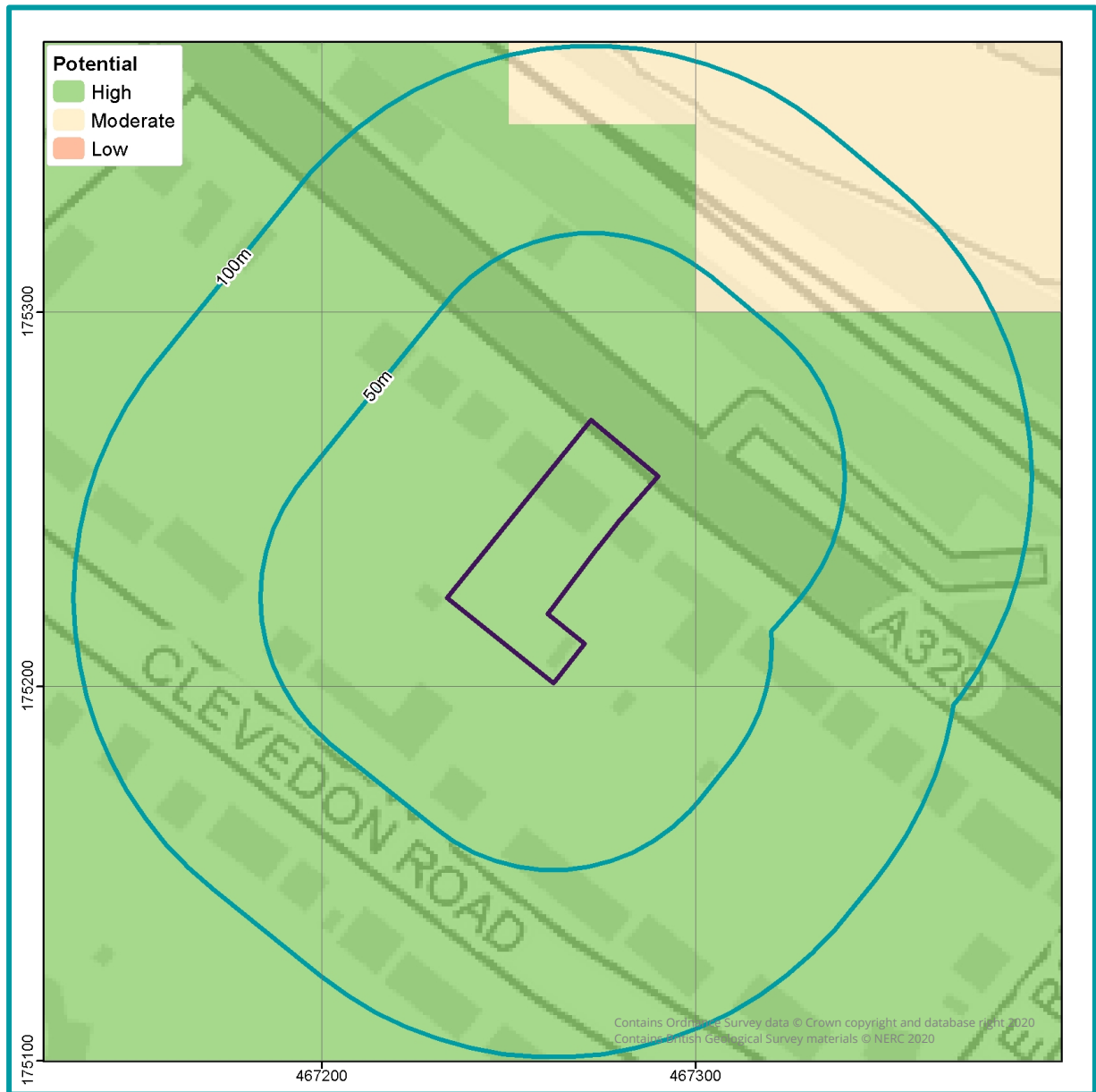


Site location

Figure 2. Aerial Imagery (Bluesky, 2020)



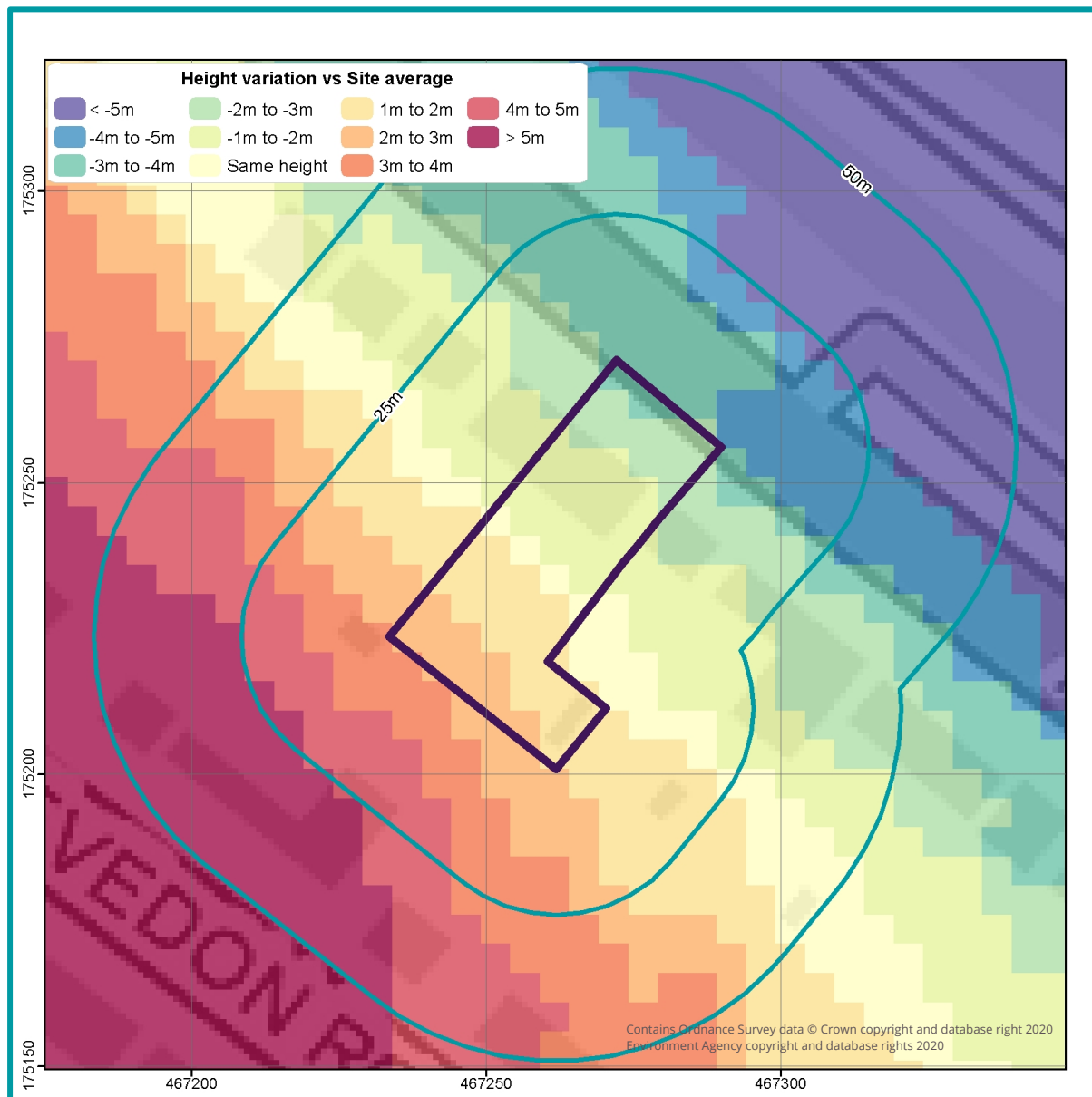
Figure 3. SuDS infiltration suitability (SD50) map (GeoSmart, 2020)



The GeoSmart SuDS Infiltration Suitability (SD50) Map screens the potential for infiltration drainage at the Site and indicates where further assessment is recommended. The map combines information on the thickness and permeability of the underlying material and the depth to the high groundwater table. According to the SD50 map, there is a high potential for infiltration SuDS at the Site.

Where infiltration SuDS are proposed a Site investigation is recommended to investigate groundwater levels, formation depth / thickness and to confirm that infiltration rates at the Site are sufficient to accommodate an infiltration SuDS feature. Infiltration testing should be undertaken strictly in accordance with BRE DIGEST 365 to ensure testing is representative of the entire Site and groundwater levels are a consideration of the SuDS design. The base of any SuDS features should be at least 1m higher than the highest recorded groundwater level.

Figure 4. Site topography (GeoSmart, 2020)

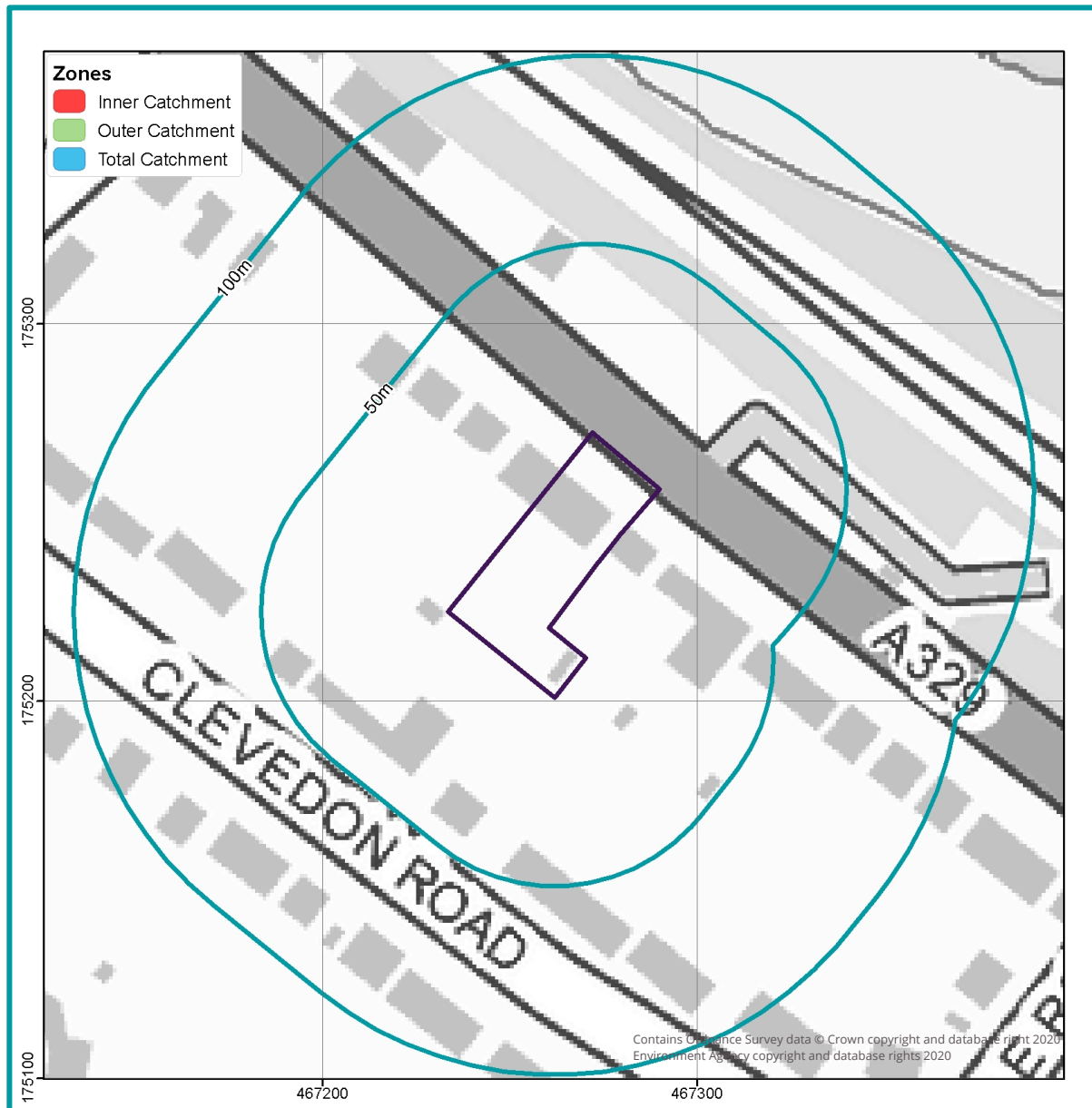


GeoSmart have undertaken an assessment of the topography at the Site and within its vicinity, using LiDAR elevation data from the Environment Agency (EA). The mapping shows a comparison between average ground levels on the Site with ground levels in the surrounding area.

The topographic data confirms the general level of the Site falls in a north easterly direction from 58.4 mAOD along the south western boundary to 53 mAOD along the north eastern boundary.

The EA LiDAR elevation obtained for the Site was to a 1m resolution with a vertical accuracy of ± 150 mm.

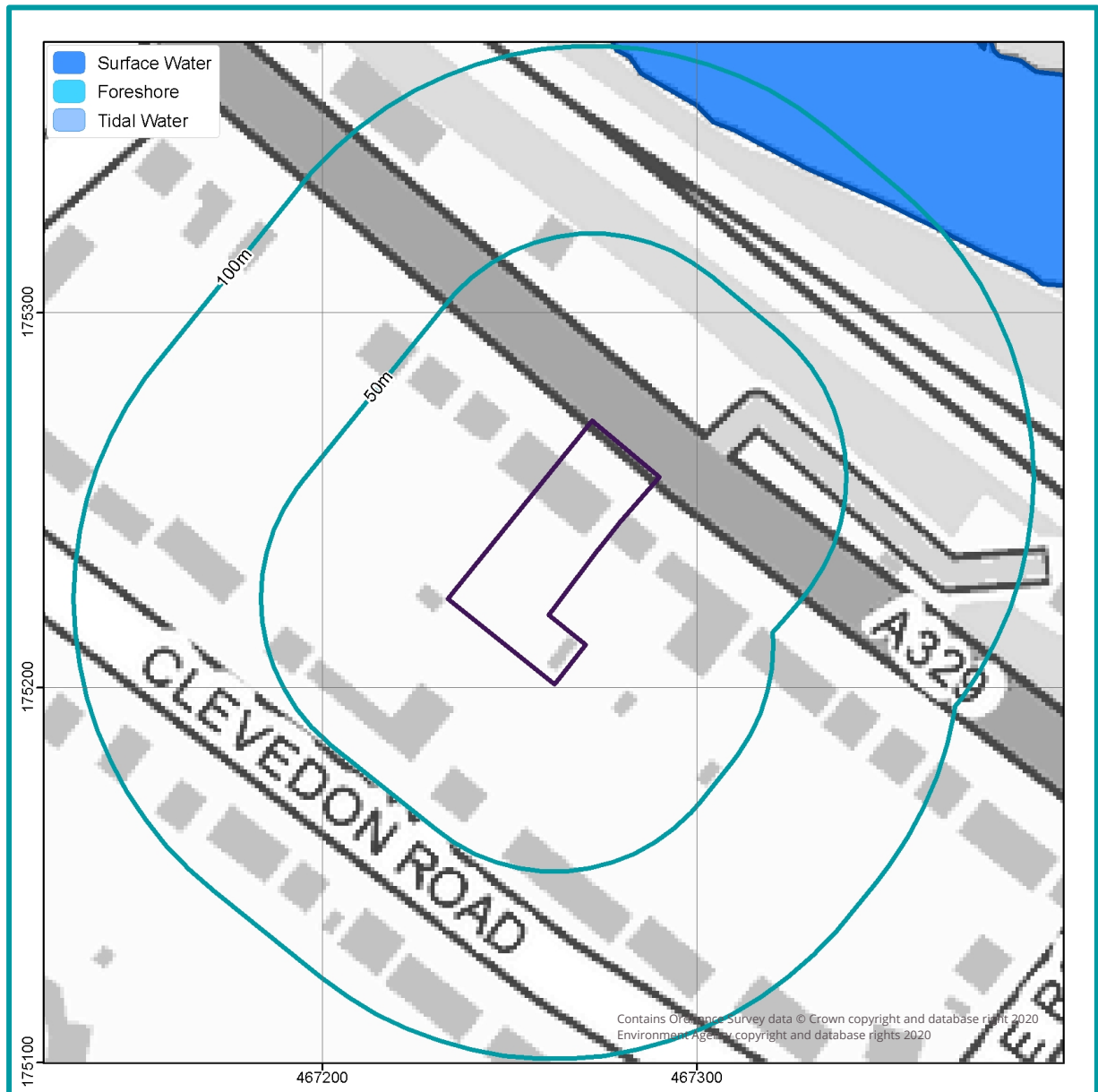
Figure 5. Source protection zone map (EA, 2020)



GeoSmart have undertaken an assessment of the EA's groundwater Source Protection Zones (SPZ) within the vicinity of the Site.

The Site is not within a SPZ, infiltration to the ground is therefore likely to be acceptable providing suitable mitigation measures are in place if required to prevent an impact on water quality from the proposed or historical land use and contaminated land.

Figure 6. Surface water features map (EA, 2020)

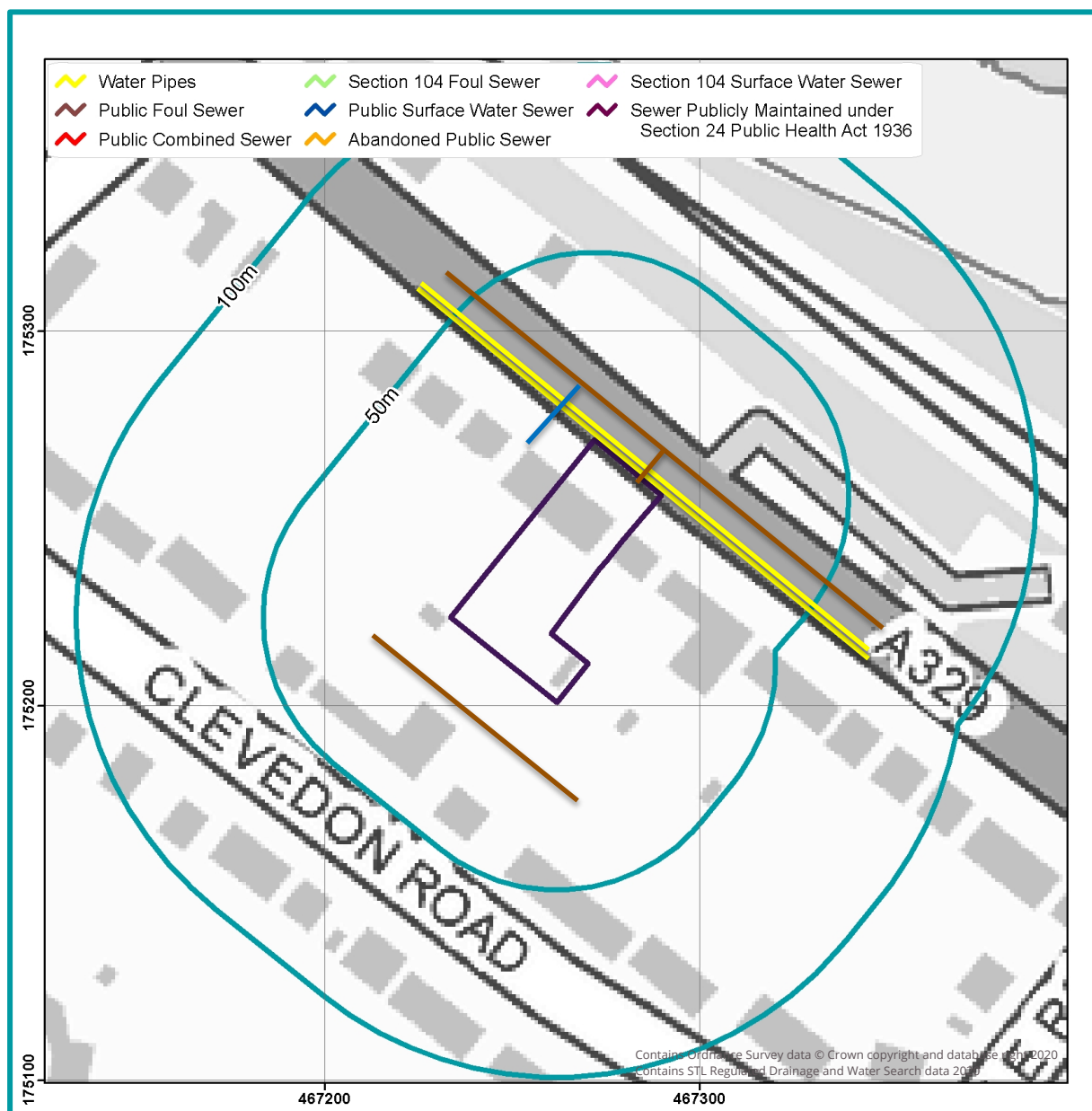


GeoSmart have undertaken an assessment of the location of surface water features within the vicinity of the Site. The River Thames is located approximately 90m north east of the Site however discharging to the river would involve crossing large amounts of third-party land including the A329. Discharge to surface water is unlikely to be appropriate.

The Site is not within 250m of a SSSI.

Further analysis could be undertaken by visiting the Site or by contacting the Local Council and the EA to confirm the presence, location and condition of these watercourses.

Figure 7. Sewer features map (OS & STL, 2020)

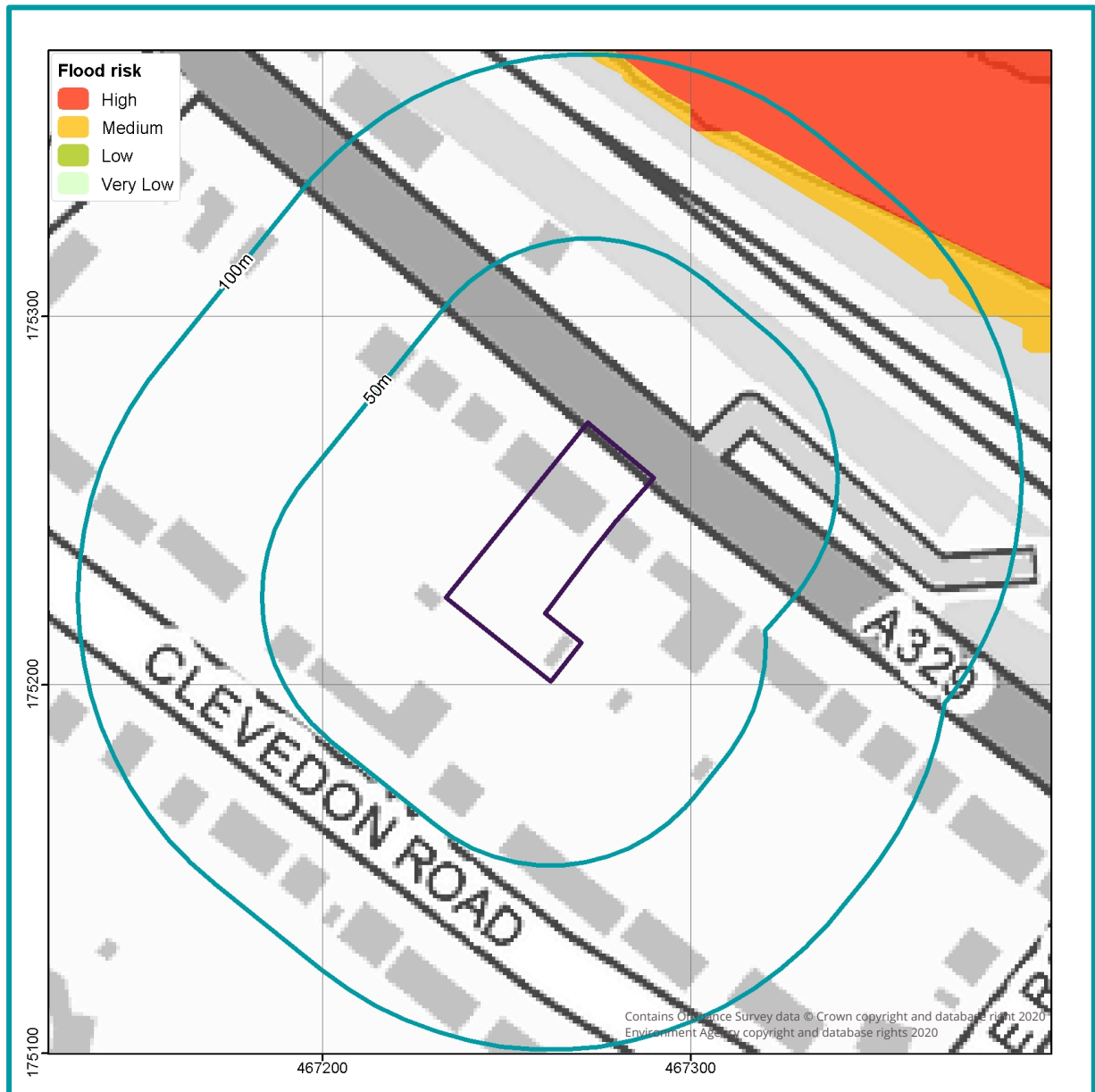


GeoSmart have undertaken an assessment of the location of sewer features within the vicinity of the Site. A public surface water sewer is located within 20m of the Site in the adjacent property however it flows into the foul sewer located within the A329. Discharge to sewer is potentially appropriate but the extent of this surface water sewer will need to be confirmed.

Further analysis of the connections and condition of the public surface water and foul drainage systems should be undertaken by carrying out a CCTV survey, or by contacting the drainage provider or the Local Council to confirm the presence, location and condition of these sewers.

Consultation with the drainage provider would also be required to determine that sufficient capacity is available to accept the proposed discharge, and to gain permission to connect if required.

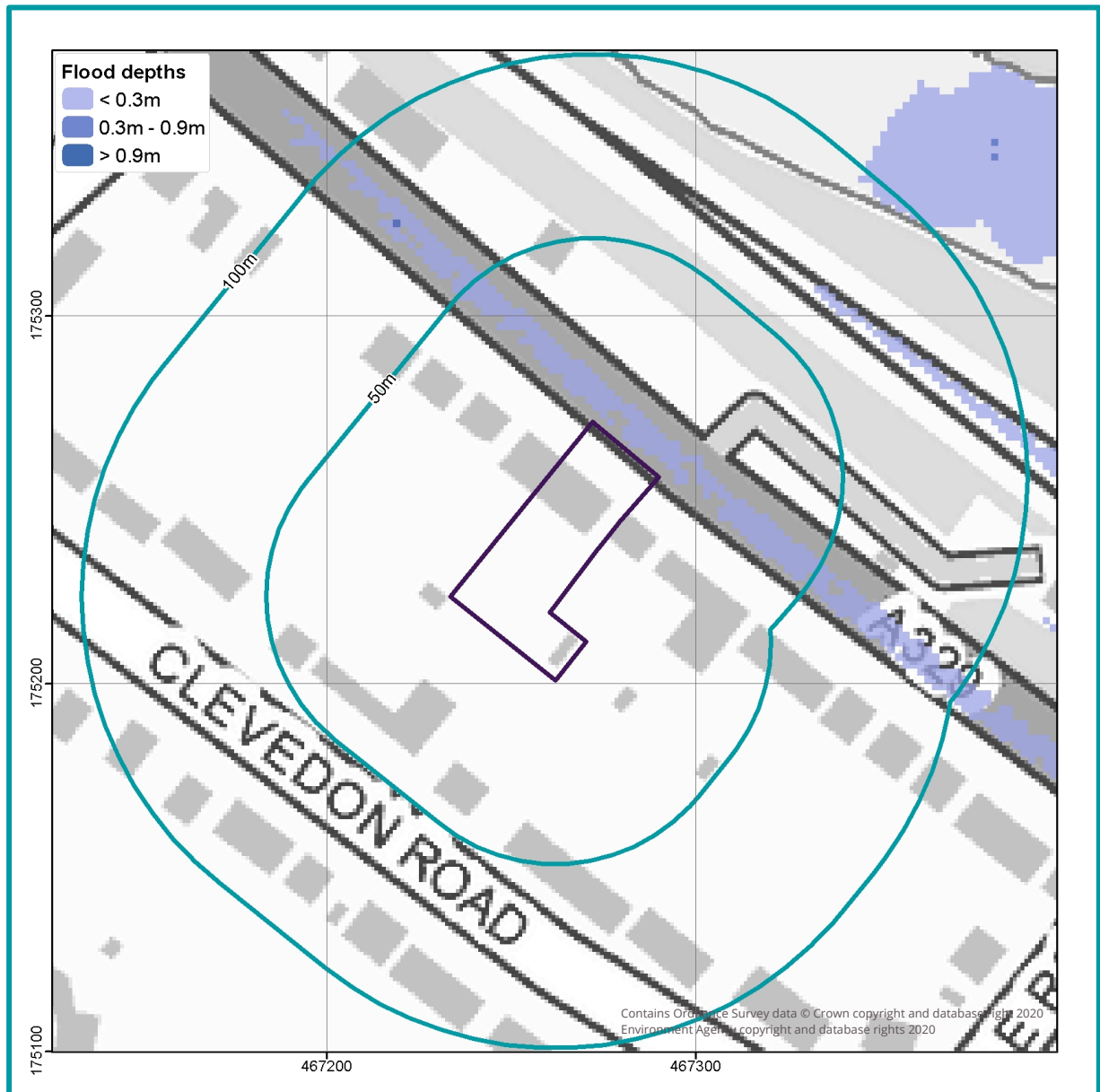
Figure 8. Risk of flooding from rivers & sea map (EA, 2020)



GeoSmart have undertaken an assessment of the risk of flooding from the rivers and the sea within the vicinity of the Site.

The Site has a negligible risk of fluvial or coastal flooding.

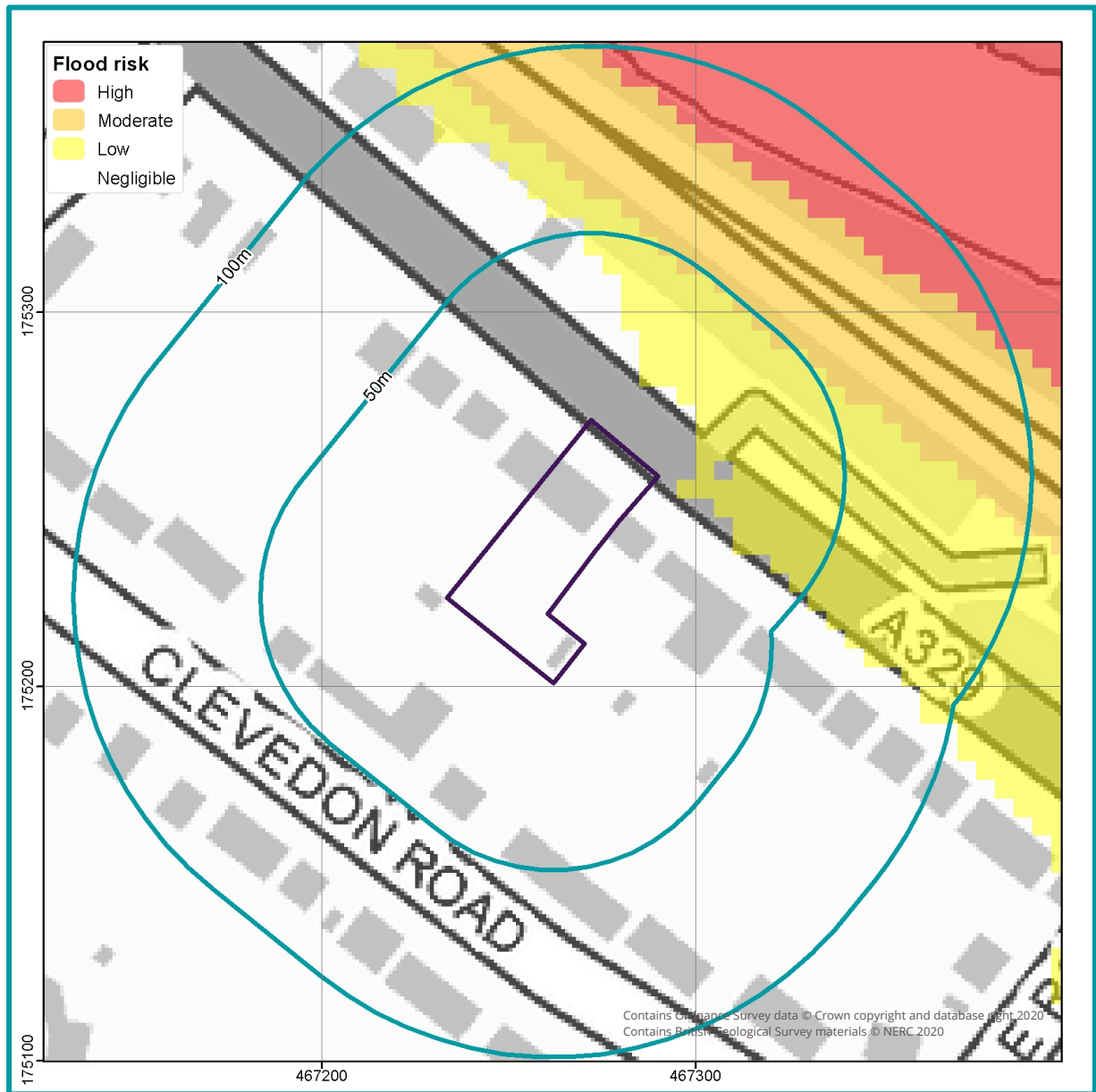
Figure 9. Risk of surface water flooding map (EA,2020)



GeoSmart have undertaken an assessment of the risk of flooding from pluvial sources within the vicinity of the Site.

The Site has a very low risk of surface water flooding.

Figure 10. Groundwater flood risk (GW5) map (GeoSmart, 2020)



GeoSmart have undertaken an assessment of the risk of flooding from groundwater sources within the vicinity of the Site. The Site has a negligible risk of groundwater flooding but is located nearby areas of low to high risk.

Therefore, SuDS design has the potential to be affected by flooding through the underlying geology. It is necessary that any SuDS are designed to operate in times when groundwater levels are high, so Site specific investigation is necessary to establish the depth to groundwater.