Project

2 Alma Road, Carshalton

Report

Basement Impact Assessment & SuDS Strategy

Prepared By

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19 February 2024

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APPENDICES

Revision History:

Revision	Date	Document Ref.	Comments
Rev 0	19/02/2024	2 Alma Road BIA	Planning Issue

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MICE #: 51813326

1.00 INTRODUCTION

This report has been prepared to support the proposed works at 2 Alma Road, Carshalton, SM5 2PF, for the creation of a small extension to the lower ground floor space, with further internal refurbishment works.

The report will present the basement impact assessment study, along with the SuDS study and proposed strategy.

The following diagram shows the property location on an extract from the referenced document:

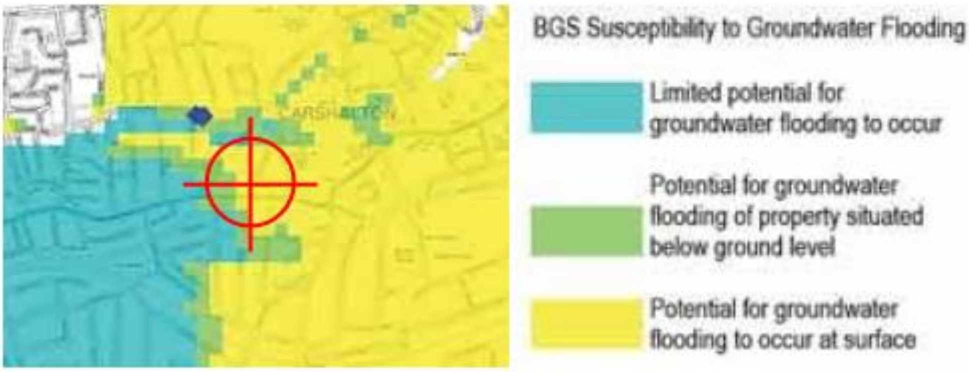


Figure 1: Extract from Figure 4.4, Appendix A of the SFRA Level 1 Report

It can be noted that the site is located on the boundary of the 'yellow' and 'green' zone, although as noted later in this report, the property is located at a higher elevation that the areas shown in yellow, and the ground water level from existing borehole records is a considerable distance below ground level.

2.00 EXISTING PROPERTY

The existing property comprises a 1930's built semi-detached property, with a 1990's built lower ground floor extension (which is also mirrored on the neighbours side).

To the rear of the property is garden, with a garage located at the end of the garden, accessible via Rosefield Close to the side.

To the front of the property is a small garden and a concrete driveway (with a mock block paving effect). The driveway wraps around half of the southern side of the property accessing steps down to a lower ground floor level with paving.

Along the southern boundary of the property is a private road – Rosefield Close, which provides access to other residences further east along the road. The road slopes down from Alma Road to the residential close at the bottom – approximately a 3m change in elevation.

Alma Road sits to the western boundary of the site, and slopes down as it heads north from the junction with Rosefield Close – approximately a 4m change in elevation to the end of the road.

Site address: 2 Alma Road, Carshalton, SM5 2PF

Grid Reference: TQ 27337 64316

Easting/Northing: 527337, 164316

Figure 2: Aerial photo (maps.google.com)

Figure 3: Photo of the front of the property

Figure 4: Photo of the southern side of the property at ground floor level

Figure 5: Photo of southern side of property showing the lower ground floor area

Figure 6: Approximate Elevations

3.00 PROPOSED DEVELOPMENT

The proposed development comprises a small internal extension to accommodate new stairs connecting the ground floor to the lower ground floor.

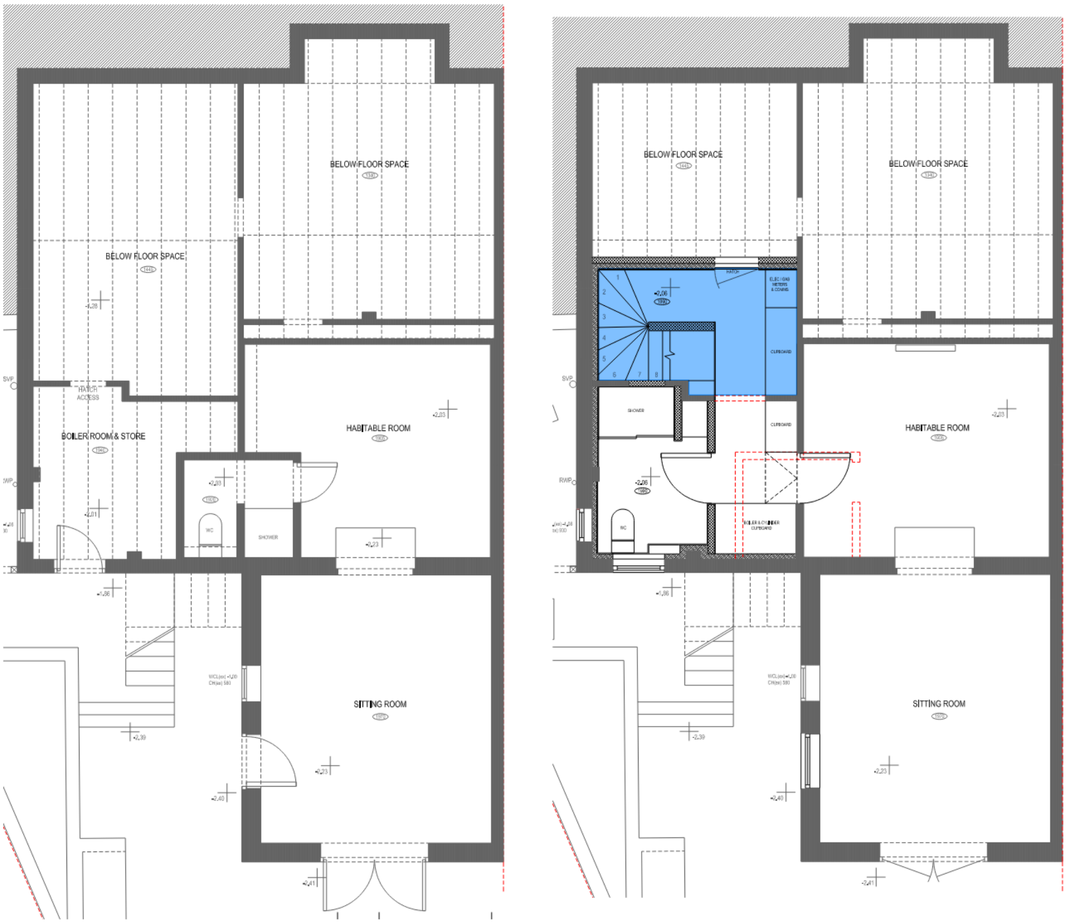


Figure 7: Proposed Ground and Lower Ground Plans

The figure above shows the existing lower ground floor, along with the proposed internal extension to the lower ground floor (shown in blue). New stairs are proposed connecting the ground floor of the main house to the lower ground floor rooms. Currently these spaces are only accessible via a separate entrance from the garden.

The existing space under the front of the house, into which the lower ground floor space is extended, is a half-height "crawl" space, where the ground level is approximately 730mm above the general lower ground floor level.

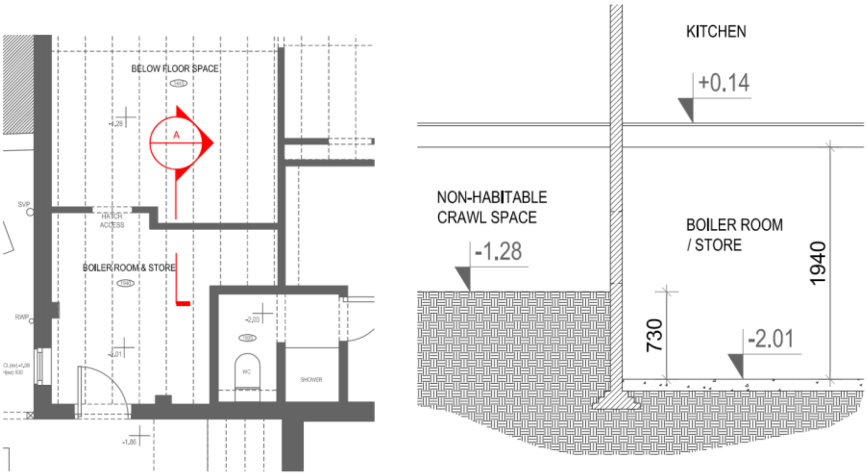


Figure 8: Section Showing Existing Lower Ground Floor

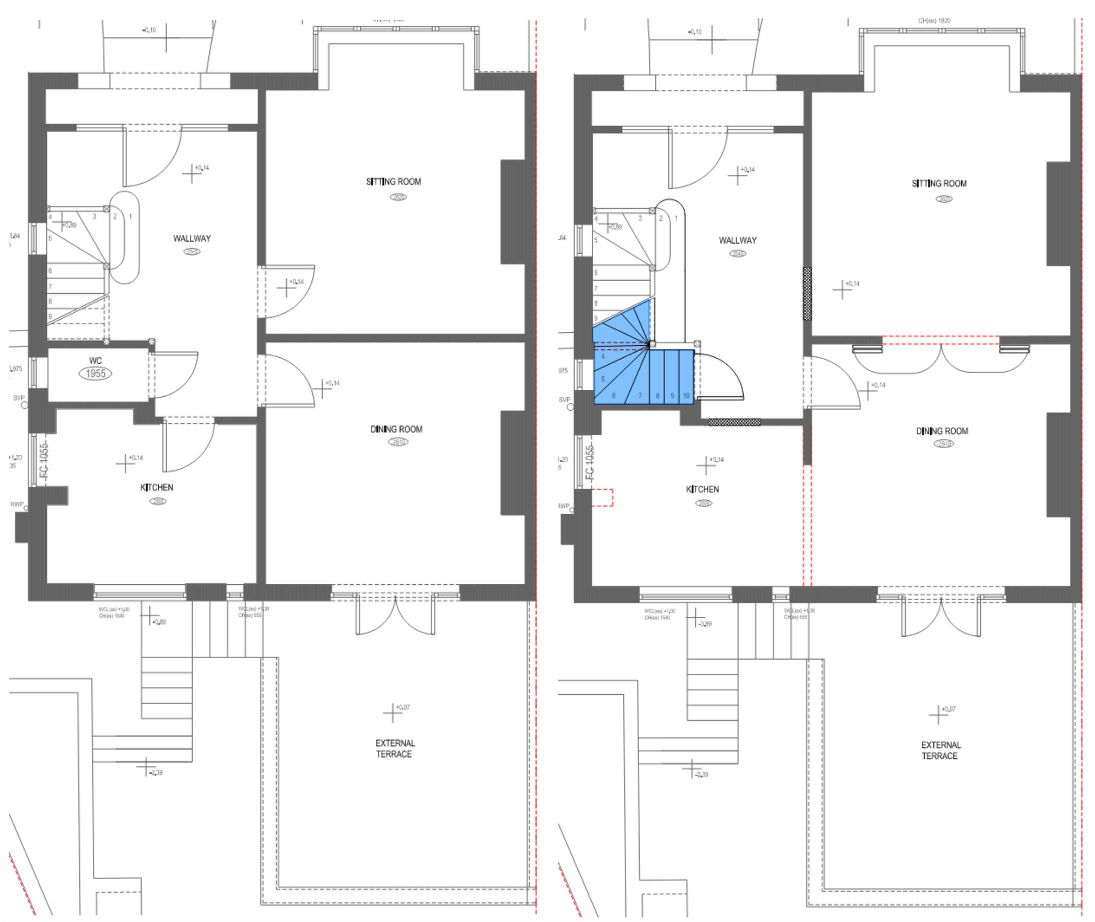


Figure 9: Existing and Proposed Ground Floor Plans

The above figure shows the new stairs replacing the existing ground floor WC, and connecting to the lower ground floor space.

Further internal works are also proposed, connecting the sitting room, dining room and kitchen spaces into an open place space. At lower ground floor level, the existing toilet and shower are being relocated to the existing boiler / storeroom.

4.00 GEOLOGY & GROUNDWATER

4.01 Hydrogeology

The British Geological Society (BGS) mapping indicated that under the garden area there are superficial deposits comprising clay, silt, sand, and gravel.

The BGS mapping indicated that the underlying bedrock geology consists of the Lewes Nodular Chalk Formation and is classified as a Principal Aquifer.

The site is not located within a Source Protection Zone.

4.02 Geology

The Soilscapes Maps provided by the National Soil Resources Institute at Cranfield University indicate that the soils at the site and the surrounding area comprised “freely draining slightly acidic but base rich” soils.

The BGS website provides the following map:

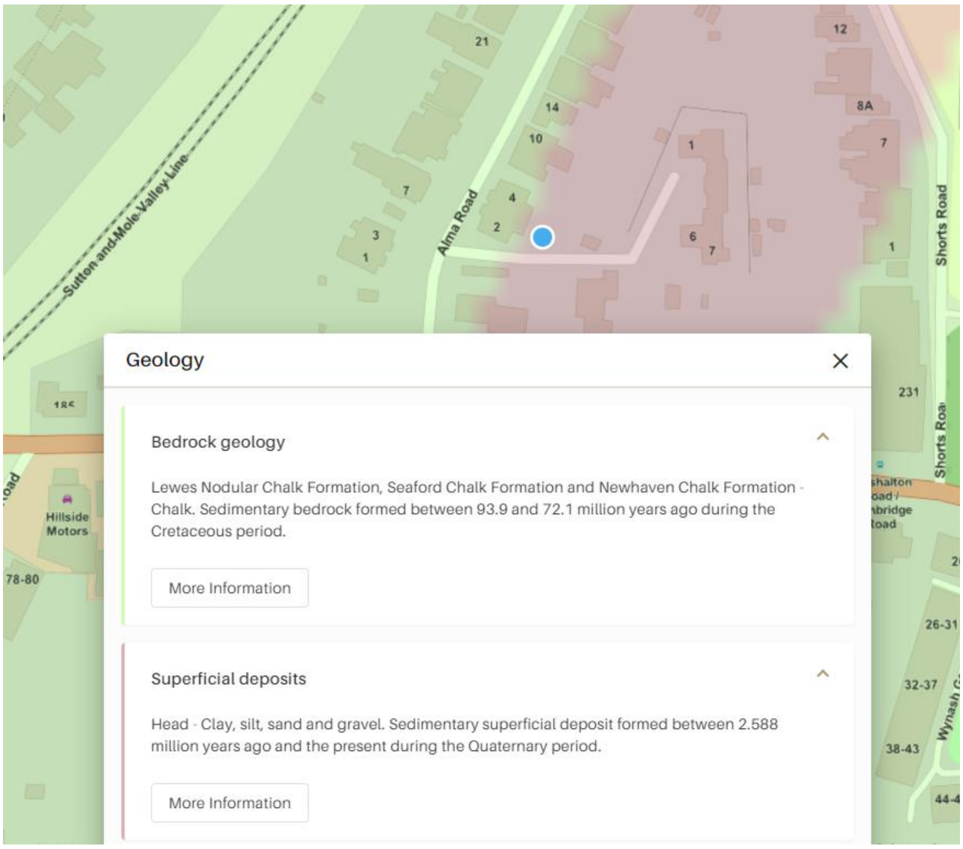


Figure 10: BGS Map - Bedrock & Superficial Deposit

Since the property straddles the boundary of the superficial deposits, the exact nature of the ground on site may vary and will be established through trial pits ahead of construction.

4.03 Groundwater

A series of borehole records have been obtained from BGS within the vicinity of the site. These are shown on the map below and summarised in the table below. The records obtained are a mix of traditional boreholes and well records. Using the data from these records it is possible to construct an interpretation of the groundwater level within the area.

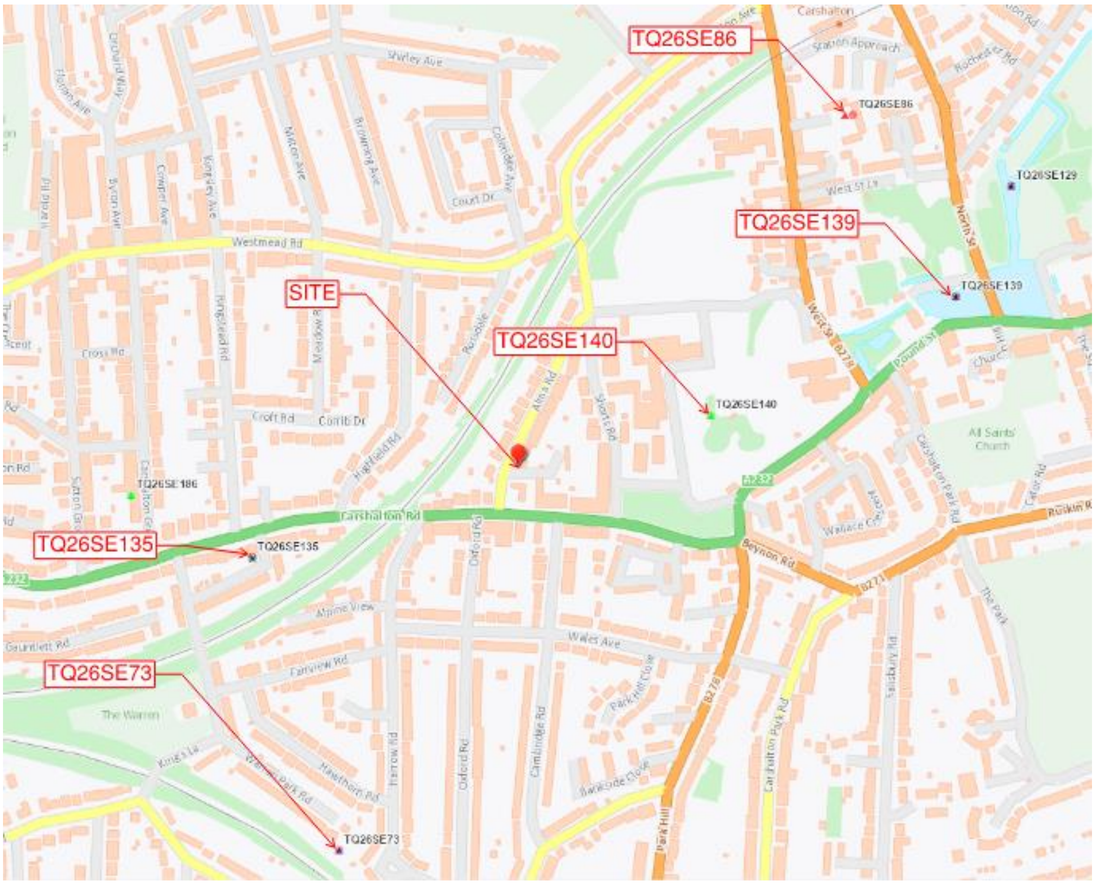


Figure 11:Map of BGS borehole locations

	TQ26SE73	TQ26SE140	TQ26SE135	TQ26SE139	TQ26SE86
Type	Borehole	Well Record	Well Record	Well Record	Borehole
Geology	Chalk with Flints	Chalk with Flints	-	-	Gravel & Silt overlying Chalk
Thickness (m)	106.67	12.19	-	-	Gravel: 30
Ground Level (mAOD)	61.5	40.5	61	35.1	36.6
Resting water level (mbgl)	24	3.53	20.4	0.7	1.2
Distance from Site	530m south-southwest	270m east	340m west	600m east	590 North East

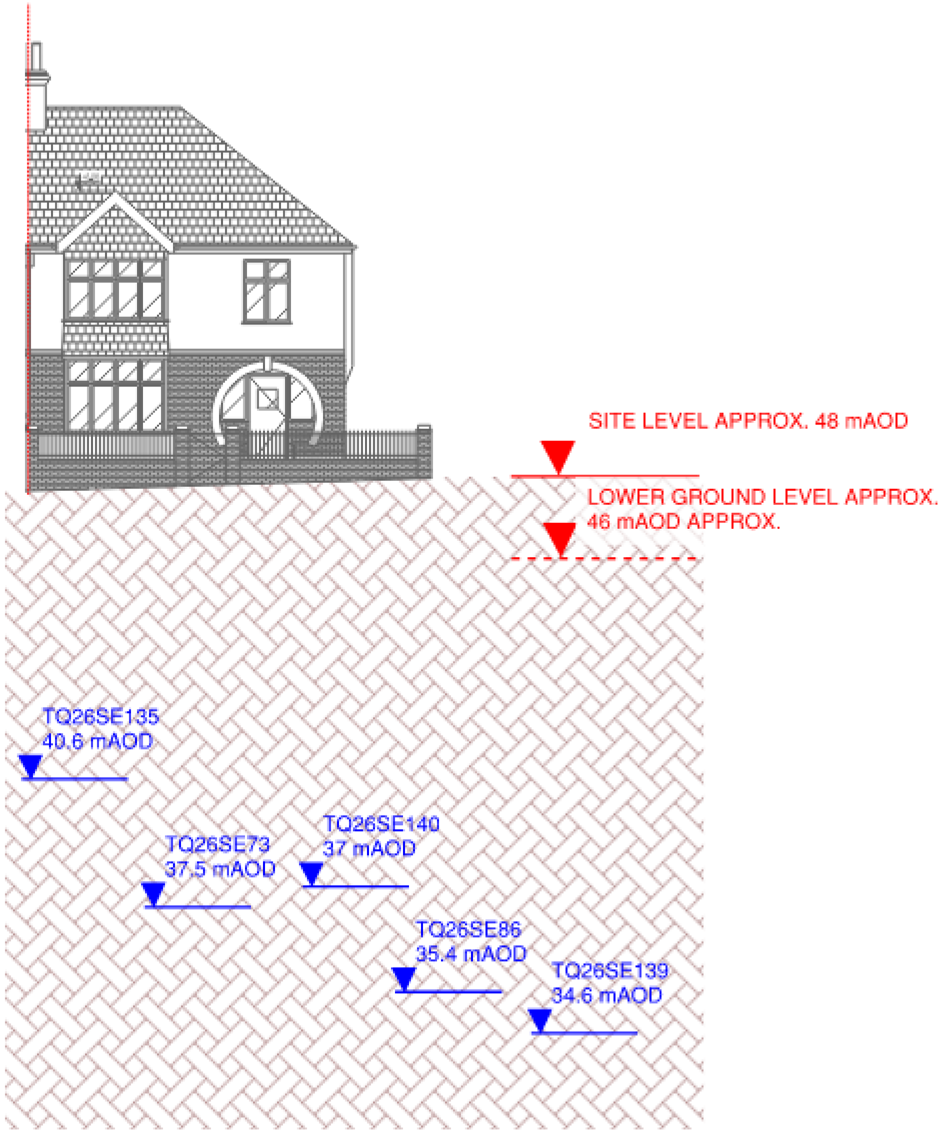


Figure 12: Section showing resting ground water level from borehole data

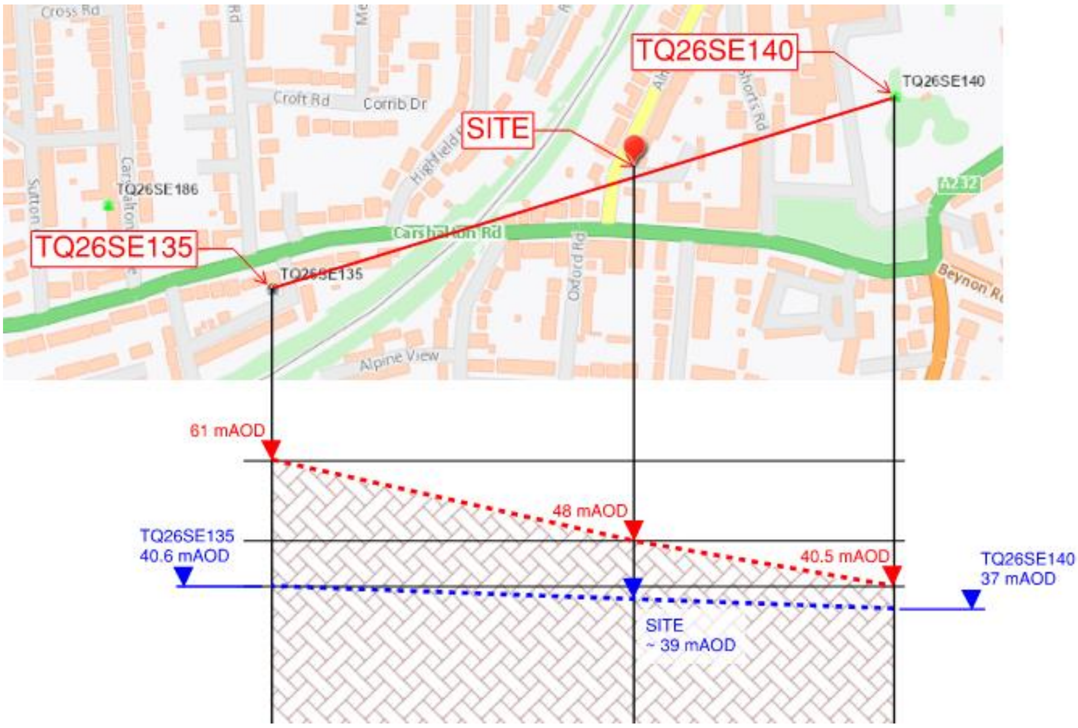


Figure 13: Section through Boreholes

In the figure above, the boreholes are ordered west to east. A straight line can be struck through 135 and 140 which roughly passes through the site location. Interpolating this data yields a resting ground water level of approximately +39 mAOD, which is approximately 7 metres below the existing and proposed lower ground floor levels for the development.

Therefore, based on the comparison of the levels, current groundwater level is not an issue at the site. Furthermore, the analysis has proved the ground water to have as expected a slight incline to the North East where the River Wandle issues. At this point the Water Table at BH TQ26SE86 is a mere 0.7m below ground level, and clearly ground water is relative to the River Wandle. Given the relatively steep topography, with the site located 13m above the river, any raise in Water Table level would clearly not affect the site.

Since the proposed development does not comprise any deep excavations into the ground water, there will not be any interruptions to the sub-surface flow regimes, and as such, no further studies in this regard are deemed necessary.

5.00 FLOOD RISK TO DEVELOPMENT

The site is located at the junction of Alma Road and Rosefield close – both of which fall away from the property.

5.01 Fluvial Flood Risk

According to the EA's Flood Map for Planning Purposes, the site is located within Flood Zone 1 and is therefore classified as having a low probability of fluvial flooding. A copy of the map and report can be found in Appendix A.

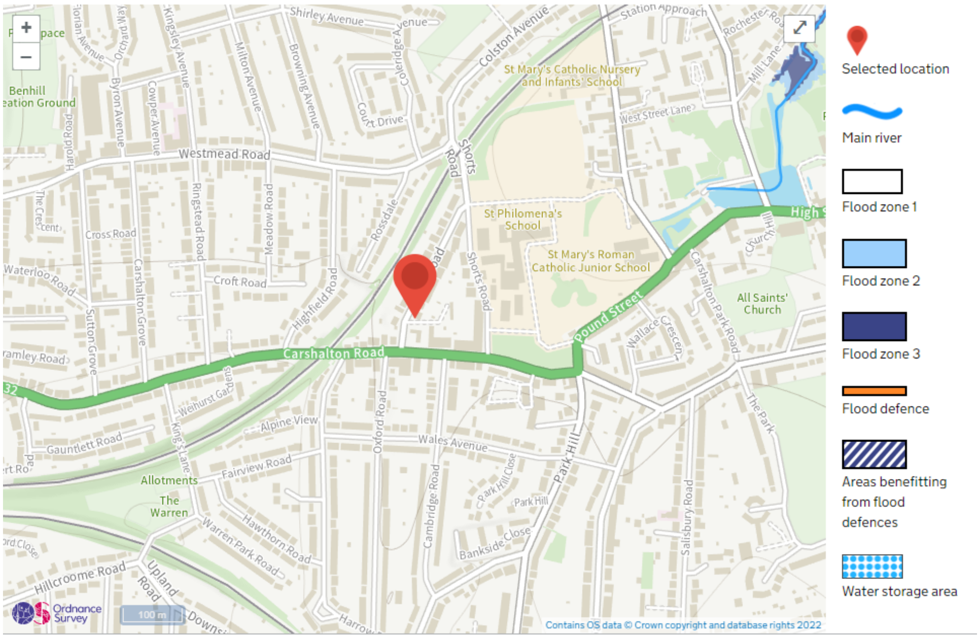


Figure 14: Environment Agency Map - Flood Zones

5.02 Surface Water Flood Risk

According to the EA's Risk of Flooding from Surface Water (pluvial) mapping, there is a Very Low risk of pluvial flooding across the Site. According to EA's surface water flood risk map, a site at very low risk has a chance of flooding of less than 1 in 1000 (0.1%).

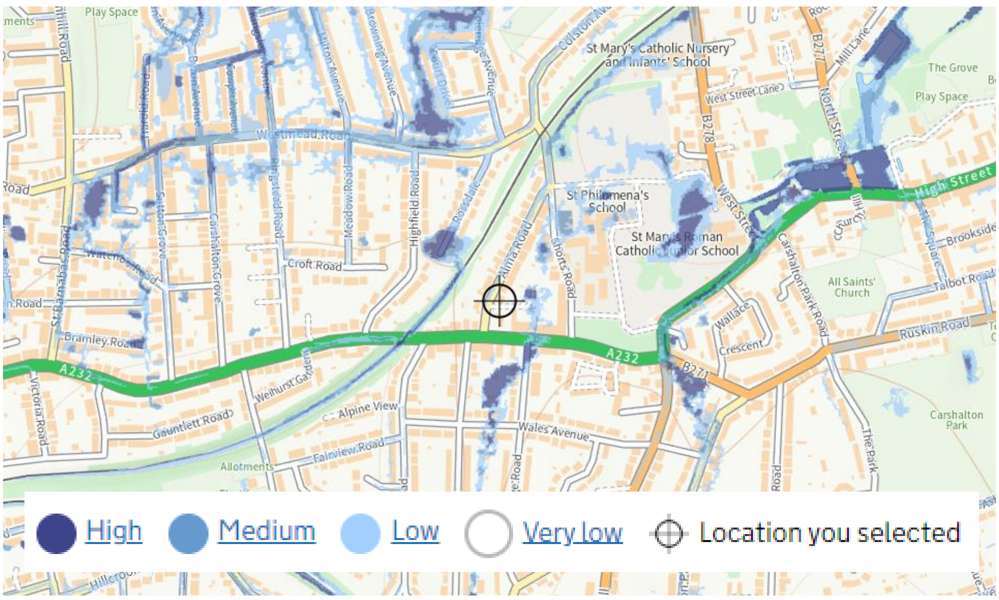


Figure 15: Environment Agency Map - Flood Risk from Surface Water

5.03 Flood Risk from Rivers or Sea

According to the EA Risk of Flooding from Rivers and the Sea (RoFRAS) mapping, which considers the crest height, standard of protection and condition of defences, the flood risk from Rivers and the Sea is very low. The Site lies approximately 780m to the south west of the nearest land outside Flood Zones 2 and 3.

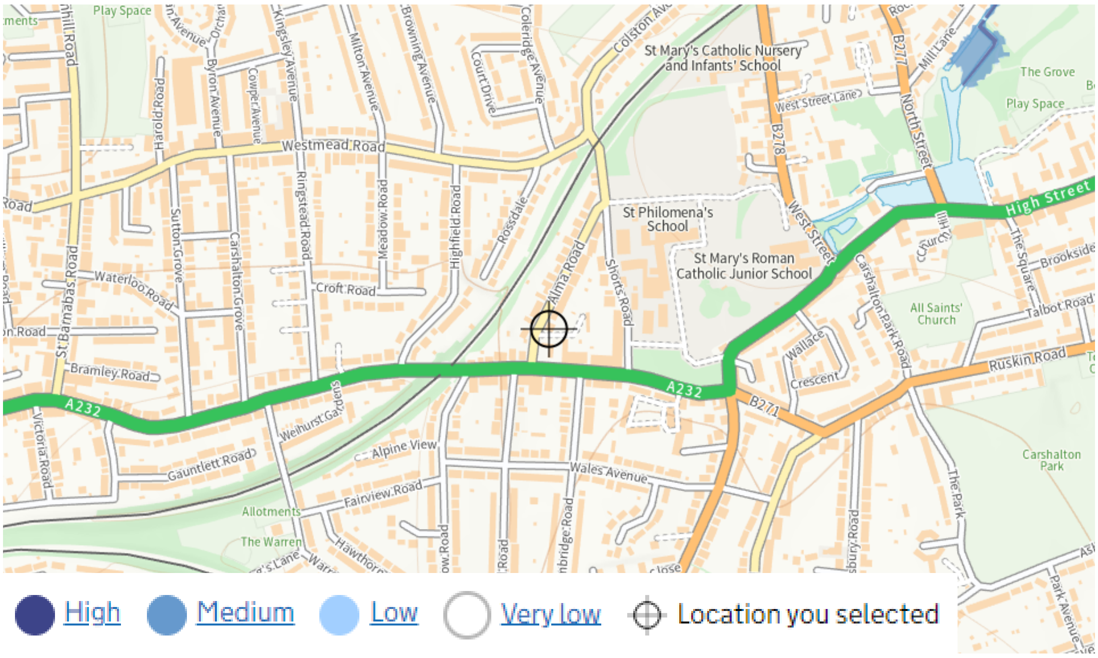


Figure 16: Environment Agency Map - Flood Risk from Rivers or Sea

Ignoring the presence of any defences, land located in a Flood Zone 1 is considered to be at low probability of flooding, with less than a 1 in 1000 annual probability of fluvial or coastal flooding in any one year.

Development of all uses of land is appropriate in this zone.

6.00 CONSTRUCTION

The extension of the lower ground floor will retain a small amount of ground to the west that currently infills the lower ground space below the main hallway above. The sections below show the existing and proposed sections (East/West) through lower ground floor space.

- The existing FFL is being lowered by 50mm to improve the floor to ceiling height. The existing ground bearing slab will be broken out and lowered to suit the new build-up.
- A new ground bearing slab will be formed throughout, cast on sand blinding, with a DPM throughout.
- A small retaining wall to the west to retain the remaining earth in the crawl space. The DPM will placed behind the retaining wall up to a level 150mm above the earth level.
- A screed layer will be cast on insulation, overlaid on the ground bearing slab to form the main FFL.

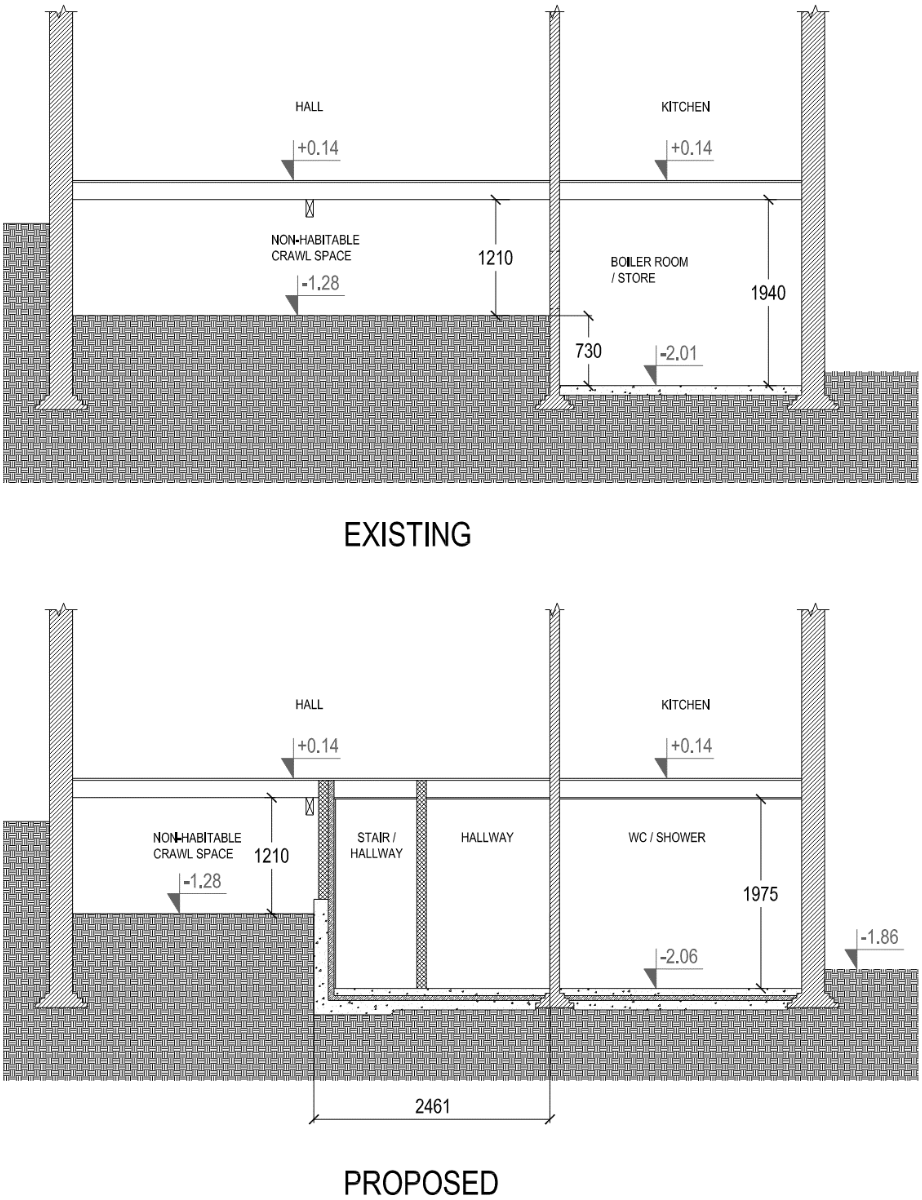


Figure 17: Existing and Proposed Section (East/West)

7.00 SURFACE WATER AND SUDS

7.01 Planning Policy

The London Borough of Sutton guidance has been reviewed, The Site Development Policies DPD has since been superseded by the 'Sutton Local Plan (Adopted 2018). SuDs is referenced in Policy 32b (page 109) as extract below. This now matches the Mayor's Sustainable Design and Construction SPG.

> **Sustainable Drainage (SuDS)**
>
> **b** Proposed developments should incorporate effective sustainable drainage (SuDS) measures as part of the design and layout of the development in order to manage surface water run-off as close to its source as possible and achieve the following minimum SuDS performance standards through application of the Mayor's drainage hierarchy:
>
> - **Greenfield sites:** ensure that peak run-off rates and volumes for the 1 in 100 year rainfall event never exceed greenfield run-off rates for the same event.
> - **Previously developed sites:** ensure that peak run-off rates and volumes for the 1 in 100 year event achieve greenfield run-off rates for the same event, unless it can be demonstrated that all opportunities to minimise final site run-off, as close as reasonably practicable to greenfield runoff rates, have been taken in line with the Mayor's drainage hierarchy. In such cases, run-off rates must not exceed 3 times the calculated greenfield rate in accordance with the Mayor's Sustainable Design and Construction SPG; and
> - ensure that the site drainage strategy can contain the 1 in 30 year event (+ climate change) without flooding and that any flooding occurring between the 1 in 30 and 1 in 100 year event (+ climate change) will be safely contained on site.

Figure 18: SuDS Policy Extract

7.02 The London Plan

Policy 5.13 of The London Plan states that: Development should utilise sustainable urban drainage systems (SuDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:

1. Store rainwater for later use
2. Use infiltration techniques, such as porous surfaces in non-clay areas
3. Attenuate rainwater in ponds or open water features for gradual release
4. Attenuate rainwater by storing in tanks or sealed water features for gradual release
5. Discharge rainwater direct to a watercourse

Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation.

7.03 Non-Statutory Technical Standards for SuDS

The Non-Statutory Technical Standards for SuDS, (and accompanying Local Authority SuDS Officer Organisation (LASOO) Practice Guidance) sets out the details which should be addressed within a SuDS Report, including:

- Flood Risk Outside of the Development
- Peak Flow Control and Volume Control
- Flood Risk Within the Development
- Runoff Destinations
- Structural Integrity
- Designing for Maintenance Considerations
- Construction

7.04 Review of Flood Risk

Refer to Sections 4.00 and 5.00 which discusses fluvial flood risk, surface water flooding and groundwater flood risk.

7.05 Existing Drainage

It is important to understand the existing drainage system drainage system prior to considering the new design.

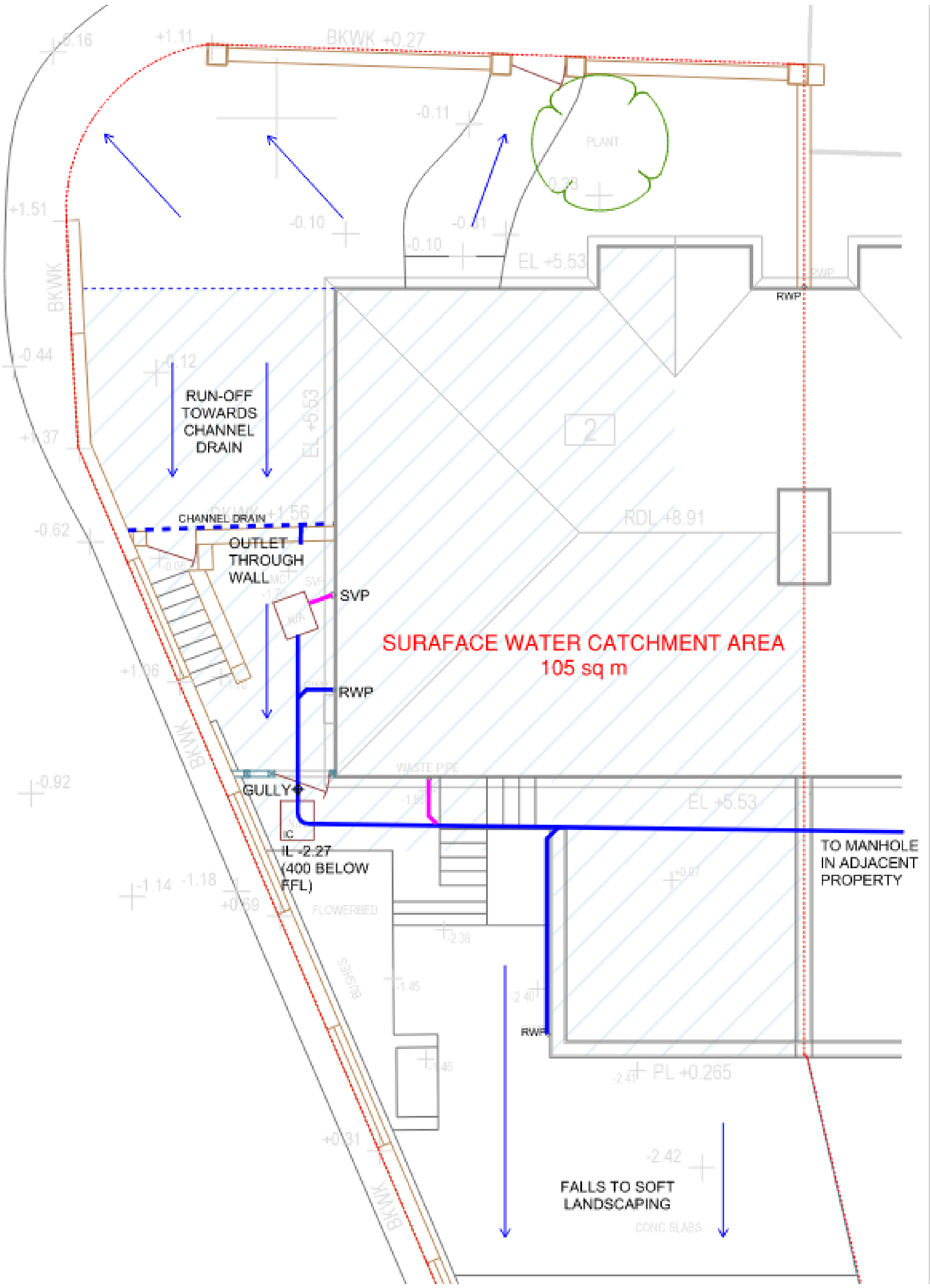


Figure 19: Existing Drainage Plan

The drainage system has been surveyed as shown in Figure 19, and the entire development plot, including paving (via and ACO channel) drains to the local public sewerage system. The drain is found to serve only the development property, so as such, is a private (non-adopted) drain.

The proposed works do not change the current strategy.

7.06 Surface Water and SuDS

The whole site comprises approximately 294.5m^2, of which 215.7m^2 is impervious drained area. Refer to Appendix B for a plan showing hard/soft landscaping for the existing and proposed development.

As previously noted, Local Plan Policy 32 states the following:

Previously developed sites: ensure that peak run-off rates and volumes for the 1 in 100 year event achieve greenfield run-off rates for the same event, unless it can be demonstrated that all opportunities to minimise final site run-off, as close as reasonably practicable to greenfield runoff rates, have been taken in line with the Mayor's drainage hierarchy. In such cases, run-off rates must not exceed 3 times the calculated greenfield rate.

Refer to Appendix D for the catchment area. Refer to Appendix E for the calculation of runoff rates.

The catchment area for the runoff currently discharging to the sewer system is 105m^2 for both the existing site and the proposed development.

For a 1 in 100 year event with 40% uplift for climate change, the runoff is 0.4l/s. The contribution from climate change to this value is 0.1 l/s.

A calculation for the greenfield runoff can be found in Appendix E. Because the impermeable area is so small, the calculation has been run on a scaled area, with the result being scaled down again to obtain a figure for this site. The run-off rate for a greenfield site of the same area is 0.14 l/s. Three times this value gives 0.42l/s. It can be seen that the actual runoff rate for the 1 in 100 year event +40% for climate change is less than 3 times the greenfield runoff rate.

The proposed development does not change the footprint of the main dwelling. As such the proposals will not result in any increase in hardstanding areas and surface water flows (other than for climate change uplift). However, the proposals do afford the opportunity for some simple SuDS measures to be included which will provide a level of betterment when compared to the existing situation.

The proposed development will not affect the quality of the surface water discharge.

7.07 Proposed Method of Surface Water Disposal

As previously noted, The London Plan sets out a hierarchy for the disposal of surface water runoff. Additionally, the Building Regulations Approved Document H sets out a hierarchy of preferred methods for the disposal of surface water runoff (infiltration, watercourse, public sewer). These are considered below:

- **Use Infiltration techniques**

  These are feasible in non-clay areas. As previously noted the superficial deposits are likely to be free draining, and BGS maps indicate that the bedrock is comprised Lewes Nodular Chalk Formation. On this basis, infiltration of surface water could be feasible in this location.

However, Approved Document H (cl 3.25) states that infiltration devices (including soakaways, swales, filter drains etc) should not be built within 5m of a building or road. Refer to Appendix C for a plan indicating the 5m stand-off from the adjacent Rosefield Close and the house. There is only a very small area of remaining garden available for infiltration SuDS, measuring less than 1.4m in width and tapering to zero. With the presence of the adjacent trees in the neighbours garden, excavation in this area would likely impact the root zones. It is also confirmed that previous excavations in this area have not identified suitable porous strata. Given the site constraints, it is therefore not possible to provide a soakaway, so infiltration testing to BRE DG 365 is not relevant.

- **Attenuate rainwater in ponds or open water features for gradual release**

  It is not practical to create a pond or water feature within the garden space due to the size of the garden, and risk it would pose for small children.

- **Attenuate rainwater by storing in tanks or sealed water features for gradual release**

  The constraints of the site mean that there is not sufficient space for attenuation storage above ground. The existing shallow drainage system means it is not feasible to create buried attenuation storage.

- **Discharge rainwater direct to a watercourse**

  There are no known watercourses in the immediate vicinity of the site.

SuDS Options

SuDS aim to mimic natural drainage and can achieve multiple objectives such as removing pollutants from urban runoff at source, controlling surface water runoff from developments, ensuring that flood risk is not increased further downstream and combining water management with green space which can increase amenity and biodiversity value. When selecting SuDS, consideration needs to be given to a range of factors including the ground conditions, type of proposals, and the constraints of the site.

As previously detailed, the proposed development does not change the ratio of hardstanding within the site, nor does it alter the surface water runoff, other than for climate change uplift, and it does not alter the existing drainage system. The constraints of the site limit the SuDS options, however the following option is proposed to provide a level of betterment when compared to the existing situation.

- Rainwater recycling – water butt / storage

Water Butts

In order to provide a level of rainwater recycling, a water butt / storage will be provided. Water butts afford the opportunity to reduce the impact on already stretched potable water supply by enabling future occupants to reuse water collected in the water butt, for example when watering the garden/or washing cars etc. If this supply is used frequently this may also ensure that some additional storage is available during an extreme rainfall event.

SuDS Maintenance

Operation and maintenance schedules are provided below (taken from CIRIA C753 The SuDS Manual): these will be undertaken by the house owner.

- The water butt should be routinely checked for litter – leaves can become trapped in the water butt which could lead to blockage of the taps and overflow. Undertake Monthly.

- Where appropriate, and if safe to do so, the water butt should be cleaned annually to prevent smells associated with stagnant water, and to remove any algae. Undertake Annually.

7.08 Residual Flooding Risk

The planning conditions stipulates the following requirement:

(iv) demonstrate that the 1 in 30 year rainfall event (plus 40% for climate change) can be contained without flooding; any flooding occurring between the 1 in 30 and 1 in 100 year event (plus 40% for climate change) will be safely contained on site; and that rainfall in excess of the 1 in 100 year event is managed to minimise risks.

A 1 in 100 year event (6 hour duration), with 40% uplift for climate change yields a 0.4 l/s runoff rate. This can be dealt with through the existing drainage system. In the event of the drainage system failing, the runoff will discharge towards the soft landscaped areas.

Total volume of runoff from a 6 hour 1 in 100yr event: 8640 litres / 8.64m^3

The garden area where run-off could accumulate: 101m^2 (See Appendix B).

Ignoring any infiltration that would occur over the soft landscaped areas, the depth of water that could accumulate is 86mm. The internal finish floor levels and door thresholds to the existing development are generally 180mm above external FFL level of the main garden. The storage and overland flow suggested is theoretical only and considers what would happen should the drainage system fail or have an exceedance event.

The existing door to the boiler room and store area is located in the upper area of the paving, which is approximately 530mm above the lower paved area / garden area where the runoff would accumulate in the above scenario.

Therefore, the runoff can be safely contained onsite without risk of flooding to the development.

APPENDIX A Environment Agency Flood Map for Planning

Flood map for planning

Your reference	Location (easting/northing)	Created
2Alma	**527333/164313**	**18 Sep 2022 15:00**

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

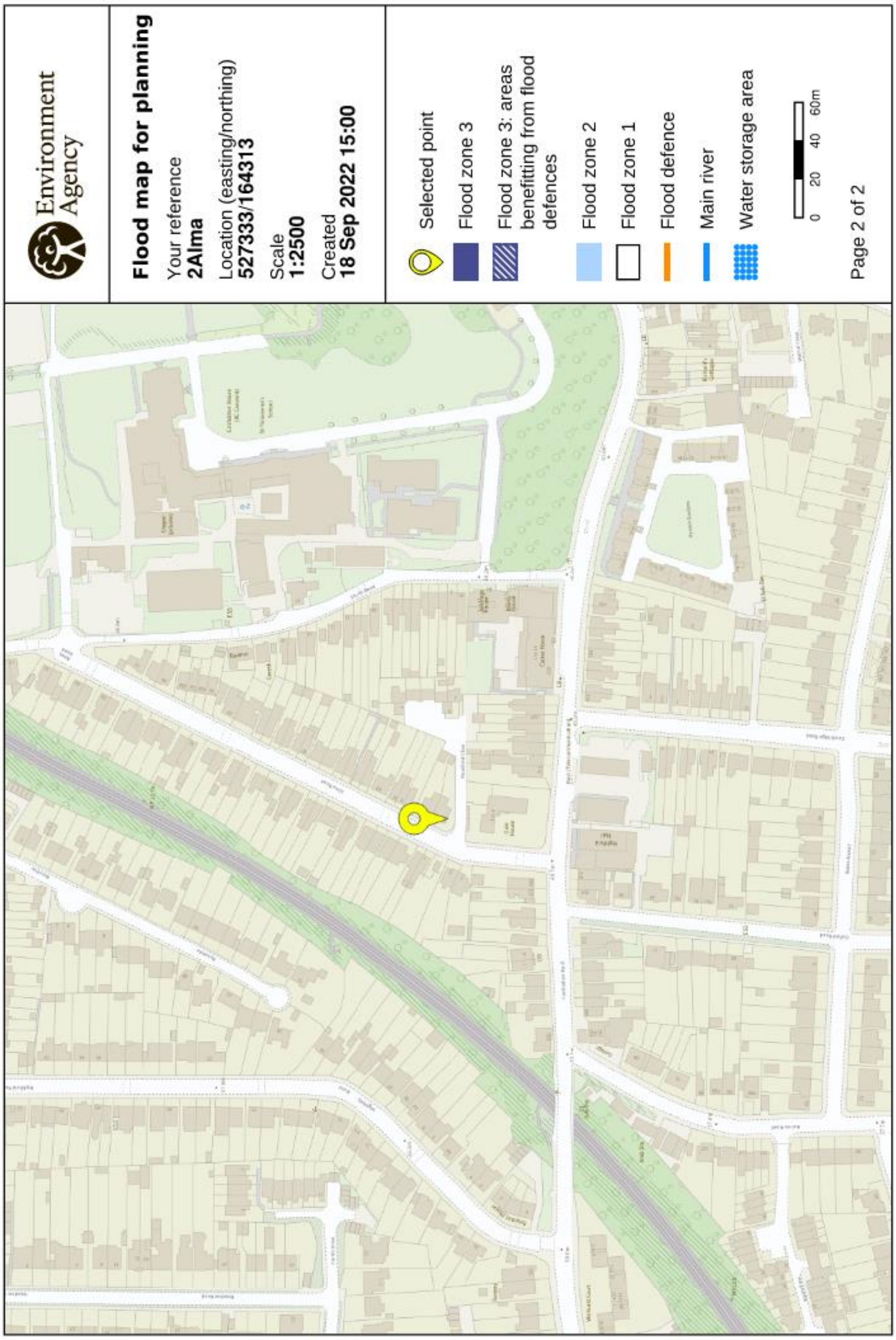
You will need to do a flood risk assessment if your site is **any of the following:**

- bigger that 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

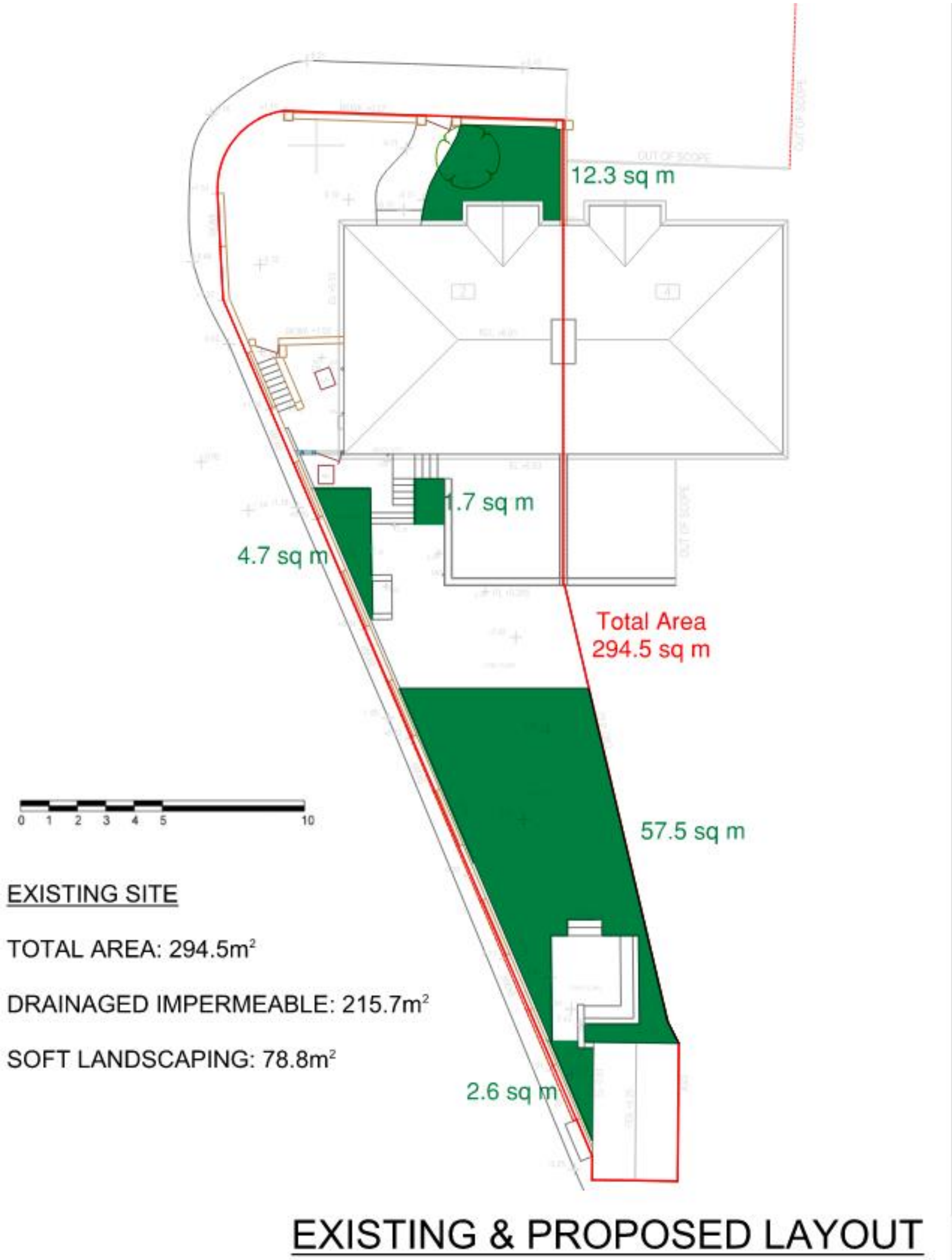
Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

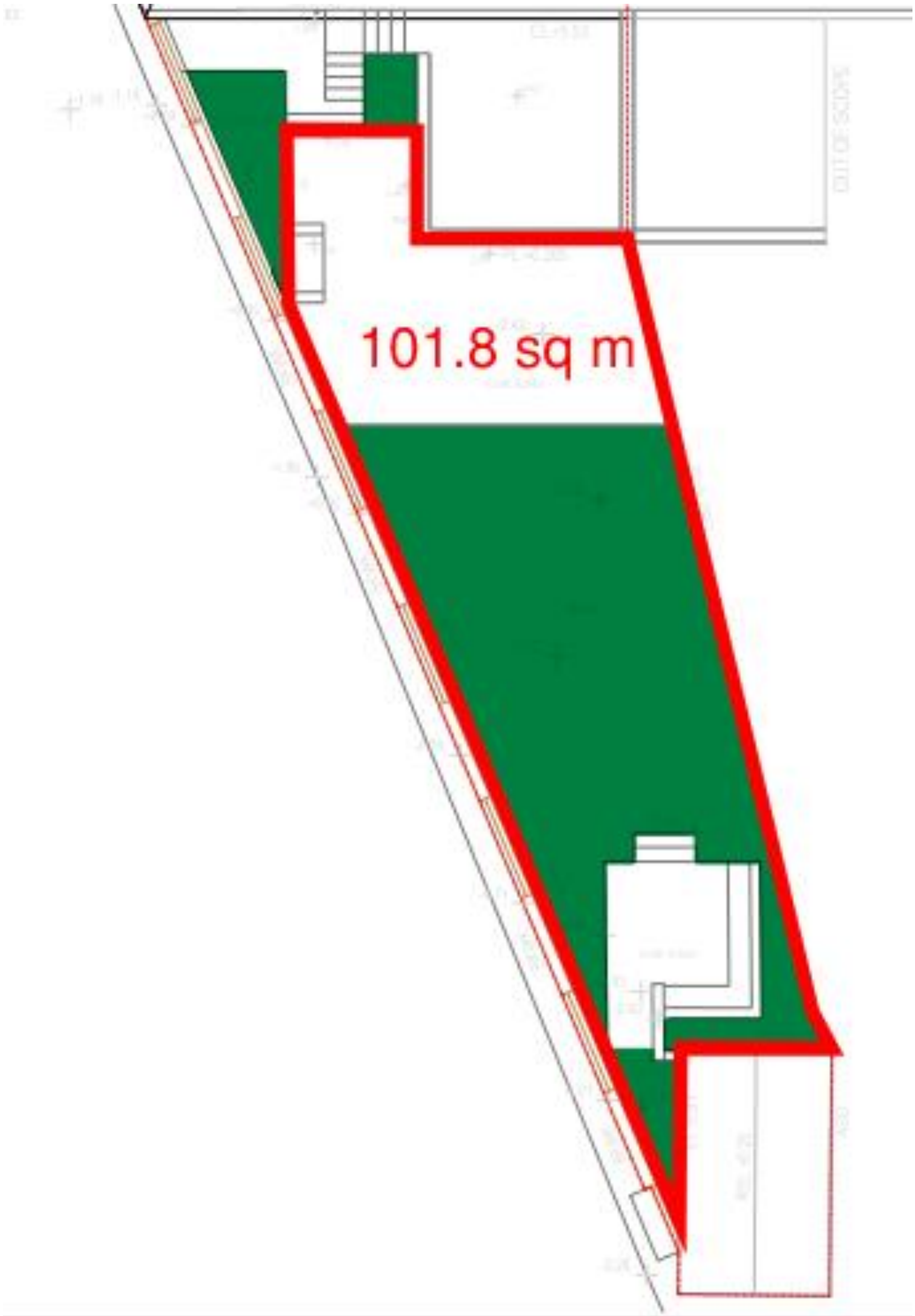

Environment Agency
Flood map for planning
Your reference
2Alma
Location (easting/northing)
527333/164313
Scale
1:2500
Created
18 Sep 2022 15:00
Selected point
Flood zone 3
Flood zone 3: areas benefitting from flood defences
Flood zone 2
Flood zone 1
Flood defence
Main river
Water storage area
0 20 40 60m
Page 2 of 2

APPENDIX B Hard/Soft Landscaping Plan

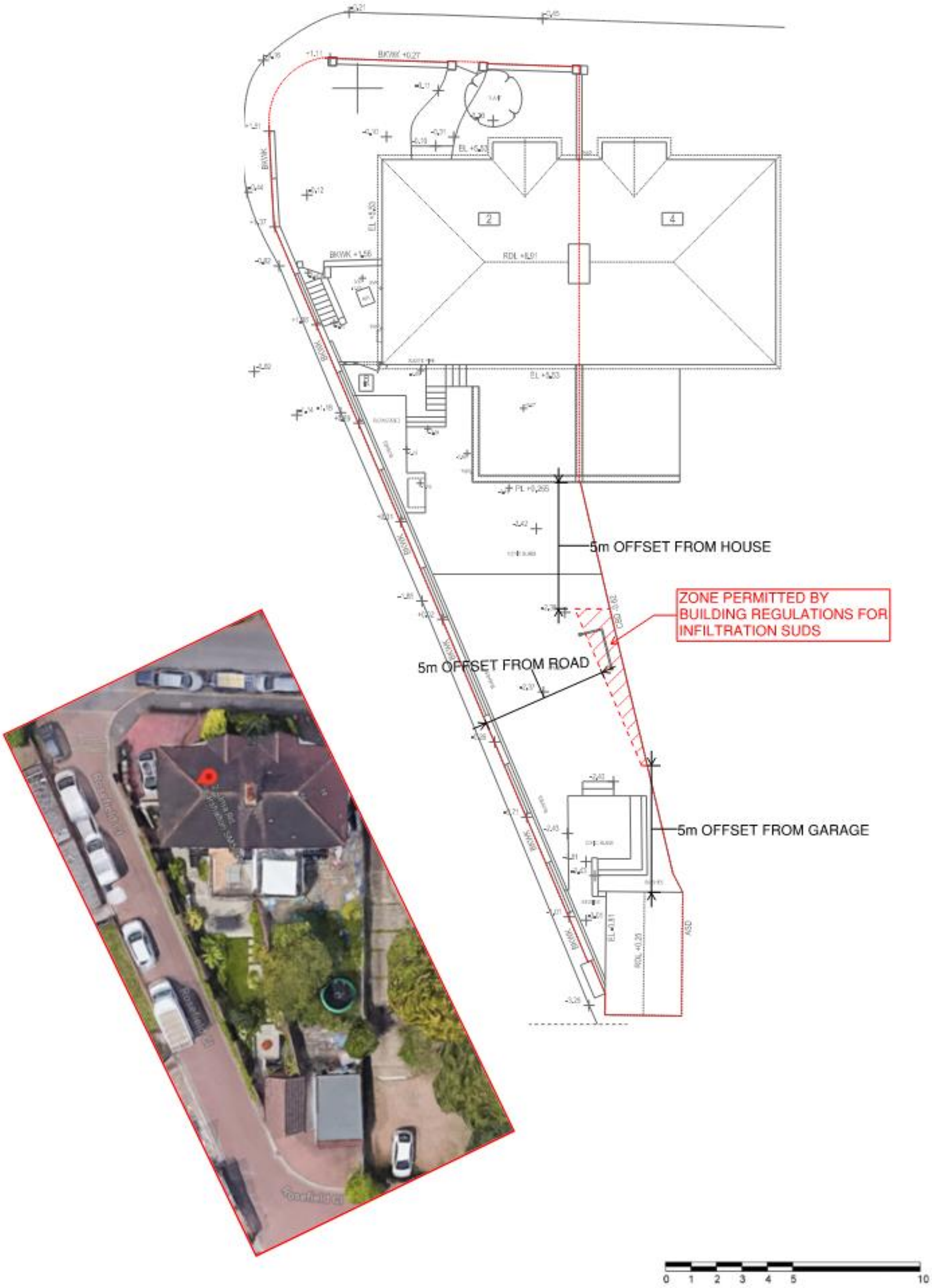


2 ALMA ROAD
HARD/SOFT LANDSCAPING

The following plan shows the area where runoff could accumulate should the drainage system fail:

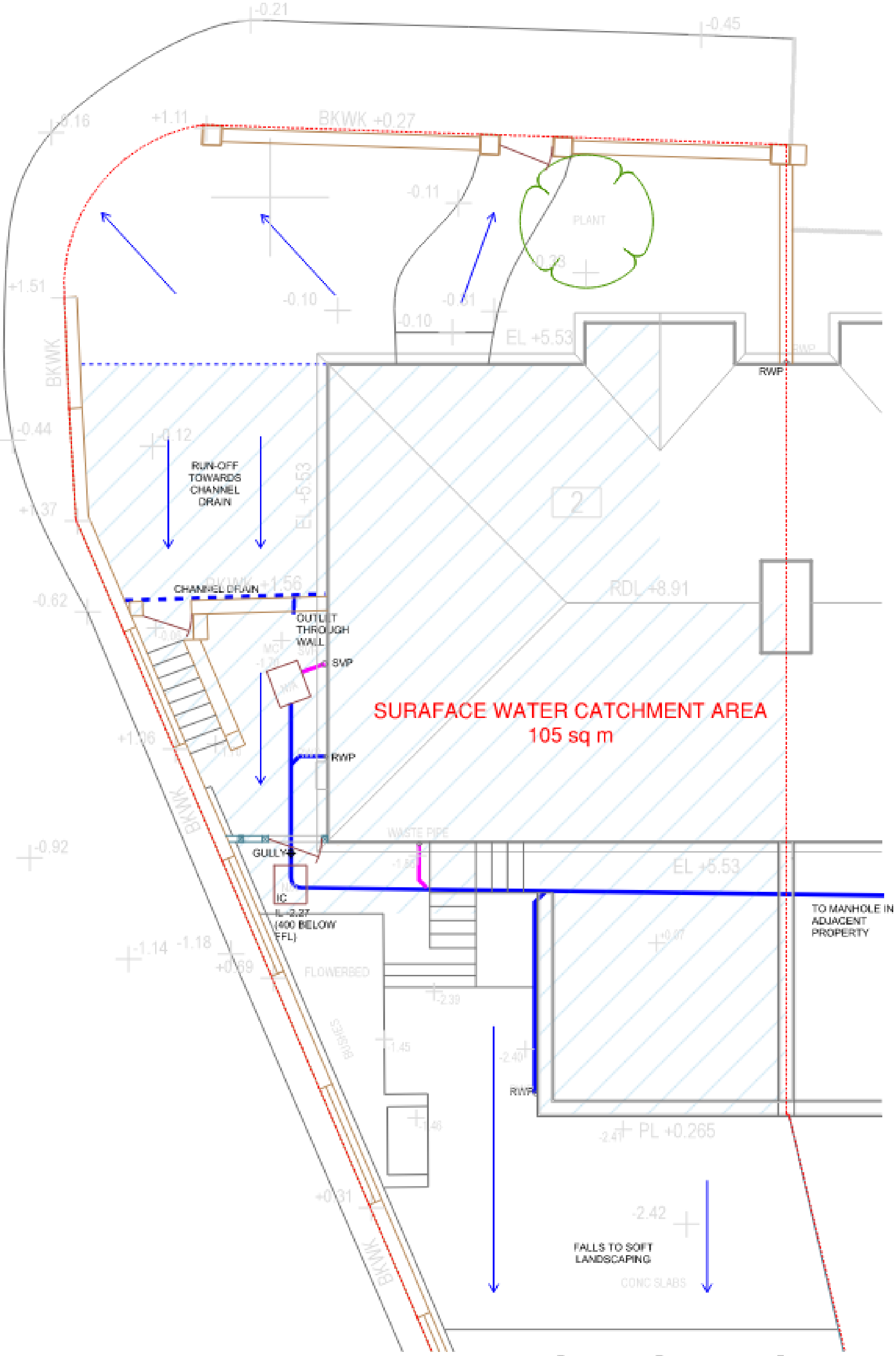


APPENDIX C Building & Road 5m Stand-off Plan



2 ALMA ROAD
5m ROAD AND BUILDING
OFFSET

APPENDIX D Drainage Layout and Catchment Areas



EXISTING LAYOUT

APPENDIX E Surface Water Runoff Calculations

The following calculation has been performed using TEDDS and is in accordance with the Wallingford Procedure:

1in 100 year event, 6 hour duration, 40% uplift for climate change

Design rainfall intensity	
Location of catchment area	London
Storm duration	D = **6** hr
Return period	Period = **100** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.400**
5-year return period rainfall of 60 minutes duration	M5_60min = **20.0** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **40** %
Factor Z1 (Wallingford procedure)	Z1 = **1.60**
Rainfall for 6hr storm with 5 year return period	$M5\_6hr_i = Z1 \times M5\_60min \times (1 + p_{climate})$ = **44.9** mm
Factor Z2 (Wallingford procedure)	Z2 = **1.85**
Rainfall for 6hr storm with 100 year return period	$M100\_6hr = Z2 \times M5\_6hr_i$ = **83.1** mm
Design rainfall intensity	$I_{max} = M100\_6hr / D$ = **13.8** mm/hr
Maximum surface water runoff	
Catchment area	A_{catch} = **105** m^2
Percentage of area that is impermeable	p = **100** %
Maximum surface water runoff	$Q_{max} = A_{catch} \times p \times I_{max}$ = **0.4** l/s

1 in 30 year event, 6 hour duration, 40% uplift for climate change

Design rainfall intensity	
Location of catchment area	London
Storm duration	D = **6** hr
Return period	Period = **30** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.400**
5-year return period rainfall of 60 minutes duration	M5_60min = **20.0** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **40** %
Factor Z1 (Wallingford procedure)	Z1 = **1.60**
Rainfall for 6hr storm with 5 year return period	$M5\_6hr_i = Z1 \times M5\_60min \times (1 + p_{climate})$ = **44.9** mm
Factor Z2 (Wallingford procedure)	Z2 = **1.44**
Rainfall for 6hr storm with 30 year return period	$M30\_6hr = Z2 \times M5\_6hr_i$ = **64.8** mm
Design rainfall intensity	$I_{max} = M30\_6hr / D$ = **10.8** mm/hr
Maximum surface water runoff	
Catchment area	A_{catch} = **105** m^2
Percentage of area that is impermeable	p = **100** %
Maximum surface water runoff	$Q_{max} = A_{catch} \times p \times I_{max}$ = **0.3** l/s

The following greenfield runoff calculation has been performed using Microdrainage. As the impermeable area is small, and the software only reports to 1 decimal place, a larger area (scaled by 10) has been run to obtain a result to two decimal places.

Infrastructure Design Studio		Page 1
31 Dyer Street Cirencester Glos GL7 2PP	2 Alma Road	
Date 12/10/2022 15:00 File	Designed by MDS Checked by MJ	
Causeway	Source Control 2020.1	

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	0.105	Urban	0.000
SAAR (mm)	688	Region Number	Region 6

Results	l/s
QBAR Rural	0.5
QBAR Urban	0.5
Q100 years	1.4
Q1 year	0.4
Q30 years	1.0
Q100 years	1.4

NOTE - SITE SCALED BY 10 TO OBTAIN CLARITY FOR A SMALLER SITE:

1:100YR RUN-OFF = 0.14 FOR 105m²

Calc with actual area – lack of detail due to 1 decimal place reporting.

Infrastructure Design Studio		Page 1
31 Dyer Street Cirencester Glos GL7 2PP	2 Alma Road	Micro Drainage
Date 12/10/2022 14:19 File	Designed by MDS Checked by MJ	
Causeway	Source Control 2020.1	

ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 Soil 0.450
Area (ha) 0.010 Urban 0.000
SAAR (mm) 688 Region Number Region 6

CALC RUN WITH ACTUAL SITE AREA

Results l/s

QBAR Rural 0.0
QBAR Urban 0.0

Q100 years 0.1

Q1 year 0.0
Q30 years 0.1
Q100 years 0.1

OUTPUT ONLY REPORTS TO 1 DECIMAL PLACE