8 Friday Street
Henley-on-Thames
Oxfordshire
[redacted]

Flood Risk Assessment & Drainage Statement

Prepared for

Whitbread Group PLC

Premier Inn
Anchor Springs
Littlehampton

P24-0122

Issue 2 – 10th April 2025

Document History

Issue No.	Description	Date
1	First issue.	03/04/25
2	Updated site plan, appendices updated.	10/04/25

Contents

Appendices

1. Introduction

1.1 This report has been prepared on behalf of Whitbread PLC to accompany a planning application for a proposed Premier Inn Hotel at Anchor Springs in Littlehampton, West Sussex.

1.2 The report assesses flood risk associated with the development proposals and identifies a scheme for the management and disposal of foul water and surface water runoff from the development, following guidance set out set out in the following local & national planning policy documents:

- The National Planning Policy Framework (NPPF) & associated Planning Practice Guidance.
- BS 8533:2017: Assessing and managing flood risk in development – Code of practice.
- Arun Local Plan 2011-2031 – Policy W DM2: Flood Risk & Policy W DM3 Sustainable Drainage Systems (SuDS)
- Arun District Council Final Level 1 & Level 2 Strategic Flood Risk Assessment (SFRA) – v5 November 2016.

2. Site Characteristics

Site Location

2.1 The site is located in Avon Road, Littlehampton and is shown outlined in red in *Figure 2.1* below.

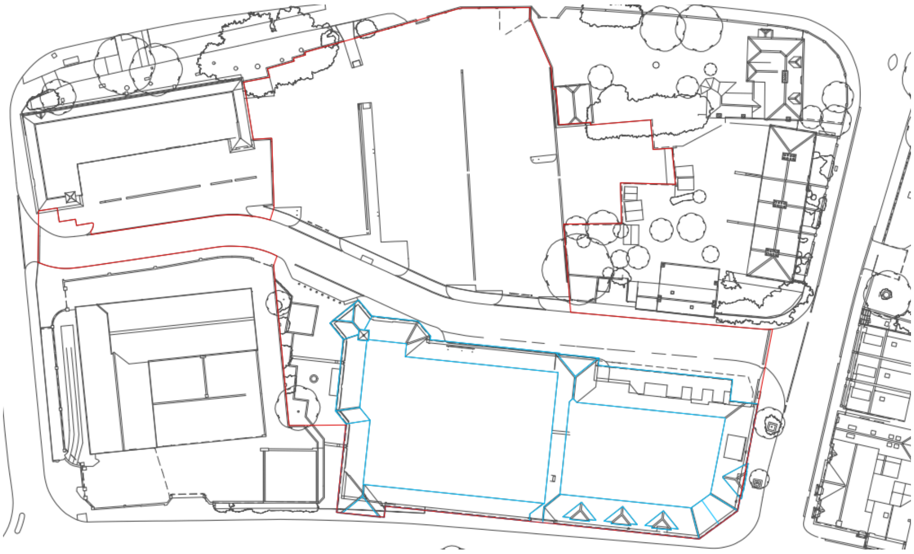


Figure 2.1: Site Location

2.2 The site is centred on Ordnance Survey grid reference TQ 02891 02222 and co-ordinates X: 502891; Y: 102222. The site post code is BN17 6BP.

Site Description

2.3 The proposed development area comprises of the former Waitrose supermarket building located to the south of Avon Road and some surrounding hard landscaping. The area of development is approximately 0.236 Ha

2.4 The planning application boundary also includes Avon Road and the car park to the north of Avon Road, which are retained and re-used.

Topography

2.5 A topographical survey is included in *Appendix A*, which shows the site to generally fall in a south-easterly and easterly direction.

2.6 Existing ground levels along Avon Road are shown to fall from approximately 5.60m AOD in the west at the junction with Duke Street to approximately 2.30m AOD in the east at the junction with East Street.

2.7 External ground levels around the perimeter of the former Waitrose supermarket building are shown to fall from approximately 4.50m AOD in the west to approximately 2.50m AOD in the east.

2.8 Ground levels across the car park are shown to fall from approximately 5.90m AOD in the north-west to approximately 3.60m AOD in the south-east.

Ground Conditions

2.9 A Geo-Environmental Assessment of the site has been carried out by Enzygo Geoenvironmental Ltd and the report, ref. SHF.1995.004.GE.R.002.A dated July 2024 has been prepared to accompany the planning application.

2.10 The Geo-Environmental Assessment comprised a Phase 1 environmental desk study and Phase 2 intrusive investigation consisting of fifteen window sampler boreholes and two trial pits.

2.11 Intrusive investigations were largely inconclusive due to investigations encountering a secondary structure beneath the former Waitrose supermarket ground floor slab that prevented penetration into soils beneath. Additional investigations would be required to confirm ground conditions below the footprint of the building following demolition of the Waitrose supermarket and removal of the existing ground floor slab.

2.12 Proven ground conditions were limited to findings of a single window sampler borehole (WS1) located in the north-western part of the former Waitrose supermarket building footprint and two trial pits carried out in the car park (TP1 & TP2). Ground conditions in these exploratory locations comprise variable Made Ground proven to a depth of 1.40m bgl in areas, over firm or medium dense to very dense River Terrace Deposits [sand, gravel and clay] proven to a maximum depth 3.0m bgl.

2.13 Soakaway tests were carried out as part of the intrusive investigation, which identified the underlying soils to be impermeable, with it not possible to determine a measurable infiltration rate due to insufficient soakage. The soakaway test results are included in *Appendix B*.

<u>Hydrology and Hydrogeology</u>

2.14 *Figure 2.2* below shows a map of source protection zones taken from DEFRA's online Magic Map. These zones show the risk of contamination from any activities that might cause pollution in the area. The map shows the site to be located outside all protection zones.

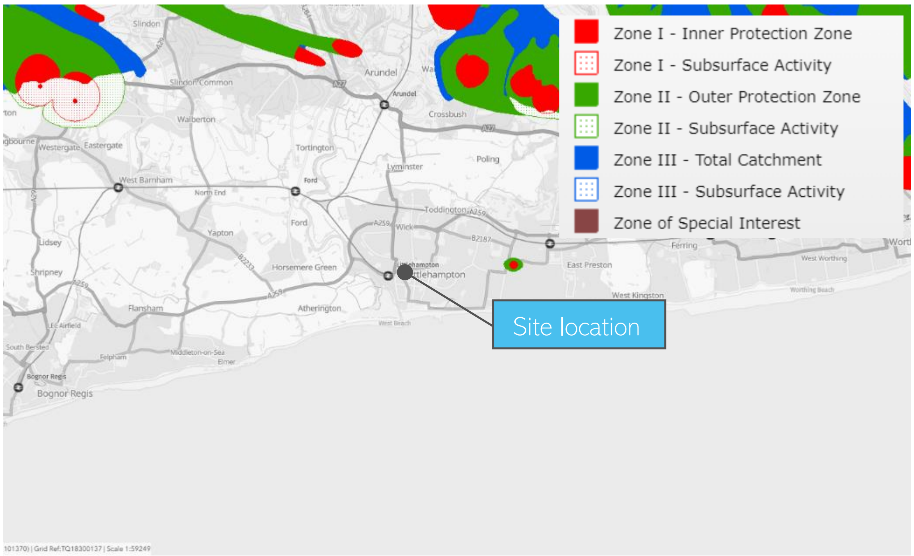


Figure 2.2: Source Protection Zone Map (https://magic.defra.gov.uk)

2.15 *Figure 2.2* and *Figure 2.3* below shows superficial drift and bedrock aquifer designation maps taken from DEFRA's online Magic Map. *Figure 2.3* shows the site to located over a Secondary A drift aquifer. *Figure 2.4* shows the site to be located over a Principal bedrock aquifer.

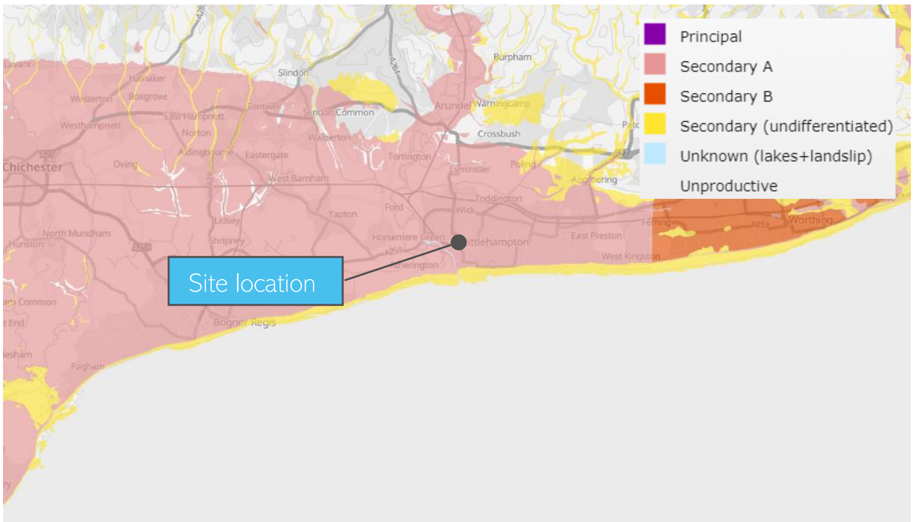


Figure 2.3: Aquifer Superficial Drift Designation Map (https://magic.defra.gov.uk)

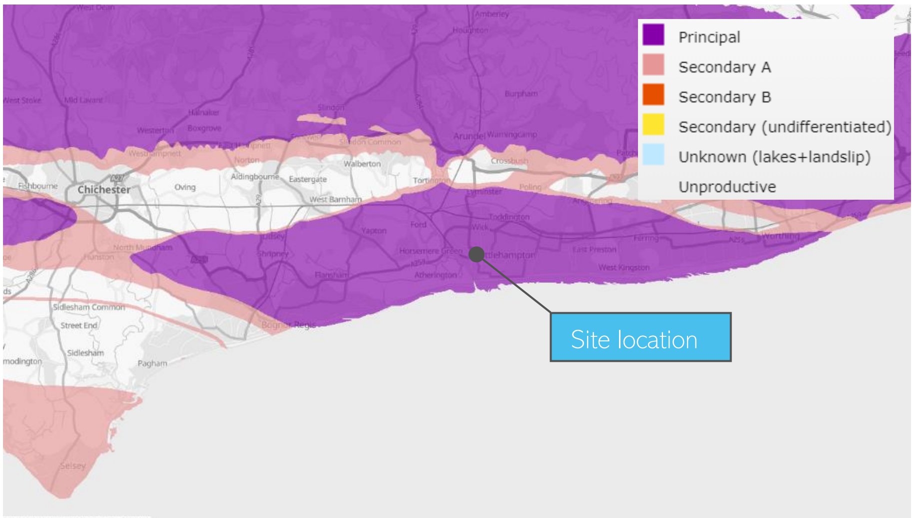


Figure 2.4: Aquifer Bedrock Designation Map (https://magic.defra.gov.uk)

2.16 The EA online main river map shown in *Figure 2.5* below shows the nearest main river to be the River Loddon located approximately 350m to the south-west of the site.

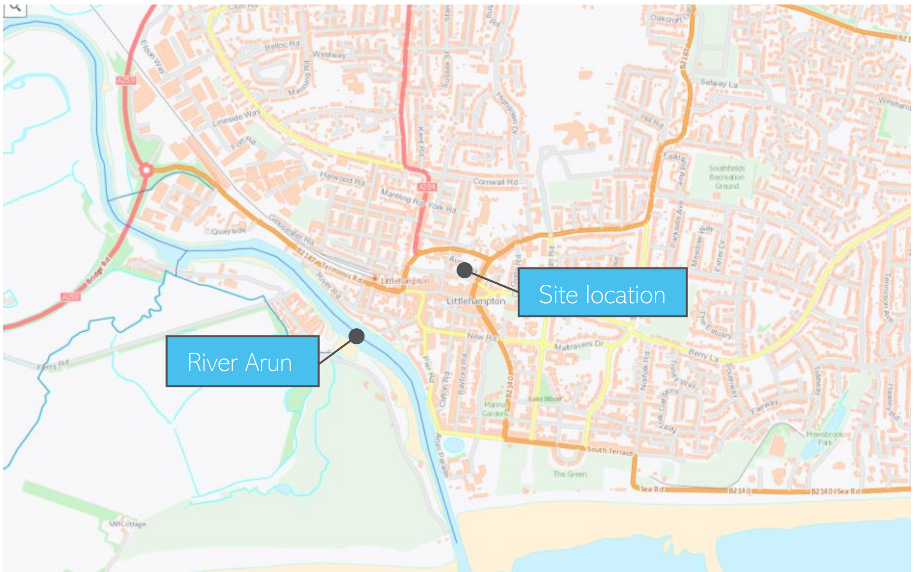


Figure 2.5: Main River Map (https://www.arcgis.com)

2.17 The DEFRA climate change allowance map shown in *Figure 2.6* below identifies the site to be in the Arun and Western Streams Management Catchment.

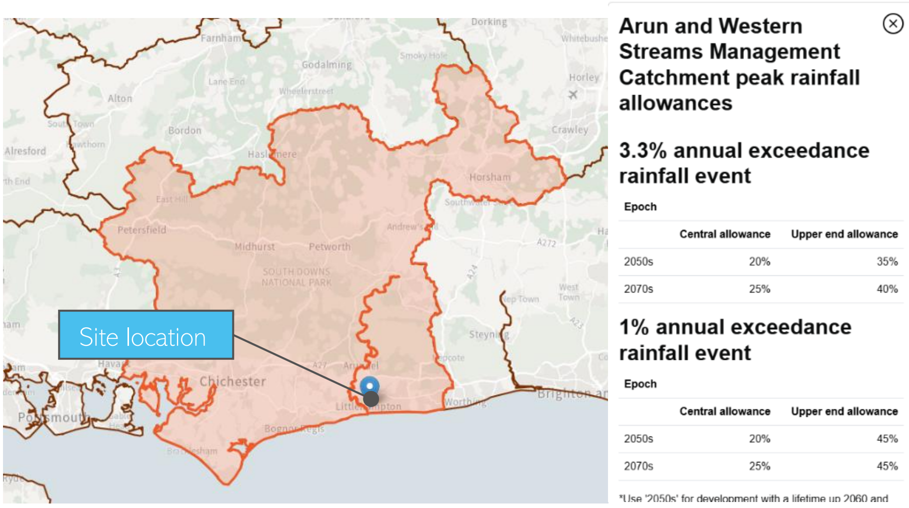


Figure 2.6: DEFRA Climate Change Allowance Map (https://environment.data.gov.uk/hydrology/climate-change-allowances)

<u>Existing Drainage Arrangements</u>

2.18 *Figure 2.7* below shows an extract from Southern Water's sewer records, which indicates the local area to be drained by a network of foul water and surface water sewers.

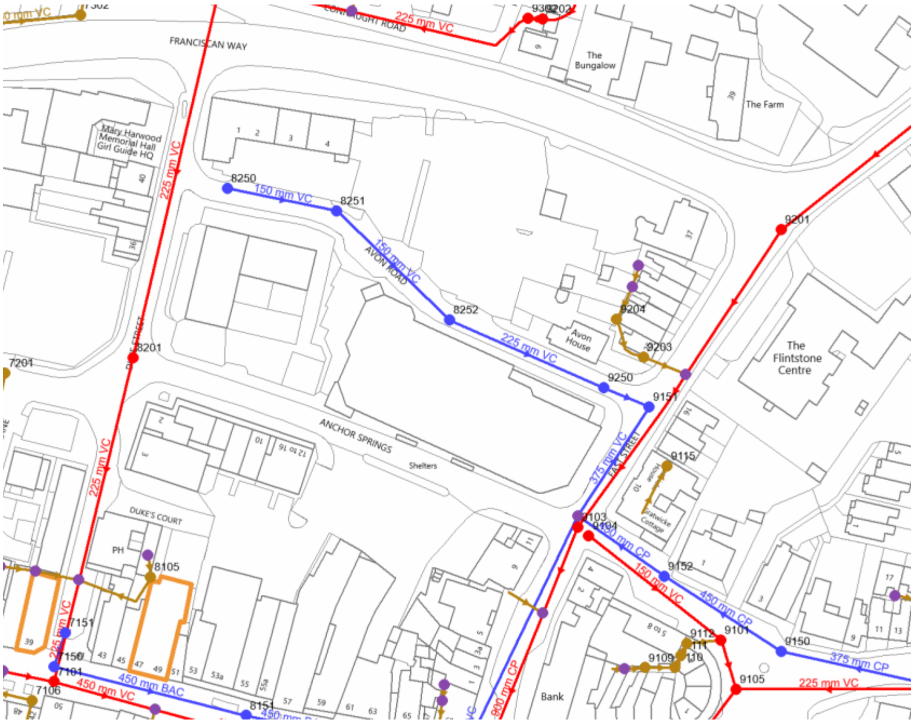


Figure 2.7: Thames Water Sewer Records

2.19 An existing drainage characteristics plan is included in *Appendix B*. The plan is based on drainage survey investigations carried out at the site and identifies the following:

- Foul water runoff from the former Waitrose building discharges to the foul water sewer in East Street via a 150mm Ø outfall.
- Surface water runoff from the former Waitrose building discharges to the surface water sewer in Avon Road via 100mm Ø and 150mm Ø outfalls.
- Surface water runoff from the car park discharges to the surface water sewer in Avon Road via a 225mm outfall.

3. Proposed Scheme

3.1 The proposed development involves demolition of the former Waitrose building and construction of a 130 bedroom Premier Inn hotel, with associated reception lobby, bar and restaurant.

3.2 Avon Road and the existing car park to the north of Avon Road will be retained and reused as part of the development.

3.3 A plan showing the development layout is included in *Appendix C*.

4. Flood Risk & Planning Policy Guidance

National Planning Policy Framework (NPPF)

4.1 At a national level, the NPPF and the Planning Practice Guidance (PPG) to the NPPF seek to ensure flood risk is considered at all stages of the planning process, to avoid inappropriate development in areas at risk of flooding and to direct development towards areas at lowest flood risk. The NPPF retains a risk-based approach to the planning process and uses the Flood Zones as the basis for applying the sequential test, as well as flood risk vulnerability classifications, which define the type of development that is considered appropriate within each zone. It advises local planning authorities to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development or land use proposed.

4.2 The NPPF establishes the Flood Zones as the starting point for assessment with the overarching aim to steer new development to areas with the lowest probability of flooding. Flood Zone maps are available on the GOV.UK website and the definitions of the Flood Zones extracted from the National Planning Policy Framework (NPPF) are described below:

- Flood Zone 1 – Low probability. This zone comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).
- Flood Zone 2 – Medium probability. This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% - 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% - 0.1%) in any year.
- Flood Zone 3a – High probability. This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- Flood Zone 3b – The functional floodplain. This zone comprises land where water has to flow or be stored in times of flood. Typically, land which would flood with an annual probability of 1 in 20 (0.5%) or greater in any year, or is designed to flood in an extreme (0.1%) flood.

4.3 In areas at risk of river flooding, the NPPF advises that preference be given to new development in Flood Zone 1. If there are no reasonably available sites in Flood Zone 1 the flood vulnerability of the development can be considered in locating development in Flood Zone 2 and then Flood Zone 3. Within each flood zone new development should be directed to sites at the lowest probability of flooding from all sources.

4.4 The NPPF advises that when determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment with development only to be allowed in areas at risk of flooding where, in the light of the assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

- within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
- the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;

- it incorporates Sustainable Drainage Systems (SuDS), unless there is clear evidence that this would be inappropriate;
- any residual risk can be safely managed; and
- safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

Local Policy

4.5 The adopted local plan 2011-2031 (July 2018)advises that all of Arun District is at some level of risk from flooding, with large areas within Zones 2 or 3 of the Environment Agency's Flood Map. Much of the coastline, including Littlehampton is currently low lying and protected against erosion and tidal inundation by coastal defences. Parts of the coastal plain are at risk of flooding from watercourses or groundwater due to a high water table.

4.6 The district is covered by a Catchment Flood Management Plan (CFMP) which identifies that as a consequence of climate change, parts of Arun District will be at an increased risk, due to rising sea levels and more extreme weather events.

4.7 Policy W DM2 (Flooding) states "*Development in areas at risk from flooding, identified on the latest Environment Agency flood risk maps and the Council's Strategic Flood Risk Assessment (SFRA), will only be permitted where all of the following criteria have been satisfied:*

a. *The sequential test in accordance with the National Planning Policy Guidance has been met.*

b. *A site specific Flood Risk Assessment demonstrates that the development will be safe, including access and egress, without increasing flood risk elsewhere and reduce flood risk overall.*

c. *The sustainability benefits to the wider community are clearly identified.*

d. *The scheme identifies adaptation and mitigation measures.*

e. *Appropriate flood warning and evacuation plans are in place; and*

f. *New site drainage systems are designed to take account of events which exceed the normal design standard i.e. consideration of flood flow routing and utilising temporary storage areas."*

Level 1 & Level 2 Strategic Flood Risk Assessment (SFRA) – v5 November 2016

4.8 The Level 1 SFRA provides details of sources of flood risk within the local area. The following section of this report reviews flood risk associated with sources of flooding identified by the SFRA and by flood maps available on the Environment Agency's website.

4.9 The Level 2 SFRA forms an integral part of Arun District Council's evidence base, in terms of identifying locations for development and preparation of flood risk policies in the Local Plan, with the primary objective being to help inform site allocations so they are in accordance with the NPPF. Potential development locations were provided by the Council to be assessed in the SFRA. The site is located in one of the development locations known as "*Littlehampton Economic Growth Area*".

4.10 The level 2 SFRA notes the area is predicted to be highly susceptible to fluvial flooding with 10% of the site located within Flood Zone 3b, 59% of the site located with Flood

Zone 3a and a further 4% located in Flood Zone 2. Under climate change, flood risk is predicted to increase in 2031, 2061 and 2111, with corresponding expansion in Flood Zones most notable east of the River Arun (west of the River Arun is largely inundated). Existing defences are present along the River Arun at Littlehampton which is not captured in the Flood Zone flood extents, so it is important to evidence the benefit these provide, and how this can be maintained for the lifetime of development. Breach assessment of the River Arun defences has indicated that large parts of the site are predicted to be at risk of inundation from this flood mechanism and consideration should be given to the management of the residual risk.

4.11 The Level 2 SFRA identifies that Exception Test will be required for development within the Littlehampton Economic Growth Area if:

- Highly vulnerable development is proposed to be located in FZ2;
- More vulnerable or Essential Infrastructure development is proposed to be located in FZ3a or
- Essential infrastructure is proposed to be located in FZ3b.

4.12 Development will not be permitted if:

- Highly vulnerable, More vulnerable and / or Less vulnerable development is located in FZ3b.

5. Sources of Flooding

<u>Historic Flooding</u>

5.1 The Level 1 SFRA advises that Arun District has a long history of flood events, with multiple sources of flooding. It notes , three notable flood events have affected the district in the last 60 years that have been associated primarily with heavy rainfall, high groundwater levels, high river flows and high tides (but not necessarily in combination). The most recent events of 1974, 2000 and 2012 caused widespread flooding in the district after significantly high rainfall over an extensive period.

5.2 The only event to have effected Littlehampton is noted to be February 1983 where flooding of more than 150 properties in Littlehampton was recorded following a tidal surge on 1 February 1983. The site is not identified to have been affected by this flood event.

5.3 *Figure 5.1* below shows a historical flood map from a flood risk screening report obtained for the site. The map shows the site to not have been affected by incidents of flooding recorded in the past by the EA.

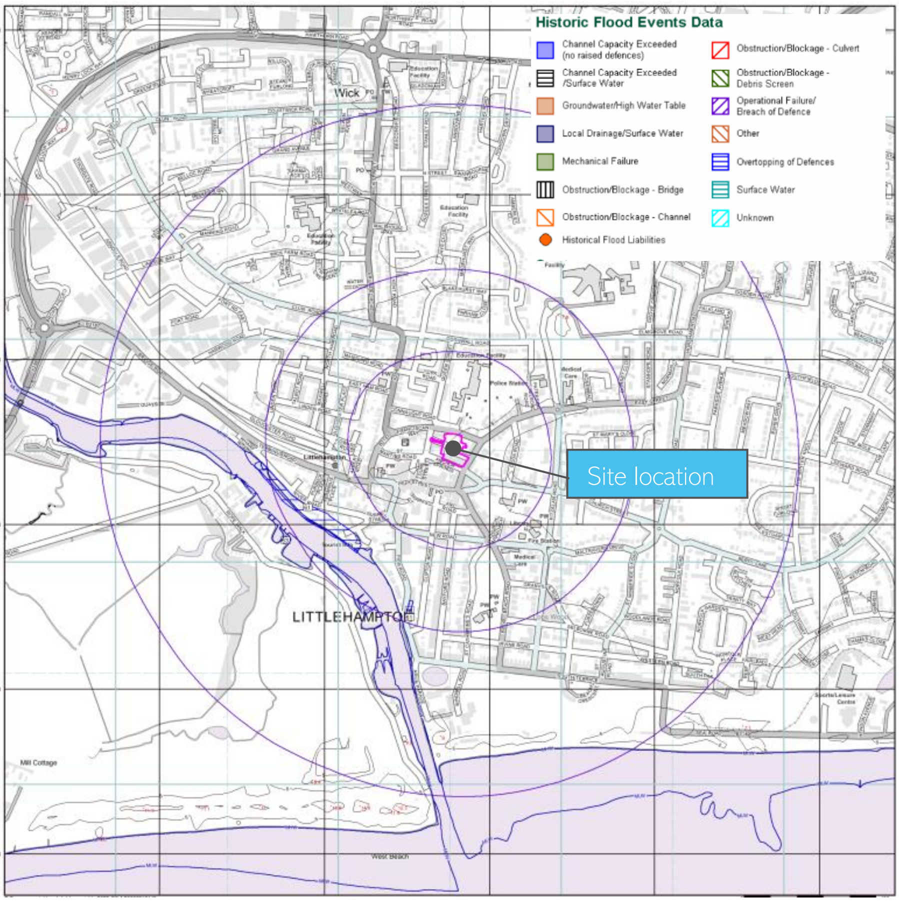


Figure 5.1: Historic Flood Map

5.4 Detailed flood risk data obtained from the EA is included in *Appendix D*. The data notes an additional record of historic flooding on the 1 February 2020, with the sea shown as the source of flooding. Areas affected by the flood event are shown to be located to the west of the River Arun and the site is not shown to have been affected.

Fluvial / Tidal Flooding

5.5 In Section 2 it was identified that the River Arun lies 350m to the south-west of the site. The Level 1 SFRA identifies the River Arun to be a primary source of fluvial flood risk to the district. In addition, Littlehampton is located where the River Arun meets the English Channel and the lower River Arun is also classified as a tidal river and water levels in the lower reaches are affected by tide levels.

5.6 The EA's Flood Map for Planning is the initial dataset used for identifying the location and extent of fluvial / tidal flooding. The map shows England split into three main flood zones linked to fluvial and tidal flooding as defined by the National Planning Policy Framework (NPPF). Flood Zone 3 is additionally delineated into Flood Zone 3a (high probability area) and Flood Zone 3b (the functional floodplain, where water has to flow or be stored in times of flood). Each of the Flood Zones is described in *Table 5.1* below.

Table 5.1: Flood Zone Definitions (as defined in the NPPF)

Flood Zone	Definition	Probability of Flooding
Flood Zone 1	Land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%)	Low Probability
Flood Zone 2	Land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% - 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% - 0.1%) in any year.	Medium Probability
Flood Zone 3a	Land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year	High probability
Flood Zone 3b	Land where water has to flow or be stored in times of flood. Typically, land which would flood with an annual probability of 1 in 20 (0.5%) or greater in any year, or is designed to flood in an extreme (0.1%) flood	Functional floodplain

5.7 *Figure 5.2* below shows the Flood Map for Planning downloaded from the EA's website, which identifies the south-eastern part of the site to be in Flood Zone 3, and thus at high probability of fluvial / tidal flooding.

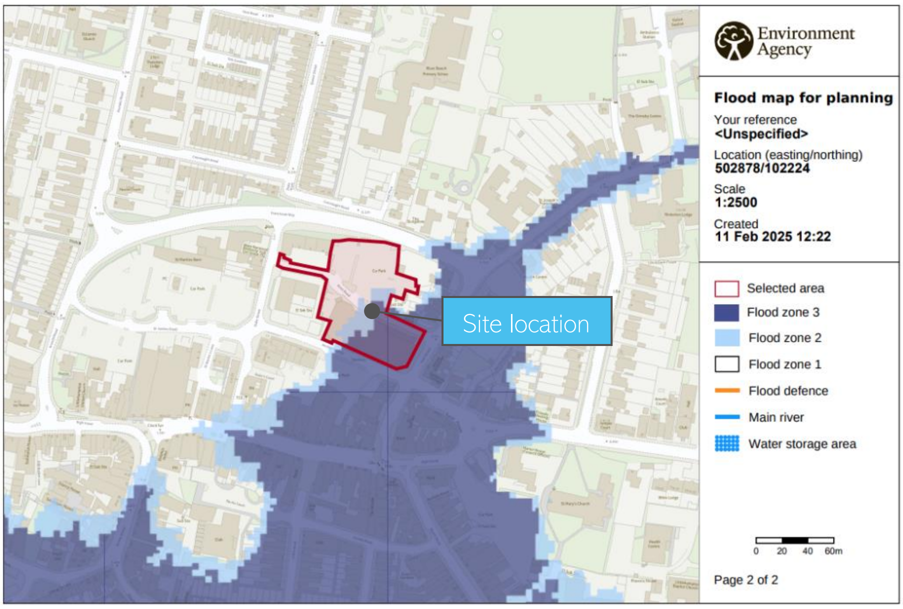


Figure 5.2: Flood Map for Planning

5.8 *Figure 5.3* below shows the EA's flood risk from rivers and sea map. The map takes into account the effect of any flood defences in the area and shows the site and immediate surrounding area to be at very low risk of flooding from rivers and the sea.

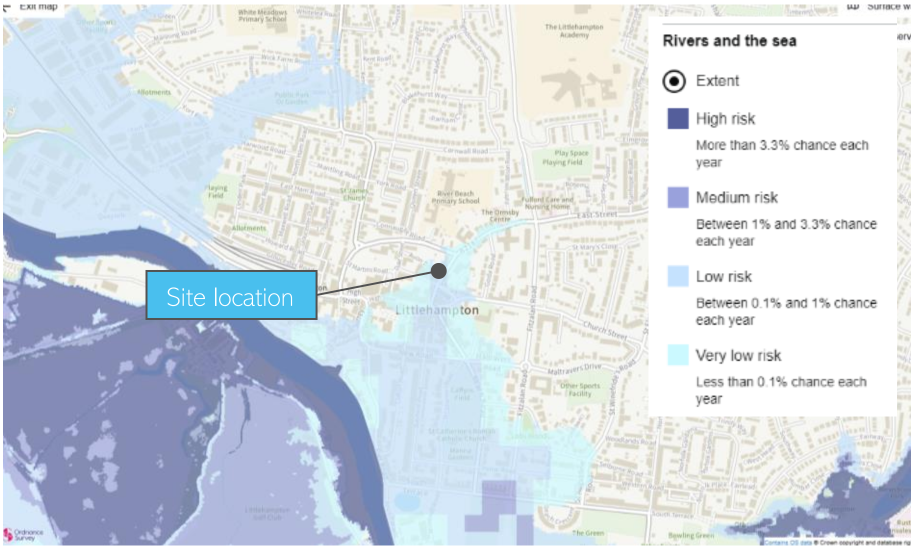


Figure 5.3: Flood risk from rivers and sea map

5.9 The Level 1 SFRA identifies that climate change is predicted to influence the rate of sea level rise, which will influence tidal flood levels. *Figure 5.4* below, shows a Climate Change Flood Zone Map from the Level 1 SFRA. The map shows the site to be south-eastern part of the site to be present Flood Zone 3a with Flood Zone 3a identified to extend in a north-westerly direction in the future scenarios, 2031, 2061 and 2111.

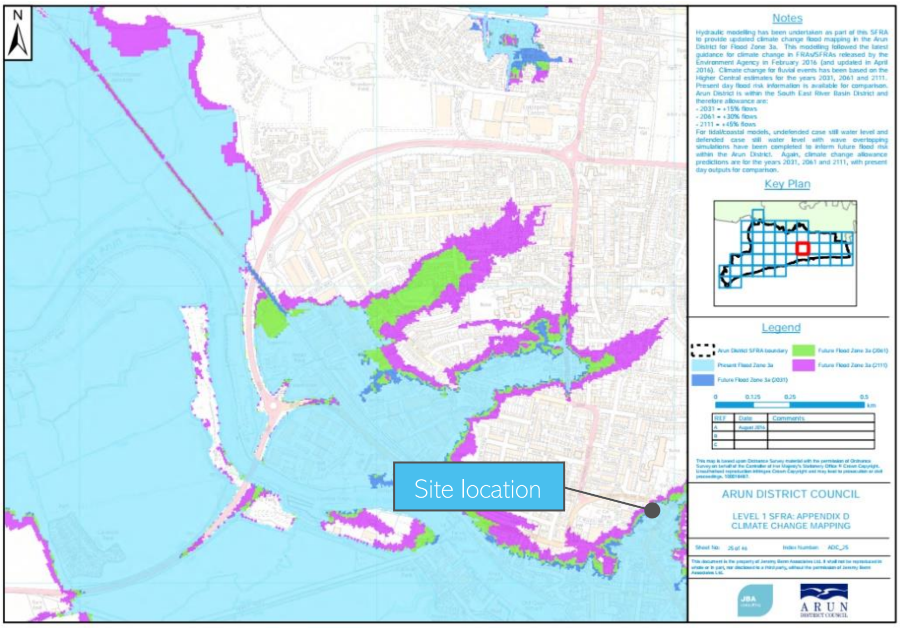


Figure 5.4: SFRA Climate Change Flood Map

5.10 The Level 2 SFRA notes that a variety of raised walls and embankments located along the banks of the River Arun protect the surrounding area of Littlehampton from fluvial and tidal flooding. Actual flood risk therefore differs notably from the Flood Zones. Raised walls constructed by the

EA and privately maintained post-construction are located along the eastern bank of the river that provide a standard of protection up to the 0.33% annual exceedance probability event.

5.11 More detailed flood data has been obtained from the EA and is included in *Appendix D*. The data confirms the presence of coastal flood defences in the form of sea walls that are maintained by the EA and that provide a standard of protection varying from 75 years to 300 years with effective crest levels varying from 3.39m AOD to 4.40m AOD.

5.12 The data received from the EA also includes a set of predicted flood levels and associated flood maps for various Annual Exceedance Probabilities (AEP) at a number of node locations on the site from the Arun Coastal Model, 2012 (Undefended Tidal, 20 August 2012) and the Littlehampton Update 2017 - River Arun Modelling Study (Defended Tidal, 1 March 2017). *Figure 5.5* below shows the node locations.

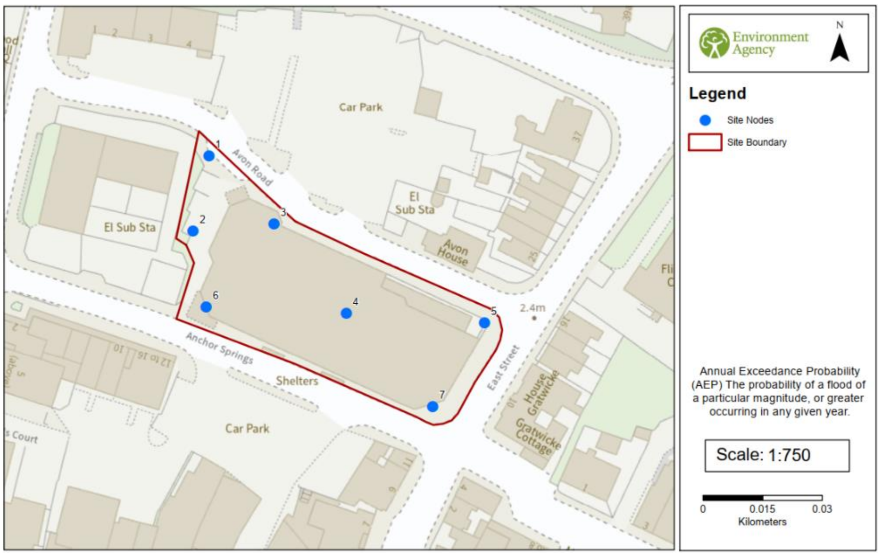


Figure 5.5: Modelled Node Locations

5.13 *Table 5.2* below shows the predicted flood levels at each node for the various Annual Exceedance Probabilities (AEP).

Table 5.2: Modelled Flood Levels

Node	Flood Level (mAOD)							
	0.5%		0.5% (2070)		0.5% (2115)		0.1%	
	Undef.	Def.	Undef.	Def.	Undef.	Def.	Undef.	Def.
1	-	-	-	-	-	-	-	-
2	-	-	-	-	4.94	-	-	-
3	-	-	4.35	-	4.94	-	-	-
4	3.74	-	4.35	-	4.94	3.74	4.05	-
5	3.74	-	4.35	-	4.94	3.68	4.05	-
6	-	-	4.35	-	4.94	-	-	-
7	3.74	-	4.35	-	4.94	3.79	4.05	-

5.14 Where flood levels are not shown at a node location in *Table 5.2*, this is due to existing ground levels been above predicted flood levels. *Figure 5.6* and *5.7* below show extracts from the flood mapping corresponding with the flood level data.

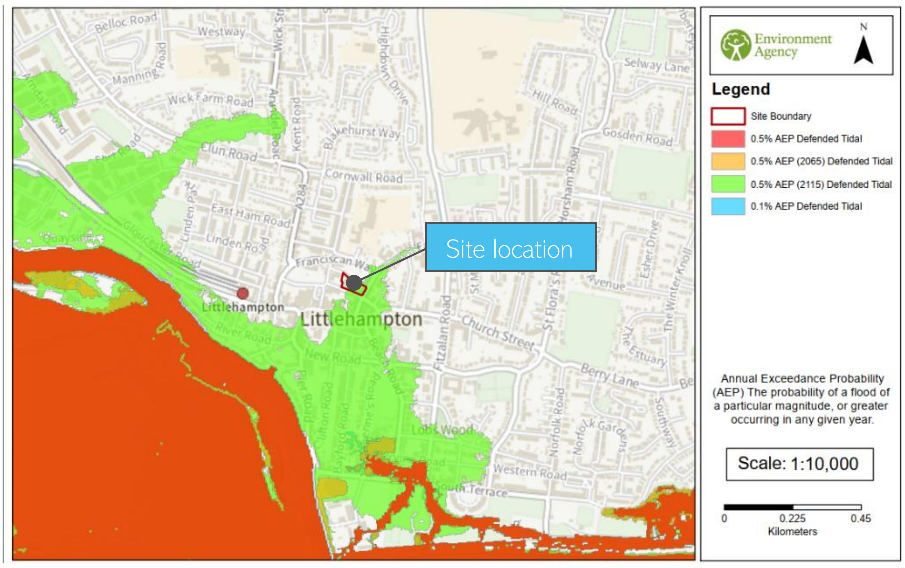


Figure 5.6:Modelled Flood Outlines Undefended (Tidal)

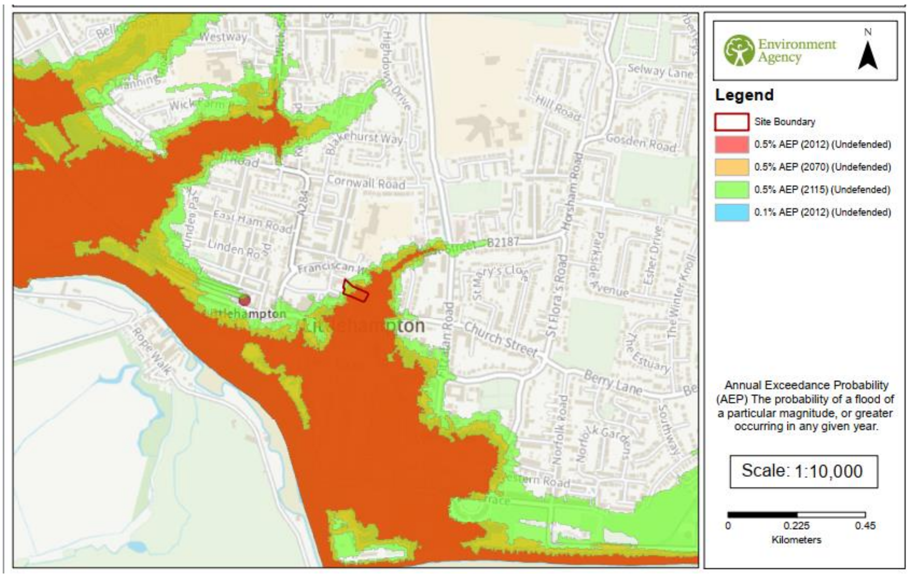


Figure 5.7: Modelled Flood Outlines Defended (Tidal)

5.15 The level data in *Table 5.2* and flood maps show that tidal defences protect the site from all analysed defended flood scenarios apart from the 0.5% AEP (2115) defended event, while the site is shown to be affected by all analysed undefended scenarios, which could represent the situation of a failure in the defences.

5.16 Based on the flood risk data supplied by the EA, the site is assessed to be in Flood Zone 3a and is at risk of tidal flooding. A design flood level of 3.79m AOD for the 0.5% AEP (2115) defended event. Consideration should also be given to the residual risk of flooding above this level associated with undefended scenarios, which could represent the situation of a failure in the defences or a flood event exceeding the design event. Analysed undefended scenarios identify a maximum flood level of 4.94m AOD for a 0.5% AEP (2115) undefended event.

5.17 Mitigation measures would be required to manage the risk of tidal flooding to the development. Typically measures comprise avoidance, resistance and resilience measures, which are generally prioritised in this order as detailed in The May 2007 Communities and Local Government Report "*Improving the Flood Performance of New Buildings*". *Table 5.3* below reviews the options.

Table 5.3: Review of Measures to Manage Tidal Risk

Avoidance Measures

These measures normally involve a sequential approach to locate most vulnerable elements of a development in areas at lowest risk of flooding. However, such measures are not suitable for the scheme as other design factors prevent locating the proposed hotel building in the northern part of the site, which is at lowest risk of flooding.

Avoidance measures can also include raised floor levels. The Level 1 SFRA advises that raised floor levels should be set a minimum of 600mm above the predicted flood level for the 0.5% AEP plus an appropriate allowance for climate change. This would be a level of 4.39m AOD (3.79+0.6m), which is generally well above existing ground levels in the location of the hotel building and would not be feasible to achieve due to restrictions on the height of the building and due to level access requirements needed at access / egress points around the building, with a maximum ground floor level of 3.45m AOD achievable.

However, all sleeping accommodation would be raised well above requirements as it would be provided at first floor level and above, while uses at ground floor level would be restricted to less vulnerable, non-residential uses. First floor levels and above would also a provide protection from the residual risk of greater flood depths in the event of breach or failure of the flood defences as floor levels would be raised above the maximum flood level of 4.94m AOD for a 0.5% AEP (2115) undefended event.

Resistance / Resilience Measures

Where it is not possible to use avoidance measures, resistance and resilience measures can be used to reduce the impact of flooding and speed up restoration times following a flood. Resistance measures are aimed at preventing floodwater ingress into a building, while resilience measures are typically used in situations where it is not possible to prevent flood water from entering a building. Resilience measures therefore typically comprise construction methods and materials that promote easy draining and drying after a flood.

Figure 5.8 below sets out the approach for selecting a resistant or resilient approach, which is based on water depth and identifies that a resistant / water exclusion approach should be adopted when flood depths of up to 600mm are anticipated with a resilient / water entry approach recommended when flood depths of over 600mm are anticipated.

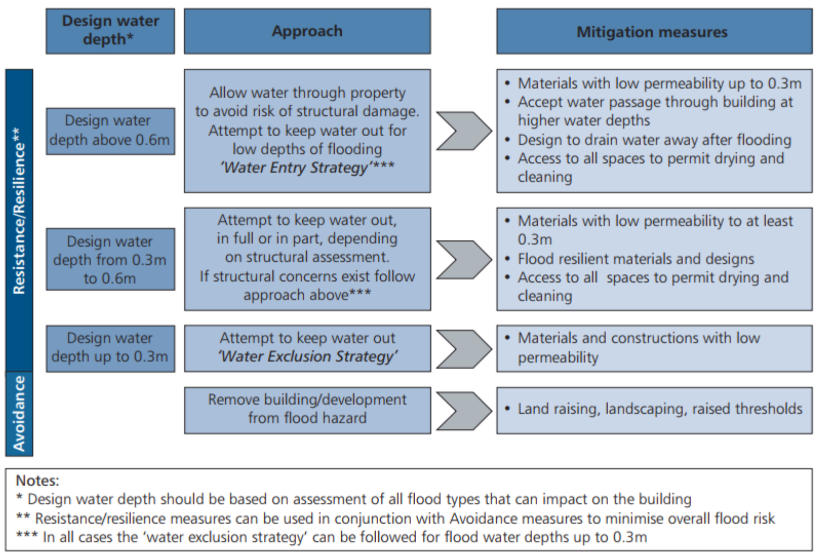


Figure 5.8: Flood Resistance & Resilience Design Approaches

Both approaches are considered appropriate for the design of the ground floor, whereby resistance measures are used up to a level of 0.6m above ground floor level. Resilience measures should then be used above this to take account of the residual risk from greater flood depths in the event of breach or failure of the flood defences for the 0.5% AEP (2115) undefended, where a maximum depth of 1.49m could occur based on a predicted flood level of 4.94m AOD.

5.18 In addition to mitigation measures, safe access and egress from the site should be provided to reduce the residual risks to a development.

5.19 Safe pedestrian access / egress from the hotels main entrance to land outside the floodplain would be available when assessed using the EA's guidance FD2320 for the design flood level of 3.79m AOD for the 0.5% AEP (2115) defended event.

5.20 The EA's guidance FD2320 identifies a calculation of flood hazard to determine safety in relation to flood risk, with flood hazard a function of the flood depth and flow velocity at a particular point in the floodplain along with a suitable debris factor to account for the hazard posed by any material entrained by the floodwater. *Figure 5.9* below shows a table extracted from "FD2320/TR2 - Extended version", which provides an indication of the relationship between flood depth, flood velocity and flood hazard.

HR	Depth of flooding - d (m)												
	DF = 0.5				DF = 1								
Velocity v (m/s)	0.05	0.10	0.20	0.25	0.30	0.40	0.50	0.60	0.80	1.00	1.50	2.00	2.50
0.0	0.03 + 0.5 = 0.53	0.05 + 0.5 = 0.55	0.10 + 0.5 = 0.60	0.13 + 0.5 = 0.63	0.15 + 1.0 = 1.15	0.20 + 1.0 = 1.20	0.25 + 1.0 = 1.25	0.30 + 1.0 = 1.30	0.40 + 1.0 = 1.40	0.50 + 1.0 = 1.50	0.75 + 1.0 = 1.75	1.00 + 1.0 = 2.00	1.25 + 1.0 = 2.25
0.1	0.03 + 0.5 = 0.53	0.06 + 0.5 = 0.56	0.12 + 0.5 = 0.62	0.15 + 0.5 = 0.65	0.18 + 1.0 = 1.18	0.24 + 1.0 = 1.24	0.30 + 1.0 = 1.30	0.36 + 1.0 = 1.36	0.48 + 1.0 = 1.48	0.60 + 1.0 = 1.60	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.50
0.3	0.04 + 0.5 = 0.54	0.08 + 0.5 = 0.58	0.15 + 0.5 = 0.65	0.19 + 0.5 = 0.69	0.23 + 1.0 = 1.23	0.30 + 1.0 = 1.30	0.38 + 1.0 = 1.38	0.45 + 1.0 = 1.45	0.60 + 1.0 = 1.60	0.75 + 1.0 = 1.75	1.13 + 1.0 = 2.13	1.50 + 1.0 = 2.50	1.88 + 1.0 = 2.88
0.5	0.05 + 0.5 = 0.55	0.10 + 0.5 = 0.60	0.20 + 0.5 = 0.70	0.25 + 0.5 = 0.75	0.30 + 1.0 = 1.30	0.40 + 1.0 = 1.40	0.50 + 1.0 = 1.50	0.60 + 1.0 = 1.60	0.80 + 1.0 = 1.80	1.00 + 1.0 = 2.00	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	2.50 + 1.0 = 3.50
1.0	0.08 + 0.5 = 0.58	0.15 + 0.5 = 0.65	0.30 + 0.5 = 0.80	0.38 + 0.5 = 0.88	0.45 + 1.0 = 1.45	0.60 + 1.0 = 1.60	0.75 + 1.0 = 1.75	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.50	2.25 + 1.0 = 3.25	3.00 + 1.0 = 4.00	3.75 + 1.0 = 4.75
1.5	0.10 + 0.5 = 0.60	0.20 + 0.5 = 0.70	0.40 + 0.5 = 0.90	0.50 + 0.5 = 1.00	0.60 + 1.0 = 1.60	0.80 + 1.0 = 1.80	1.00 + 1.0 = 2.00	1.20 + 1.0 = 2.20	1.60 + 1.0 = 2.60	2.00 + 1.0 = 3.00	3.00 + 1.0 = 4.00	4.00 + 1.0 = 5.00	5.00 + 1.0 = 6.00
2.0	0.13 + 0.5 = 0.63	0.25 + 0.5 = 0.75	0.50 + 0.5 = 1.00	0.63 + 0.5 = 1.13	0.75 + 1.0 = 1.75	1.00 + 1.0 = 2.00	1.25 + 1.0 = 2.25	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	3.50	4.75	6.00	7.25
2.5	0.15 + 0.5 = 0.65	0.30 + 0.5 = 0.80	0.60 + 0.5 = 1.10	0.75 + 0.5 = 1.25	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.50	1.80 + 1.0 = 2.80	3.40	4.00	5.50	7.00	8.50
3.0	0.18 + 0.5 = 0.68	0.35 + 0.5 = 0.85	0.70 + 0.5 = 1.20	0.88 + 0.5 = 1.38	1.05 + 1.0 = 2.05	1.40 + 1.0 = 2.40	1.75 + 1.0 = 2.75	3.10	3.80	4.50	6.25	8.00	9.75
3.5	0.20 + 0.5 = 0.70	0.40 + 0.5 = 0.90	0.80 + 0.5 = 1.30	1.00 + 0.5 = 1.50	1.20 + 1.0 = 2.20	1.60 + 1.0 = 2.60	3.00	3.40	4.20	5.00	7.00	9.00	11.00
4.0	0.23 + 0.5 = 0.73	0.45 + 0.5 = 0.95	0.90 + 0.5 = 1.40	1.13 + 0.5 = 1.63	1.35 + 1.0 = 2.35	1.80 + 1.0 = 2.80	3.25	3.70	4.60	5.50	7.75	10.00	12.25
4.5	0.25 + 0.5 = 0.75	0.50 + 0.5 = 1.00	1.00 + 0.5 = 1.50	1.25 + 0.5 = 1.75	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	3.50	4.00	5.00	6.00	8.50	11.00	13.50
5.0	0.28 + 0.5 = 0.78	0.60 + 0.5 = 1.10	1.10 + 0.5 = 1.60	1.38 + 0.5 = 1.88	1.65 + 1.0 = 2.65	3.20	3.75	4.30	5.40	6.50	9.25	12.00	14.75

Flood Hazard Rating (HR)	Colour Code	Hazard to People Classification
Less than 0.75		Very low hazard - Caution
0.75 to 1.25		Danger for some – includes children, the elderly and the infirm
1.25 to 2.0		Danger for most – includes the general public
More than 2.0		Danger for all – includes the emergency services

Figure 5.9: Hazard to People Classification using Hazard Rating

5.21 *Figure 5.9* shows that flood depths up to 300mm would be a very low hazard for velocities up to 0.3m/s. This would be representative of worst-case conditions along the footpath from the hotel to land outside the floodplain to the north of the hotel, where minimum levels along the route are identified to be 3.60m AOD from the topographical survey included in *Appendix A* and where velocities are expected to be less than 0.25m/s due to the area rising steeply out of the floodplain, which is reflected on surface water velocity and hazard mapping. A drawing showing the route and flood depths reducing northwards from the hotels main entrance is included in *Appendix E*.

5.22 The buildings upper floors would provide a second form of management as they would offer a safe refuge for staff and guest in the event of safe access and egress not being possible in flooding conditions.

Surface Water Flooding

5.23 The Level 1 SFRA advises that surface water flooding problems in the district are inextricably linked to issues of poor drainage, or drainage blockage by debris, and sewer flooding.

5.24 The Level 2 SFRA notes that only 5% of the Littlehampton Growth Area is within predicted 30-year or 100-year surface water flooding event extents shown on the EA's risk of flooding from surface water mapping. The mapping provides an understanding of the areas, which may be at greater risk from surface water flooding, with the maps showing critical flow paths and areas situated in topographic depressions that could flood following an extreme rainfall event. *Figure 5.10* below shows a surface water flood risk map taken from the EA's website.

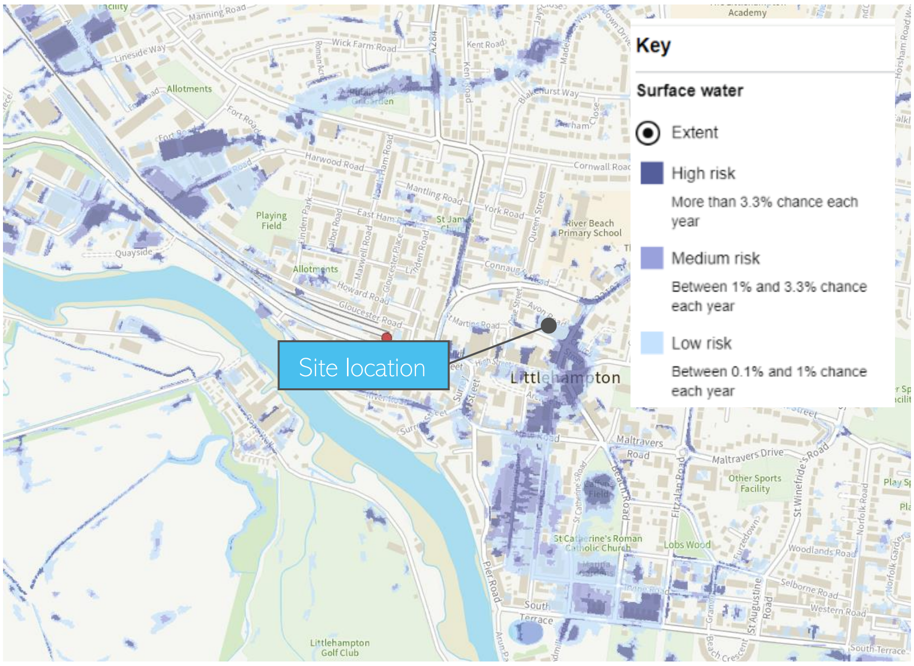


Figure 5.10: Flood Risk from Surface Water Map

5.25 *Figure 5.10* shows East Street, to the east of the site to be at high risk of surface water flooding, but the site itself is shown to be at low risk. Therefore, the risk of site being affected by surface water flooding is assessed to be low.

<u>Groundwater Flooding</u>

5.26 The Level 1 SFRA advises that significant events or groundwater flooding are reported to have occurred in 1974, Winter 1993-1994, Winter 2000-2001, Winter 2002-2003, 2012 and 2013/14.

5.27 The Level 2 SFRA notes that risk of groundwater flood mapping indicates that the Littlehampton Economic Growth Area is within a 1km grid area where the susceptibility to groundwater flooding is >=75%.

5.28 The British Geological Survey (BGS) has produced a national dataset on the susceptibility of groundwater flooding, covering England, Wales and Scotland. The dataset is based on geological and hydrogeological information and can be used to identify areas where geological conditions could enable groundwater flooding to occur and where groundwater may come close to the ground surface. *Figure 5.11* below shows the BGS groundwater susceptibility map with the site location indicated. The site is shown to be in an area where there is potential for groundwater flooding to occur below the surface.

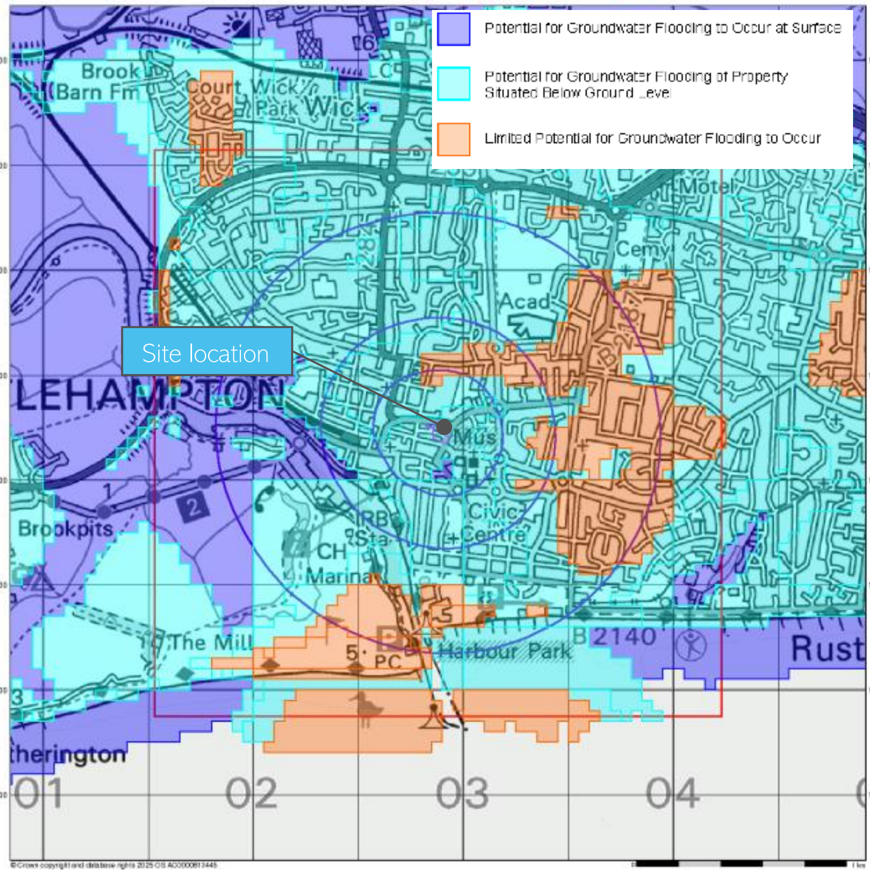


Figure 5.11: BGS Groundwater Susceptibility Map

5.29 GeoSmart information have developed algorithms and calibrated predictions of the risk of groundwater flooding occurring in Great Britain. The resulting map classifies groundwater flood risk for each 5m x 5m into four categories, negligible, low, moderate and high. These classifications are based on the level of risk, combining severity and uncertainty that a site will suffer groundwater flooding within a return period of about 200 years. *Figure 5.12* below shows the GeoSmart Information Groundwater Flood Map. The map indicates the site to be in an area at moderate risk of groundwater flooding.

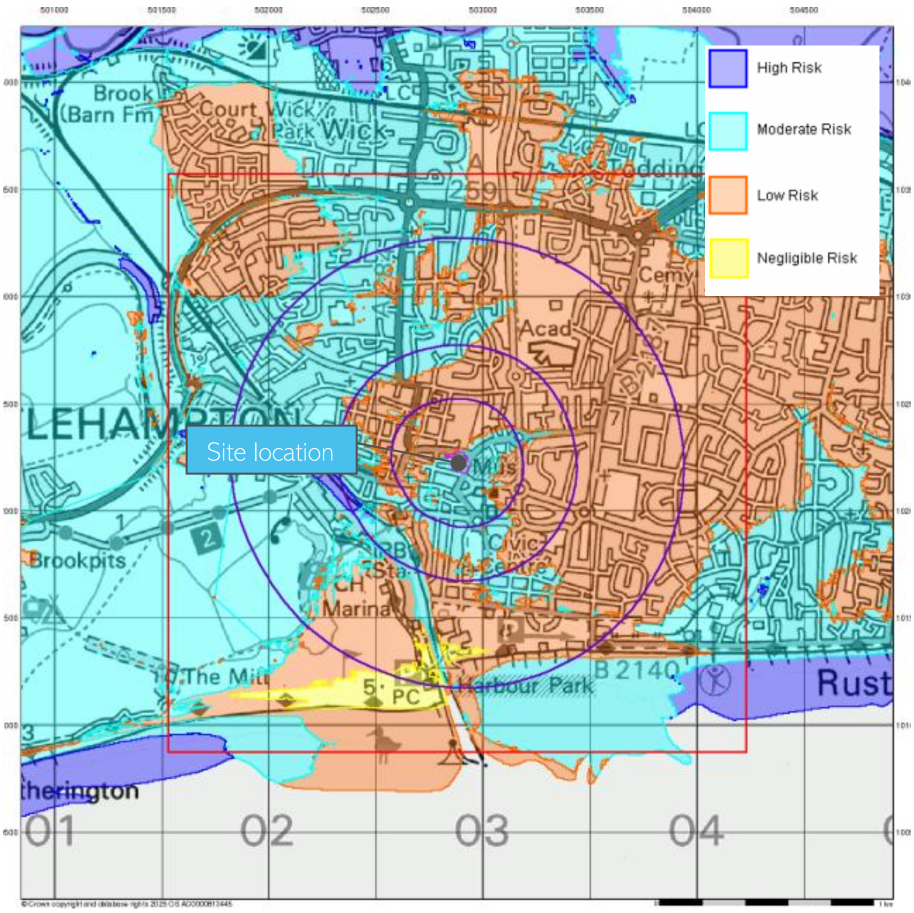


Figure 5.12: GeoSmart Information Groundwater Flood Map

5.30 Based on the review of the SFRA and groundwater flood maps, the site is assessed to be at moderate risk of groundwater flooding with potential for groundwater flooding below the surface. However, it is considered that groundwater flooding would be closely linked to tidal flooding and any measures proposed to manage the risk from tidal flooding would simultaneously address the risk from groundwater flooding.

Sewer Flooding

5.31 The site is not identified to be within one of the most frequently flood postcodes noted in the Level 1 SFRA. In the local post code BN 17 6, the Level SFRA identifies 3 recorded incidents of sewer flooding out of a total of 315 recorded flood incidents in the district based on Southern Water's DG5 register, as of its export on 25th February 2016.

5.32 Sewer flooding is also not identified as a source of flood risk to the Littlehampton Economic Growth Area in the Level 2 SFRA.

5.33 Southern Water have been consulted in connection with the ability of their sewer networks to accommodate foul water and surface water flows from the development. Their correspondence is included in *Appendix F*, which advises that the foul water and surface water sewer networks would have capacity for the development subject to the restriction of surface water flows from the site to a maximum discharge rate of 2.0 l/s.

Flooding from Artificial Sources

5.34 Flooding from artificial sources is most likely to result from burst water mains or from infrastructure failure in an artificial watercourse or water body, i.e., canals or other water features such as reservoirs. These systems are maintained, improved, and regularly inspected by relevant authorities so flood risk from these sources is generally considered to be low.

5.35 The Level 1 SFRA notes that although there are no large reservoirs within Arun District, risk of reservoir flood mapping identifies three reservoirs to impact the district. However, the Level 2 SFRA identifies the Littleworth Economic Growth Area to not be at risk of inundation in the event of reservoir failure. This is consistent with the EA's risk of reservoir flood mapping. The mapping shows all large reservoirs that hold over 25,000 cubic meters of water and displays a realistic worst-case scenario of the largest area that may be flooded if a reservoir were to fail and release the water it holds. *Figure 5.13* below shows the reservoir flood map taken from the EA's website. The map shows the site and surrounding area to not be at risk of reservoir flooding.

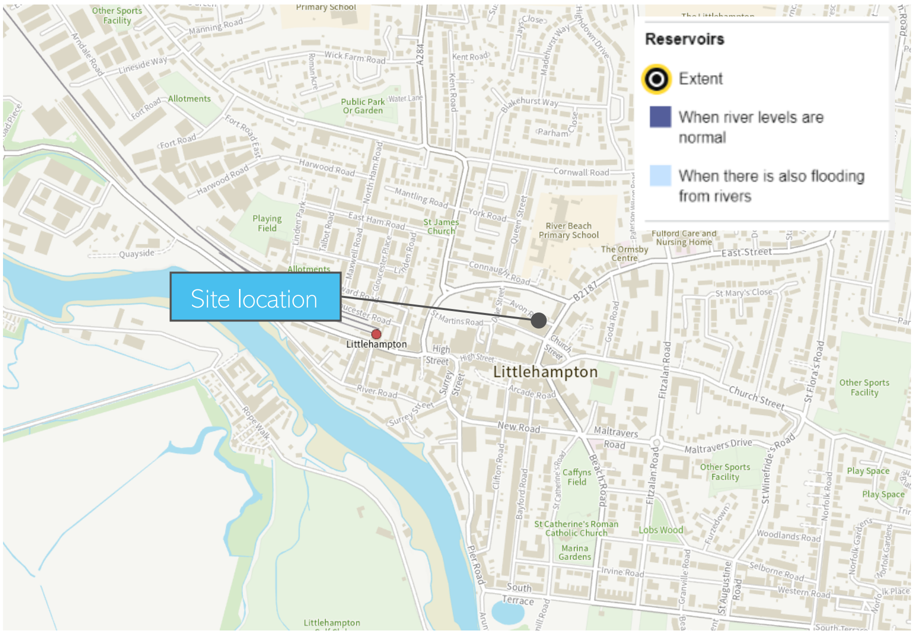


Figure 5.13: Risk of Flooding from Reservoirs Map

5.36 The Level 1 SFRA identifies that there is only one canal located within Arun District SFRA area, the Portsmouth to Arundel Canal, intersecting the centre of the SFRA district between Lidsey, Yapton and Ford. The SFRA notes that the canal is disused, and so is not considered to pose a flood risk. This is consistent with *Figure 5.14* below, which shows a canal failure map extracted from the flood screening report obtained for the site. The map shows the site to not be in an area that could be affected by a canal failure.

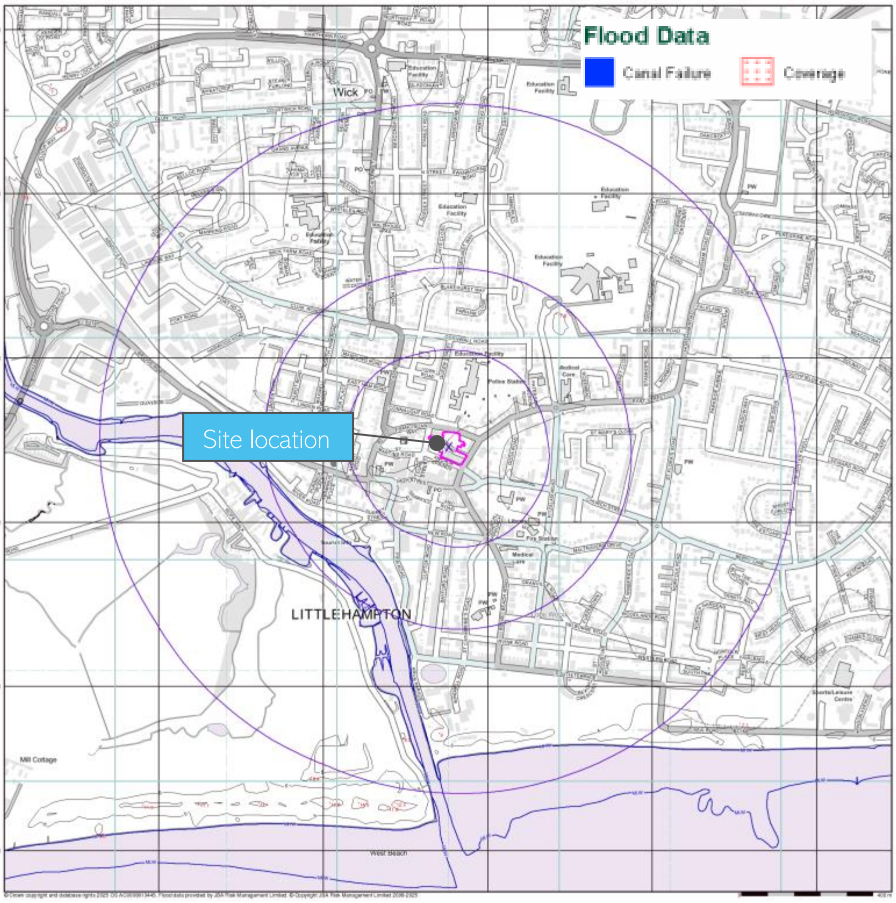


Figure 5.14: Canal Failure Flood Map

5.37 Flood patterns associated with burst water mains would typically be limited to existing roads where watermain infrastructure is normally located, often following similar paths of surface water flooding. This is consistent with *Figure 5.15* below, which shows Southern Water's watermain infrastructure to be generally located in the surrounding road networks. A watermain is shown to cross the existing car park but this is indicated to be an abandoned main and so would not pose a risk to the development.

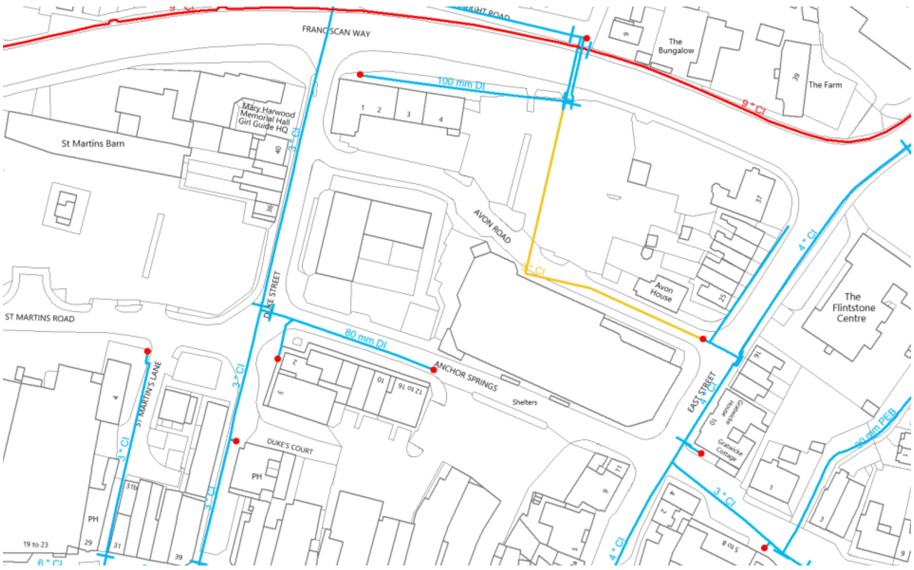


Figure 5.15: Watermain Records

5.38 Based on the review of mapping relating to flooding from artificial sources, the site and immediate surrounding area is not assessed to be at risk of flooding from artificial sources.

6. Managing the Risk of Flooding

6.1 The National Planning Policy Framework (NPPF) Planning Practice Guidance for Flood risk and coastal change National Planning Policy Framework (NPPF) advises that the objectives of a site-specific flood risk assessment are to establish:

- Whether a proposed development is likely to be affected by current or future flooding from any source;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate;
- the evidence for the local planning authority to apply (if necessary) the Sequential Test, and;
- whether the development will be safe and pass the Exception Test, if applicable.

6.2 The objectives are considered below:

Current or Future Flooding from any Source

6.3 Section 5 identified the site to be at high risk of tidal flooding. The site was also identified to be at moderate risk from groundwater flooding. However, it is considered that any measures proposed to deal with the effects of tidal flooding would largely deal with the effects of flooding from groundwater.

6.4 The design flood event and design flood level for the site were established to be: -

- Design flood event - 0.5% AEP (2115) defended event
- Design flood level - 3.79m AOD

6.5 It was identified that consideration should also be given to the residual risk of flooding above the design flood event based on an undefended scenario, which could represent the situation of a failure in the defences or a flood event exceeding the design event. A maximum flood level of 4.94m AOD was identified based on a 0.5% AEP (2115) undefended event.

Potential for Development to Increase Flood Risk Elsewhere

6.6 The main areas where development typically has potential to increase flood risk elsewhere are where development increases building footprint, raises levels within the floodplain or obstructs flood flow paths. This can reduce the floodplains ability to store floodwater and can increase the risk of flooding to neighbouring areas through the displacement of floodwater.

6.7 The proposed hotel building footprint would be substantially smaller than the former Waitrose building that it replaces, so there is no potential for the development to increase flood risk elsewhere.

Flood Risk Management Measures

6.8 Measures are required to manage the risk of tidal flooding to the development, but it is not possible to raise the buildings ground floor level above the design flood level due to restrictions on the height of the building and due to level access requirements needed at access / egress points around the building. Therefore, the following measures are proposed in combination with setting the hotels ground floor level at a maximum level of 3.45m AOD.

- All sleeping accommodation would be provided at first floor level and above, while uses at ground floor level would be restricted to less vulnerable, non-residential uses.

- Flood resistance measures are to be used up to a level of 0.6m above the proposed ground floor level, while resilience measures are to be used above this to take account of the residual risk from greater flood depths in the event of breach or failure of the flood defences. An approach should follow The May 2007 Communities and Local Government Report "Improving the Flood Performance of New Buildings" and could comprise of the
    - Floor construction comprising of a solid ground bearing concrete slab on 1200 gauge damp proof membrane.
    - Reinforced concrete external walls and raised DPC to minimum height of 600mm above ground floor level.
    - Demountable barriers at doors / openings at ground floor level to minimum height of 600mm above ground floor level.
    - Appropriate sealing of all service entries (e.g. with expanding foam or similar closed cell material).
    - Setting of water, electricity and gas meters a minimum of 600mm above ground floor level.
    - Raising of electrical sockets a minimum of 600mm above ground floor level.
    - Suspending of electric ring mains from first floor level with drops to ground floor sockets and switches.
    - Raising of heating systems including boiler units and ancillary devices a minimum of 600mm above ground floor level.
    - Protection of communications wiring for telephone, TV, Internet and other services with suitable flood insulation in the distribution ducts agreed with the service provider.
    - Use of floor finishes with water resilient materials including ceramic or concrete-based floor tiles, stone, and sand/cement screeds.

6.9 A drawing showing the flood risk management approach is included in *Appendix E*.

6.10 In addition to the above measures, safe access and egress conditions would be available for staff and guest in a design flood event, while the buildings upper floors would provide a second form of management as they would offer a safe refuge for staff and guest in the event of safe access and egress not being possible in flooding conditions. A drawing showing the safe access egress route is included in *Appendix E.*

<u>Sequential & Exception Test</u>

6.11 The Level 2 SFRA identifies the site to be in the Littlehampton Economic Growth Area and appropriate for residential uses. Both residential and hotel development are classified as "*more vulnerable*" uses in terms of flood risk, thus the development is considered to have passed the Sequential Test.

6.12 The Level 2 SFRA identifies that the Exception Test is required for "*more vulnerable*" uses in Flood Zone 3a.

6.13 The Exception Test requires it to be demonstrated that:

- development that has to be in a flood risk area will provide wider sustainability benefits to the community that outweigh flood risk; and
- the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

6.14 This flood risk assessment fulfils the second aspect of the Exception Test while a separate Sustainability Report has been prepared to accompany the application, which fulfils the first aspect of the Exception test.

6.15 Policy W DM 3: Sustainable Urban Drainage Systems of the Arun Local Plan 2011-2031 advises that to increase the levels of water capture and storage and improve water quality, all development must identify opportunities to incorporate a range of Sustainable Urban Drainage Systems (SUDS), appropriate to the size of development, at an early stage of the design process. It also advises that both major and minor development proposals must incorporate SUDS within the private areas of the development in order to provide source control features to the overall SUDS design. The following section of this report sets out an assessment of the use of SuDS and how these systems could be used to manage surface water runoff.

7. Surface Water Drainage Scheme

Surface Water Drainage Policy & Guidance

7.1 The Flood and Water Management Act 2010 (FWMA) was introduced with the specific aim of reducing the risk of flooding in England and Wales and improving water management. The Act states that Lead Local Flood Authorities (LLFA), such as Hampshire County Council, must act within the Environment Agency's (EA) national strategy and co-operate with neighbouring authorities to address flood risk in their area and contribute towards the achievement of sustainable development.

7.2 The FWMA states that Sustainable Drainage System's (SuDS) should manage rainwater with the following aims:

- reducing damage from flooding,
- improving water quality,
- protecting and improving the environment,
- protecting health and safety, and
- ensuring the stability and durability of drainage systems

7.3 This has been incorporated into the NPPF and associated PPG, which recommends SuDS are designed to control surface water run off close to where it falls and mimic natural drainage as closely as possible to provide opportunities to:

- reduce the causes and impacts of flooding;
- remove pollutants from urban run-off at source;
- combine water management with green space with benefits for amenity, recreation, and wildlife.

7.4 The PPG goes on to advise that generally, the aim should be to discharge surface run off as high up the as high up the following hierarchy of drainage options as reasonably practicable.

- into the ground (infiltration);
- to a surface water body;
- to a surface water sewer, highway drain, or another drainage system;
- to a combined sewer.

7.5 The March 2015 DEFRA report "Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems" sets out the generic requirements for design of SuDS. It provides requirements for: flood risk outside the development; peak flow control; volume control; flood risk within the development; structural integrity; designing for maintenance considerations; and construction.

7.6 A BREEAM 'Excellent' rating is being targeted by the development. The associated technical manual states that for the achievement of credits relating to surface water runoff *"Surface water run-off design solutions must be bespoke, i.e. they must take account of the specific site requirements and natural or man-made environment of and surrounding the site."*

7.7 In accordance with the hierarchy of drainage disposal options, *Table 7.1* below provides an assessment of each methods suitability.

Table 7.1: Surface Water Runoff Discharge Method

System	Assessment
Into the ground (infiltration)	Soakaway testing carried out as part of a ground investigation identified the underlying soils to be impermeable. The soakaway test results are included in *Appendix B*. Therefore, disposal of surface water into the ground by infiltration is not considered suitable.
to a surface water body	In Section 2 it was identified that there are no watercourses located near to the site. Therefore, disposal of surface water to a surface water body is not feasible.
to a surface water sewer, highway drain, or another drainage system	In Section 2 it was identified that the site currently discharges surface water runoff to a surface water sewer in Avon Road. It is considered feasible to discharge surface water runoff from the development to the surface water sewer in a similar manner to the existing situation. However, surface water discharge rates would need to be restricted in accordance with Arun Council's requirements for restricting surface water discharge rates.
to a combined sewer	As it has been established to be feasible to discharge surface water to the surface water sewer system, it is not necessary to consider the feasibility of surface water disposal to a combined sewer.

7.8 Based on the assessment in *Table 7.1* it has been established to be appropriate to discharge surface water runoff from the development to the surface water sewer network, subject to the restriction of surface water discharge rates in accordance with Arun Council's requirements for restricting surface water discharge rates.

Runoff Management

7.9 It is also necessary to consider Arun Council's requirements for restricting surface water discharge rates. Their requirements are provided in supplementary guidance on their website https://www.arun.gov.uk/surfacewater.

7.10 The guidance states "Discharge to a surface water sewer must be restricted to the estimated mean greenfield runoff rate (Qbar) for all design storm events. The calculations must be based on the positively drained area, rather than the entire greenfield site area. For brownfield sites, the same criteria applies. If it is deemed that this is not achievable, evidence must be provided and flow should be restricted to as close to Qbar as possible, with a minimum requirement of 50% betterment. Flow restriction is to be achieved using a suitable controlled outflow with a minimum outflow of 2.0 l/s, unless otherwise agreed, with satisfactory blockage mitigation measures specified. The storage design must include a climate change allowance."

7.11 Qbar has been estimated to be 0.5 l/s using the ReFH2 FEH method based on the proposed developments positively drained area of 0.218 Ha shown on the drained area drawing in *Appendix G*. *Figure 7.1* below shows the greenfield runoff results.

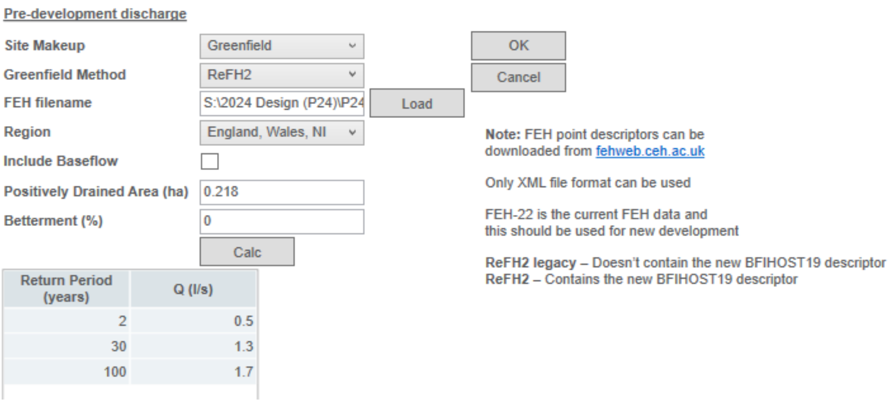


Figure 7.1: Greenfield Runoff Results

7.12 Qbar would be less than a minimum outflow of 2.0 l/s recommended in Arun Councils supplementary guidance as a minimum practicable discharge rate. Therefore, it is proposed to restrict surface water runoff from the development to a maximum allowable discharge rate of 2 l/s, which is consistent with Southern Water's requirements.

7.13 *Table 7.2* below compares the maximum allowable discharge rate of 2.0 l/s to existing brownfield runoff rates for the sites existing positively drained area of 0.236 Ha. The runoff rates have been estimated using the Modified Rational Method Formula based on 360 minute rainfall profiles generated using FEH rainfall data. The calculations are included in *Appendix G* along with a drawing showing the existing positively drained area.

Table 7.2: Maximum Allowable Runoff Rates

Return Period	Maximum Allowable Runoff Rate (l/s)	Existing Brownfield Runoff Rate (l/s)	Betterment (%)
2	2.0	11.2	82.1
30	2.0	23.1	91.3
100	2.0	28.9	93.1

7.14 *Table 7.2* shows that shows that restricting surface water flows from the development to a maximum allowable discharge rate of 2.0 l/s would provide significant betterment when compared against existing brownfield runoff rates, whilst also achieving over 50% betterment for all storm events, in line with Arun Council's restricted discharge requirements for brownfield sites.

7.15 Restricting surface water flows from the development to a maximum allowable discharge rate of 2 l/s would also demonstrate compliance with Pol 03 (Surface Water Runoff) of an associated BREEAM assessment to achieve an 'Excellent' rating as follows:

- The peak rate of run-off from the development shows over a 30% improvement for the developed site compared with the pre-developed site for the 1- year and 100-year return period events, including allowance for climate change.
- The peak rate of run-off from the development is reduced to a limiting discharge less than the pre-development one-year peak flow rate.

Sustainable Urban Drainage Systems (SuDS)

7.16 Within the drainage strategy it is necessary to consider the use of SuDS, which encompass a wide range of drainage techniques intended to minimise the rate of discharge, volume, and environmental impact of runoff and include; green roofs / rainwater harvesting; soakaways / infiltration systems; infiltration trenches and filter drains; permeable paving; swales and basins; ponds and wetlands. *Table 7.3* below provides an assessment of each methods suitability.

Table 7.3: SUDS Assessment

System	Assessment	Suitability
Rainwater Harvesting	Rainwater harvesting is the collection of rainwater runoff for use. Runoff can be collected from roofs and then used in place of mains water for certain applications. In this instance, it is unlikely that rainwater harvesting would contribute to a significant reduction in surface water runoff volumes as the development use would have limited requirement for recycled rainwater. There iso also very limited areas of soft landscaping that will require additional irrigation and any proposed planting would be of 'normal' water demand meaning that whilst some initial irrigation may be required whilst the planting is getting established, there would be no need for additional irrigation in the longer term. Therefore, rainwater harvesting has not been considered as part of the surface water drainage strategy.	✗
Infiltration Systems	Soakaway testing carried out as part of a ground investigation identified the underlying soils to be impermeable. The soakaway test results are included in *Appendix B*. Therefore, disposal of surface water into the ground by infiltration is not considered suitable.	✗
Blue / Green Roofs	Green roofs are areas of living vegetation, installed on the top of buildings, for a range of reasons including visual benefit, ecological value, enhanced building performance and the reduction of surface water runoff. They can be adapted to incorporate blue roof systems beneath, which comprise of a cellular system used to provide further attenuation and storage of surface water. The schemes roof comprises of a flat roof that could normally be considered for blue / green roof systems. However, much of the roof area is used for accommodating mechanical plant areas and solar panels. Therefore, blue / green roof systems would not be suitable for the scheme.	✗
Filter Strips	Filter strips are uniformly graded and gently sloping strips of grass or other dense vegetation that are designed to treat runoff from adjacent impermeable areas by promoting sedimentation, filtration, and infiltration. They are often used as a pre-treatment facility before swales, bioretention systems and trenches and are generally located in landscaping and open space alongside roads and parking areas. The use of filter strips is not possible because of the limited space for soft landscaping.	✗
Filter Drains	Filter drains are shallow trenches filled with stone / gravel that create temporary subsurface storage for the attenuation, conveyance, and filtration of surface water runoff. Generally, these systems are located alongside areas of hardstanding and used in conjunction with other systems. It is likely that filter drains could be used for the collection and conveyance of surface water runoff.	✓
Bioretention Systems	Bioretention systems (including rain gardens / tree pits) are shallow landscaped depressions that can reduce runoff rates / volumes, and treat pollution using engineered soils and vegetation. Generally, these systems are provided in small shared public areas, on car park islands, roundabouts, footpaths, traffic calming and pedestrian zones (streetscapes). Areas of proposed soft landscaping could be considered for bioretention systems.	✓
Permeable Pavements	Permeable pavements provide a pavement suitable for pedestrian and/or vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying structural layers. The water is temporarily stored beneath the overlying surface before it soaks into the ground or is collected by a filter drain where ground conditions do not permit infiltration and systems are lined with an impermeable geomembrane. Permeable pavements could be considered for the development although areas of new paving are limited to areas of	✗

	hard landscaping surrounding the building, which would be preferable to drain using bioretention systems.	
Swales	Swales are shallow, flat bottomed, vegetated open channels designed to convey, treat, and store runoff. They are generally suited for managing runoff from roads because they are a linear feature and easily incorporated into the roadside space. They are also suitable for managing runoff from car parks and other impermeable and permeable areas. Swales are normally incorporated into landscape and public open spaces, as they tend to demand significant land-take due to their shallow side slopes, which restricts their use and would make them impractical for incorporation into the development.	✗
Basins / Ponds	Basins are large, landscaped depressions that are normally dry except during and immediately following storm events, while ponds are features with a permanent pool of water that provide both attenuation and treatment of surface water runoff. The systems are generally strategically located in areas of open space and are designed to temporarily store runoff associated with extreme rainfall events while it is released at controlled rates. The scheme has been designed to make efficient use of the available land appropriate to the site and its context. Whilst environmental objectives have been taken into consideration, areas of soft landscaping are limited with no areas available for basins or ponds.	✗
Attenuation Tanks	Attenuation tanks comprise below ground storage systems that temporarily store runoff associated with extreme rainfall events while it is released at controlled rates. It would normally only be appropriate to consider their use where site constraints preclude the use of other methods or where they offer specific benefits in facilitating the delivery of SuDS design criteria for a site. A below ground storage tank could be located beneath the developments yard for the attenuation of surface water runoff associated with extreme rainfall events.	✓
Proprietary Treatment Systems	Proprietary treatment systems are manufactured products that remove specified pollutants from surface water runoff. They are especially useful where site constraints preclude the use of other methods or where they offer specific benefits in facilitating the delivery of SuDS design criteria for a site. Proprietary treatment chambers in conjunction with petrol interceptors could be used to treat surface water runoff from the development prior to discharging to the surface water sewer system.	✓

Surface Water Drainage Strategy

7.17 Based on the assessment in *Table 7.3*, a surface water drainage strategy has been developed for the site and is shown on the drainage scheme drawing included in *Appendix H*. Construction details for the drainage scheme are also included in *Appendix H*. A description of the proposals is provided below and.

- Surface water runoff from the development would be discharged to the surface water sewer in Avon Road via an existing connection fitted with a flow control chamber that would restrict surface water flows from the development to a maximum allowable discharge rate of 2.0 l/s.

- Runoff would be conveyed by a traditional network of below ground pipework that is designed to surcharge into a below ground attenuation tank located in the area of hard/soft landscaping between the hotel building and Avon Road. The attenuation tank provides capacity to store runoff on site for a required 1 in 100 year rainfall event with 45% allowance for climate change.

- The attenuation tank is shown to be laid on a protective geotextile filter fabric and wrapped in an impermeable geomembrane to prevent groundwater from entering.

- The attenuation tank has been fully co-ordinated with the soft landscaping design with areas of planting above the attenuation tank designed as bioretention areas with 850mm minimum planting depth and filtration / protective geotextiles including drainage layer. These areas will also drain areas of surrounding hard landscaping, which have been designed with falls towards the areas of planting as shown by design contours on the drainage scheme drawing.
- Remaining areas of hard landscaping are shown to be drained using linear drainage channels to prevent runoff from discharging on to the public highway. The linear drainage channels are shown to in turn discharge to the network of below ground pipework.
- All roofwater runoff is shown to be drained by rainwater down pipes to the network of below ground pipework.
- The network of below ground pipework is shown to discharge through hydrodynamic proprietary treatment chambers, which would prevent silt and sediment from entering the attenuation tank.

Hydraulic Analysis

7.18 The Causeway Flow storage estimate tool was used to initially estimate the required storage volumes for the development and provisionally size strategic attenuation features. The estimate indicated an attenuation volume of between 173m³ to 224m³ would be required for a 1 in 100 year event including for 45% climate change allowance using the following variables:

- FEH 2022 data
- CV's of 1.0 (winter & summer)
- Maximum allowable discharge rate of 2.0 l/s
- Measured drained area of 0.218 Ha.

7.19 *Table 7.4* below provides a summary of the storage volumes provided by the surface water drainage scheme and shows that the total storage volume would be just below the minimum storage estimate for the 1 in 100 year event including for 45% climate change allowance.

Table 7.4: Storage Volume Summary

Element	Footprint/Cross sectional area (m^2)	Depth/Length (m)	Porosity	Storage Volume (m^3)
Attenuation Tank 1	180	0.5	0.95	85.5
	144	0.5	0.95	68.4
Attenuation Tank 1 total				153.9
Attenuation Tank 1 filter drain material	36	0.5	0.30	5.4
Attenuation Tank 1 filter drain pipe	0.07	36	1.00	2.5
Attenuation Tank 1 filter drain total				2.9
Attenuation Tank 2	15	1.0	0.95	14.3
			Total	171.1

7.20 There would be additional storage within the pipe network itself which is not accounted for within *Table 7.4*. This explains why the attenuation volumes are slightly below the storage estimate range.

7.21 The capacity and hydraulic characteristics of the surface water drainage network has been assessed in its entirety by fully simulating the network using Causeway Flow for the following rainfall events and based on the variables identified in 7.18.

- 1 in 2 year event
- 1 in 30 year event and 1 in 30 year event including 40% allowance for climate change
- 1 in 100 year event and 1 in 100 year event including 45% allowance for climate change

The climate changes allowances have been established from the DEFRA climate change allowance map shown in *Figure 2.6* in Section 2.

7.22 Arun Council's supplementary guidance identifies that a 10% allowance for urban creep should be applied to network models. However, creep is generally associated with housing developments to allow for potential minor extensions and positively drained areas that may be created post development. Given the development occupies the sites full footprint, there would be no potential for creep and therefore it has not been included in the design calculations.

7.23 The results of the analysis are included in *Appendix I*, which should be read in conjunction with pipe numbering shown on the drainage scheme included in *Appendix H* and the drained area plan included in *Appendix G*.

7.24 The results show that the system would control and store surface water runoff from the development to the proposed restricted rate of discharge of 2.0 l/s for all analysed storm return periods up to and including 1 in 100 year event with 45% allowance for climate change.

<u>Exceedance</u>

7.25 Overland surface water flows resulting from exceedance of the drainage system's capacity or resulting from a blockage should be managed in a manner that minimises the risks to people and the property. Finished levels for the scheme have been designed with this in mind and are shown on the finished level scheme included in *Appendix M*.

7.26 The drainage scheme drawing shows hardstanding areas surrounding the building to be designed with falls away from the building, which would protect the building from overland exceedance flows. Plans showing pre and post development exceedance flow paths are included in *Appendix J*. The plans show that exceedance flow paths would be directed away from the hotel building and that the development would not result in any changed to the routes of exceedance flow paths compared to the existing situation.

7.27 The impact of a surcharged outfall has been assessed for a 1 in 30 year rainfall event and the simulation results are included in *Appendix K*, which identify that surface water flooding would not occur from the system for such an event if the sites outfall was surcharged.

7.28 *Table 7.5* below shows the half drain times from the system for a variety of rainfall events and identifies that the half drain time would be less than 24 hours for all analysed rainfall events.

Table 7.5: System Half Drain Time

Rainfall Event	Half Drain Time (Minutes)
1 in 10	624
1 in 10 + 45%	672
1 in 30	664
1 in 100	720
1in 100 + 45%	900

<u>Structural Integrity</u>

7.29 Components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the design life of the development, considering the requirement for reasonable levels of maintenance.

7.30 The proposed geocellular storage tanks would be located beneath non trafficked areas of hard and soft landscaping designed with levels that provide a minimum cover depth of 0.95m. *Table 7.6* below shows cover depth requirements for a typical geocellular attenuation tanks system and identifies that the provided cover depth would be sufficient.

Table 7.6: Typical Geocelluar Attenuation Tank Cover Requirements (GEOlight by SDS Limited)

GEOlight Spec	Min Cover (mm)
800	400
600	500
400	600

7.31 A ground investigation did not encounter groundwater to a depth of investigation of 3m below ground level. The invert of the attenuation tank is 2m below ground level and so at least 1m above groundwater levels. Nevertheless attenuation tank has been checked for vulnerability to flotation with sufficient weight from soil, or other covering placed over the tank to counter any buoyancy uplift force from the rising groundwater level.

7.32 Uplift forces and soil weight forces associated with the minimum cover depth of 0.95m have been calculated below, which confirm that there would be sufficient weight from soil cover to counter any buoyancy uplift force from the rising groundwater level.

Uplift force $= Yw(kN/m^3) \times dw(m)$
$= 10 \times 0.95$
$= 9.5\ kN/m^2$

Soil Weight $= ds(m) \times Ys(kN/m^3) \times 0.8$
$= 0.95 \times 16 \times 0.8$
$= 12.2\ kN/m^2$

7.33 Full construction details for the drainage scheme are included in *Appendix H*.

<u>Water Quality</u>

7.34 The CIRIA C753 SuDS Manual 2015 sets out requirements for delivering appropriate levels of treatment to surface water runoff using SuDS. *Table 7.6* below identifies that the proposed SuDS components would have a total pollution mitigation index exceeding the recommended pollution hazard index for sources of surface water runoff on the development, thus confirming the SuDS components would provide suitable treatment of surface water runoff.

Table 7.7: Pollution Mitigation Assessment

Runoff Source	Pollution Hazard Index			SUDS Component	Mitigation Index		
	TSS	Metals	TPH		TSS	Metals	TPH
Roof	0.3	0.2	0.05	Hydrodynamic Treatment Chamber	0.8	0.5	0.7
Hard Landscaping	0.5	0.4	0.4	Hydrodynamic Treatment Chamber	0.8	0.5	0.7
Hard Landscaping	0.5	0.4	0.4	Bioretention Planter	0.8	0.8	0.8

<u>Amenity / Biodiversity</u>

7.35 The development proposals would incorporate new mutli-functional planting as shown on the drainage scheme drawing included in *Appendix H*. The planting is fully integrated and co-ordinated with the surface water drainage system and would maximise the amenity and biodiversity benefits over the existing situation.

Maintenance

7.36 The surface water drainage system would be private and would be maintained by Premier Inn's estate maintenance team. A drainage maintenance and management plan has been prepared for the site and is included in *Appendix L*. The plan would be incorporated into the developments Operation and Maintenance Manual. The as-built drainage system would be operated and maintained by the maintenance team in accordance with the regime set out in the plan on occupation of the development.

8. Foul Water Drainage Scheme

8.1 Southern Water have confirmed that the existing public sewer network can accommodate foul water flows from the development. Correspondence received from Thames Water is included in *Appendix F*.

8.2 A foul water drainage scheme has been developed for the site and is shown on the drainage scheme drawing included in *Appendix H*. The foul water drainage scheme would comprise of a traditional network of below ground pipework discharging to Southern Water's foul water sewer in East Street via the sites existing connection.

8.3 The foul water drainage system would be private and would be maintained by Premier Inn's estate maintenance team. A drainage maintenance and management plan has been prepared for the site and is included in *Appendix L*. The plan would be incorporated into the developments Operation and Maintenance Manual. The as-built drainage system would be operated and maintained by the maintenance team in accordance with the regime set out in the plan on occupation of the development.

9. Summary & Conclusions

9.1 The south-eastern part of the site has been identified to be in present day Flood Zone 3a associated with tidal flooding from the River Arun. Flood Zone 3a is shown to extend into the site, in a north-westerly direction in the future scenarios, 2031, 2061 and 2111 when taking account of potential future rises sea level associated with climate change.

9.2 A variety of raised walls and embankments are located along the banks of the River Arun that protect the surrounding area of Littlehampton from fluvial and tidal flooding. Actual flood risk therefore differs notably from the Flood Zones and detailed flood mapping and flood level data provided by the EA shows that tidal defences protect the site from all analysed defended flood scenarios apart from the 0.5% AEP (2115) defended event.

9.3 A design flood event and design flood level for the site were established to be: -

- Design flood event - 0.5% AEP (2115) defended event
- Design flood level - 3.79m AOD

9.4 There is a residual risk of flooding above the design flood event based on an undefended scenario, which could represent the situation of a failure in the defences or a flood event exceeding the design event. A maximum flood level of 4.94m AOD was identified based on a 0.5% AEP (2115) undefended event.

9.5 Measures are required to manage the risk of tidal flooding to the development, but it is not possible to raise the buildings ground floor level above the design flood level due to restrictions on the height of the building and due to level access requirements needed at access / egress points around the building. Therefore, the following measures are proposed in combination with setting the hotels ground floor level at a maximum level of 3.45m AOD.

- All sleeping accommodation would be provided at first floor level and above, while uses at ground floor level would be restricted to less vulnerable, non-residential uses.
- Flood resistance measures are to be used up to a level of 0.6m above the proposed ground floor level, while resilience measures are to be used above this to take account of the residual risk from greater flood depths in the event of breach or failure of the flood defences. An approach should follow The May 2007 Communities and Local Government Report "*Improving the Flood Performance of New Buildings*".

9.6 In addition to the above measures, safe access and egress conditions would be available for staff and guest in a design flood event, while the buildings upper floors would provide a second form of management as they would offer a safe refuge for staff and guest in the event of safe access and egress not being possible in flooding conditions.

9.7 The development would not increase flood risk elsewhere as the proposed hotel building footprint would be substantially smaller than the former Waitrose building that it replaces. It would also not obstruct any existing flood flow paths and no raising of ground levels is proposed.

9.8 The site was also identified to be at moderate risk from groundwater flooding. However, it is considered that the measures proposed to deal with the effects of tidal flooding would largely deal with the effects of flooding from groundwater.

9.9 The site is located within the Littlehampton Economic Growth Area, which is identified to be appropriate for residential uses in the Level SFRA. Both residential and hotel development are classified as "*more vulnerable*" uses in terms of flood risk, thus the development is considered to have passed the Sequential Test.

9.10 The Level 2 SFRA identifies that the Exception Test is required for "more vulnerable" uses in Flood Zone 3a. This flood risk assessment fulfils the second aspect of the Exception Test while a separate Sustainability Report has been prepared to accompany the application, which fulfils the first aspect of the Exception test.

9.11 A surface water drainage scheme is proposed that has been developed in line with national and local policy. The scheme would restrict surface water runoff from the site to a maximum allowable discharge rate of 2.0 l/s, before discharging to Southern Waters surface water sewer in Avon Road via the sites existing connection. This would closely match greenfield runoff rates and provide significant betterment over the existing situation. It would also comply with Southern Water requirements and fulfil BREEAM requirements in relation to surface water management.

9.12 The scheme comprises of a traditional network of below ground pipework for conveyance of surface water runoff that would surcharge into a below ground geocelluar attenuation tank beneath an area of hard and soft landscaping that would provide capacity to store runoff on site for a 1 in 100 year rainfall event with 45% allowance for climate change. The attenuation tank has been fully co-ordinated with the soft landscaping design, with areas of planting above the attenuation tank designed as bioretention areas with 850mm minimum planting depth and filtration / protective geotextiles including drainage layer. These areas will also drain areas of surrounding hard landscaping, which have been designed with falls towards the areas of planting. The network of below ground pipework would discharge through a hydrodynamic proprietary treatment chamber, which would protect the attenuation tanks from silt and sediment.

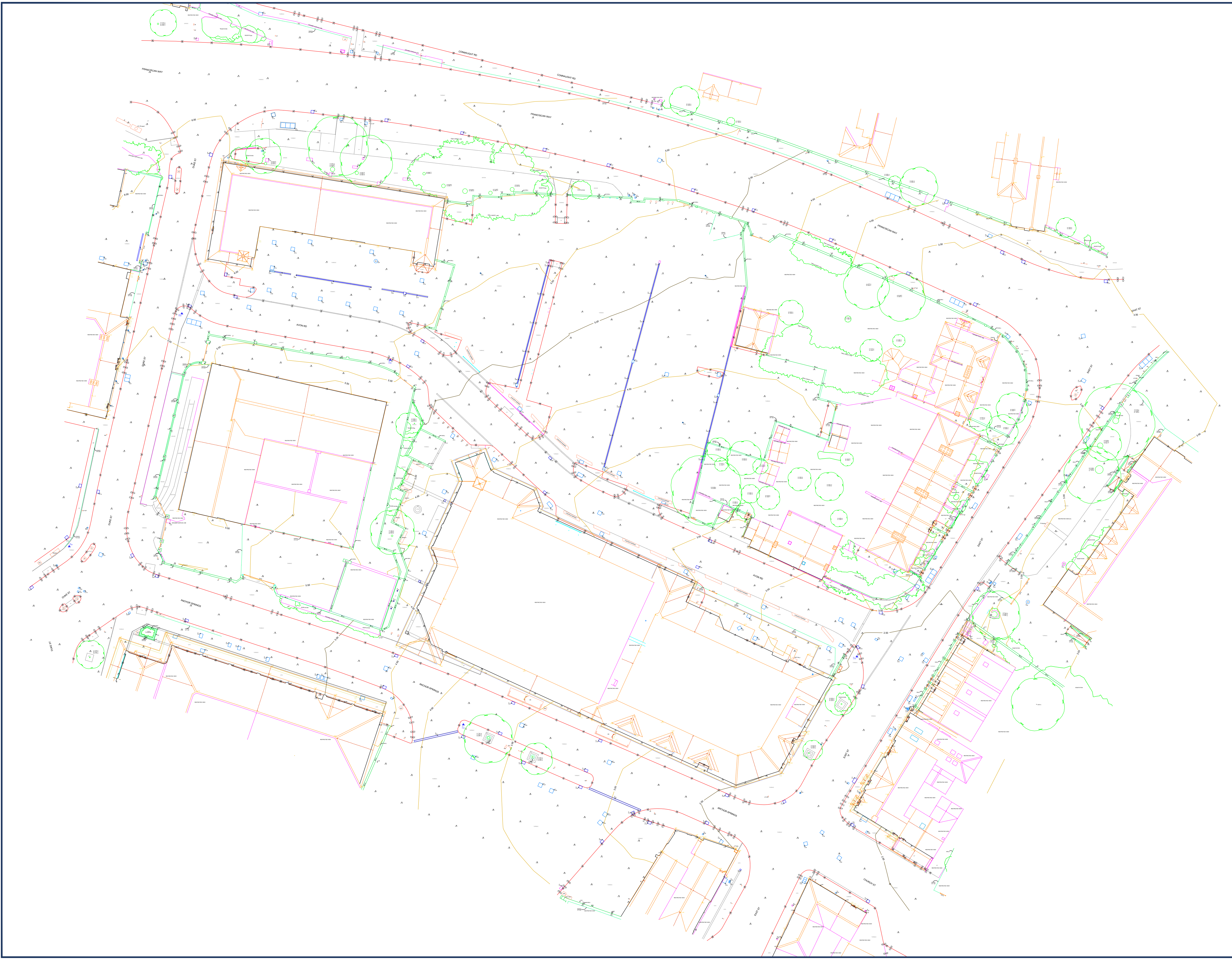
9.13 Hydraulic analysis has been undertaken, which has confirmed that the surface water drainage scheme would store and attenuate surface water runoff from the development on site for all rainfall events up to and including the 1 in 100 year storm return period with 45% allowance for climate change, whilst surface water is gradually released at the maximum allowable discharge rate of 2.0 l/s.

9.14 A foul water drainage scheme is proposed, which comprises of a traditional network of below ground pipework discharging to Southern Water's foul water sewer in East Street via the sites existing connection. Thames Water have confirmed that the existing public sewer network can accommodate foul water flows from the development.

9.15 The developments foul water and surface water drainage systems would be private and would be maintained by the tenant that takes occupancy of the unit. A maintenance plan has been developed for the drainage scheme that would be incorporated into the developments Operation and Maintenance Manual. The as-built drainage system would be operated and maintained by the tenant in accordance with the regime set out in the plan on occupation of the development.

9.16 In terms of flood risk and drainage strategy, it is concluded that the development can be occupied and operated safely and that there will be no increase in the level of flood risk to the site or neighbouring sites because of the proposed development. On this basis, the development would fulfil the aims of national and local planning policy in terms of flood risk and drainage strategy. Should any further details of in terms of flood risk or drainage strategy be required then it is considered that such details could be provided via condition once detailed design information and construction drawings are available for the development.

Appendix A
Topographical Survey



Key:

A/C	Air Conditioning Unit	IC	Inspection Cover
B	Bollard	JB	Junction Box
BP	Brick paving	LP	Lamp Post
BT	BT Inspection Cover	MH	Man Hole Cover
CATV	Cable Television Inspection Cover	PB	Post Box
CH	Coal Hole	PL	Pavement Light
CPS	Concrete Paving Slab	PO	Post
DK	Dropped Kerb	RL	Ridge Level
DP	Down Pipe	S/O	Smoke Outlet
EL	Eaves Level	SRFC	Surface Change
FH	Fire Hydrant	SV	Stop Valve
G	Gully	TCB	Telephone Call Box
GP	Gate Post	TP	Tactile Paving
ILB	Illuminated Bollard	W	Water Inspection Cover
IRS	Illuminated Road Sign	WM	Water Meter

N

Control Stations

C1 502800.084, 102213.901, 5.291
C2 502866.944, 102183.672, 3.797
C3 502819.184, 102253.417, 5.540
C4 502854.523, 102245.559, 5.538
C5 502933.696, 102195.211, 2.478

Notes:

Levels are related to Ordnance Survey Datum via GPS Observations.

Survey location is related to Ordnance Survey Grid via GPS Observations.

All information contained in this drawing (including digital data) should be checked and verified prior to any fabrication or construction.

Project: Anchor Springs
Littlehampton
West Sussex
BN17 6AU

Title: Topographical Survey

Drawn By:	Scale:	Date:
GB	1:200	June 2024

Dwg No: LS2838/T — A0

Point 2 Surveyors Limited
17 Slingsby Place
London
WC2E 9AB

0207 836 5828

point2.co.uk

Appendix B

Existing Drainage Characteristics Plan & Soakaway Test Results

DO NOT SCALE

A1

NOTES

1. This drawing is based on the following survey information:
   - Topgraphical Survey: LS2838/T by Point 2 Surveyors Ltd
   - Site Plan: 6122-F7-100-E-Proposed Ground Floor Plan by Axiom Architects
   - Underground Utility Survey: 4565/P01 by Three Sixty Group
   - Sewer Records: 1461411-3 by Southern Water

LEGEND

- Application boundary
- Existing surface water sewer (adopted)
- Existing foul water sewer (adopted)
- Existing surface water drainage (private)
- Existing foul water drainage (private)
- Existing combined water sewer (adopted)
- Existing road gully
- Existing drainage channel
- Existing overland flow routes
- Existing level
- Existing contour at 0.1m intervals

MK	REVISION	BY	DATE
P1	FIRST ISSUE.	JPC	01.04.25

DRAWING STATUS

PLANNING

DRAWING TITLE

EXISTING DRAINAGE CHARACTERISTICS

PROJECT

PREMIER INN
ANCHOR SPRINGS
LITTLEHAMPTON

simpson | tws
8 Friday Street
Henley-On-Thames
Oxfordshire, RG9 1AH
T: 01491 576 221
E: mail@simpsoneng.com
W: www.simpsoneng.com

London, Henley-on-Thames and Gloucester

Drawn	Ch'kd	Scales	Date
JPC	GC	1:200@A1	MAR'25

Purpose of Issue

FOR PLANNING

Drawing Number	Revision
P24-0122 SK003	P1

enzygo geo environmental

The Byre, Woodned Lane
Cromhall, Gloucestershire GL12 8AA

[redacted]

Your Ref:
Our Ref: CRM.413.425.GE.R.001.A

Gareth Crowther
Simpson TWS
8 Friday Street
Henley-on-Thames
RG9 1AH

Dear Gareth

RE: Waitrose Site Littlehampton Premier Inn Soakaway testing.

Enzygo Geoenvironmental Ltd have undertaken soakaway testing at the above named site.

Site Works

The site works were undertaken on 10th March 2025 and comprised three soakaway tests (SA01 to SA03) located to provide coverage as requested by the Engineer for the scheme.

Soakaways were advanced to depths of 2.0m so that there is a 1m unsaturated zone above groundwater depths measured during the ground investigation.

Soakaway Test Results

Soakaway sheets are attached and results are summarised on the table below:

Soakaway	Depth	Test	Soil Infiltration Rate (m/s)
SA01	2.0	Test 1	Insufficient uptake to calculate infiltration rate.
SA02	2.0	Test 1	Insufficient uptake to calculate infiltration rate.
SA03	2.0	Test 1	Insufficient uptake to calculate infiltration rate.

All tests were undertaken in Clay and Sand.

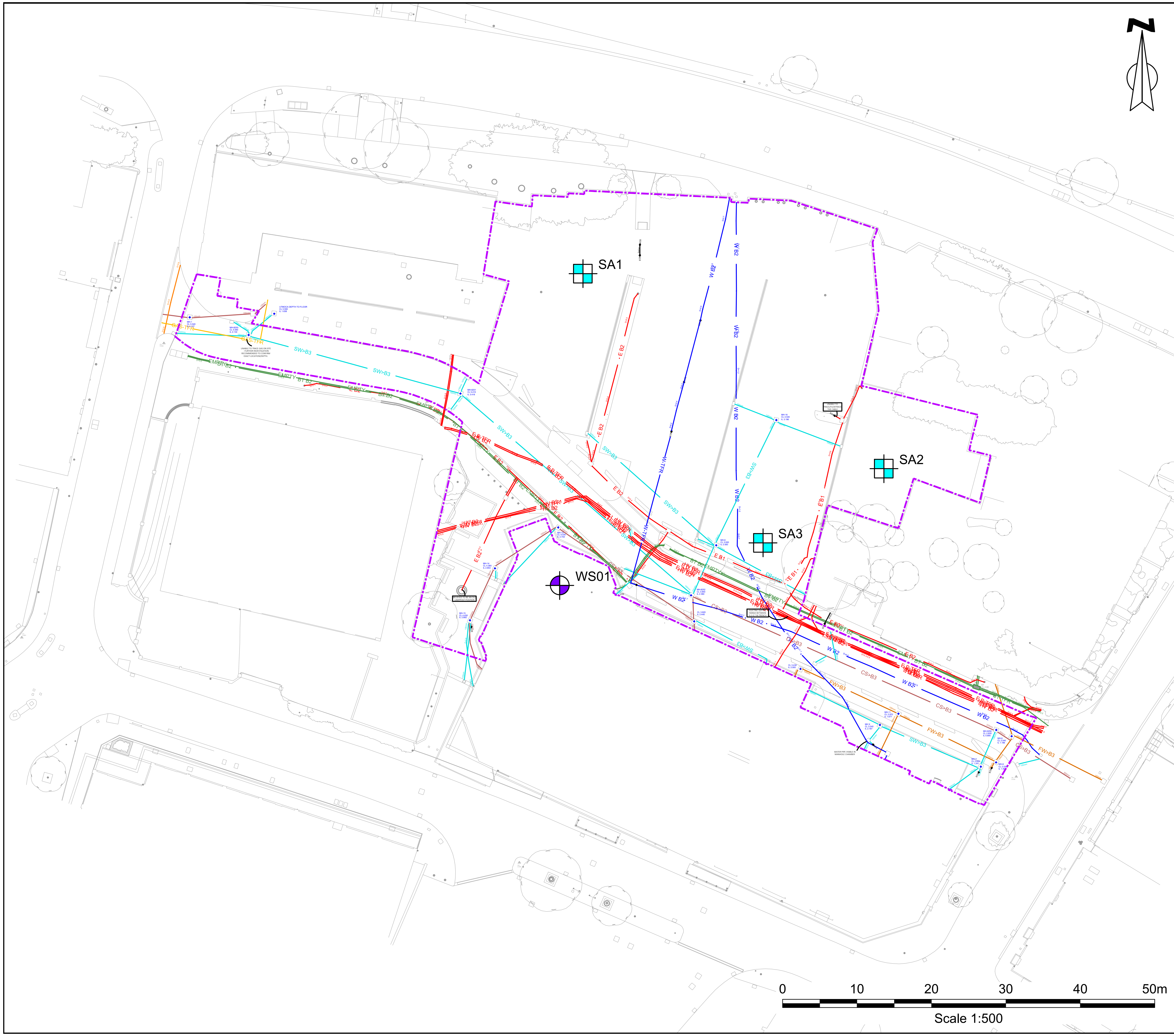
An existing groundwater well was monitored during return visits, the results are attached.

Yours sincerely,
For and on behalf of Enzygo

[redacted]

Daniel James BSc(hon)
Consultant Engineer
Enzygo Geoenvironmental Ltd

Site Plan



NOTES:

ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS AND DOCUMENTS ASSOCIATED WITH THIS PROJECT.

ALL EXISTING AND PROPOSED DIMENSIONS, LEVELS AND LOCATIONS TO BE CHECKED AND VERIFIED BY THE MAIN CONTRACTOR ON SITE PRIOR TO THE COMMENCEMENT OF THE WORKS AND ANY ANOMALIES REPORTED TO THE ENGINEER.

REFERENCES:

PLEASE REFER TO DRAWING: 4565 - ENZYGO - LITTLEHAMPTON WAITROSE - UNDERGROUND UTILITY SURVEY

Soak Away Pits (SA)

Window Sampler Borehole (WS)

Rev	Date	Description	DRA	CHK	APP
P01	02.04.25	Issued for comment / approval	LB	DJ	DJ

Project
Waitrose, Littlehampton

Client
Cummings Group Ltd

Drawing Title
Location Plan

Scale	Date	Status
1:500 @ A3	02.04.25	Preliminary

DWG No. SHF1995004-ENZ-XX-XX-DR-G-0007 **Revision** P01

Bristol 01454 269 237
Cardiff 02920 023 700
Manchester 0161 413 6444
Cambridge 01799 542 473
Sheffield 0114 321 5151
Belfast 07377673948

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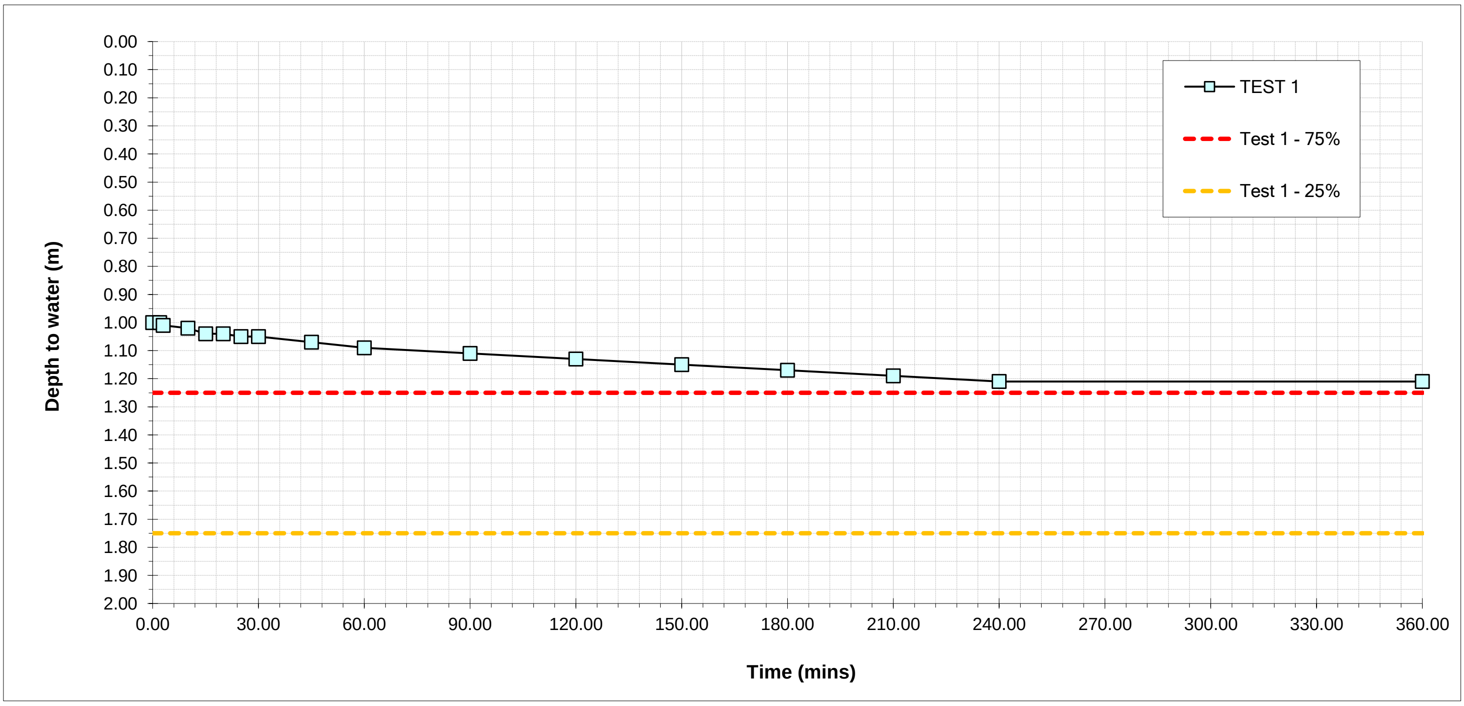
Exploratory Hole	Depth	Date							
		11.03.25	17.03.25	28.03.25	03.04.25	11.04.25	17.04.25	24.04.25	01.05.25
WS01	2.69	Dry	Dry	Dry	Dry				

Soakaway Results

enzygo	Site.......................... Littlehampton, Waitrose Job Number........... SHF.1995.004 Date of Test............ 18/03/2025	Soakaway Number........... SA01 Length.............................. 1.40 m Width................................ 0.40 m Depth................................ 2.00 m
	SOIL INFILTRATION RATE TEST See B.R.E. Digest 365, 1991, Soakaway Design.	Groundwater Level........... Dry m

Remarks -		TEST 1		TEST 2		TEST 3	
		Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
		0.0	1.00				
		2.0	1.00				
		3.0	1.01				
		10.0	1.02				
		15.0	1.04				
		20.0	1.04				
		25.0	1.05				
		30.0	1.05				
		45.0	1.07				
		60.0	1.09				
		90.0	1.11				
		120.0	1.13				
		150.0	1.15				
		180.00	1.17				
		210.00	1.19				
		240.00	1.21				
		360.00	1.21				
Effective Storage Depth	m		1.00				
75% Effective Storage Depth	m		0.75				
(i.e. depth below GL)	m		**1.25**				
25% Effective Storage Depth	m		0.25				
(i.e. depth below GL)	m		**1.75**				
Effective Storage Depth 75%-25%	m		0.50				
Time to fall to 75% effective depth	mins		N/A				
Time to fall to 25% effective depth	mins		N/A				
V (75%-25%)	m3		0.28				
a (50%)	m2		2.36				
t (75%-25%)	mins		N/A				
SOIL INFILTRATION RATE	m/s		**N/A**				

DESIGN SOIL INFILTRATION RATE, f **Insufficient uptake to calculate infiltration rate** **m/s**

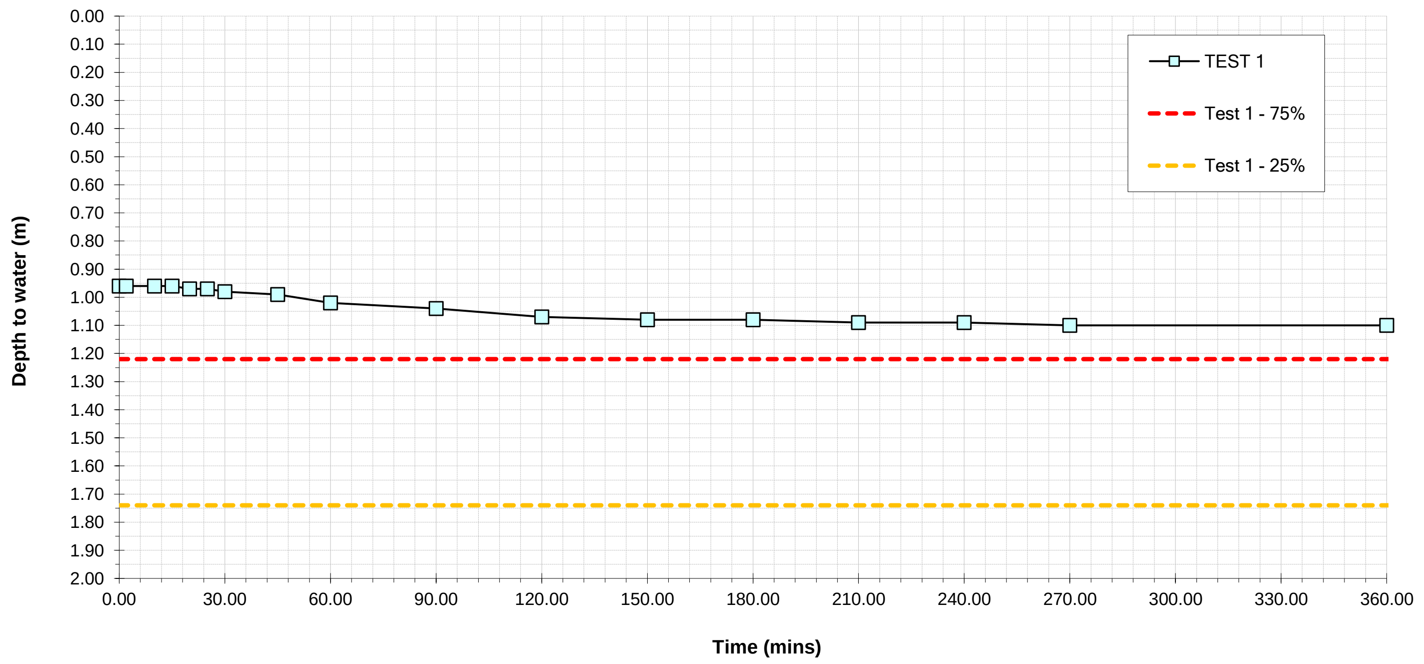


Compiled By:	Date:	Checked By:	Date:	Approved By:	Date:
K. Cordes	18.03.25	D.James	19.03.25	S.Rhodes	19.03.25

enzygo	Site........................ Littlehampton, Waitrose Job Number........... SHF.1995.004 Date of Test........... 18/03/2025	Soakaway Number........... SA02 Length............................... 1.40 m Width................................ 0.40 m Depth................................ 2.00 m
	SOIL INFILTRATION RATE TEST See B.R.E. Digest 365, 1991, Soakaway Design.	Groundwater Level........... Dry m

Remarks -		TEST 1		TEST 2		TEST 3	
		Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
		0.0	0.96				
		2.0	0.96				
		10.0	0.96				
		15.0	0.96				
		20.0	0.97				
		25.0	0.97				
		30.0	0.98				
		45.0	0.99				
		60.0	1.02				
		90.0	1.04				
		120.0	1.07				
		150.0	1.08				
		180.0	1.08				
		210.00	1.09				
		240.00	1.09				
		270.00	1.10				
		360.00	1.10				
Effective Storage Depth	m		1.04				
75% Effective Storage Depth	m		0.78				
(i.e. depth below GL)	m		**1.22**				
25% Effective Storage Depth	m		0.26				
(i.e. depth below GL)	m		**1.74**				
Effective Storage Depth 75%-25%	m		0.52				
Time to fall to 75% effective depth	mins		N/A				
Time to fall to 25% effective depth	mins		N/A				
V (75%-25%)	m3		0.29				
a (50%)	m2		2.43				
t (75%-25%)	mins		N/A				
SOIL INFILTRATION RATE	m/s		N/A				

DESIGN SOIL INFILTRATION RATE, f **Insufficient uptake to calculate infiltration rate** **m/s**

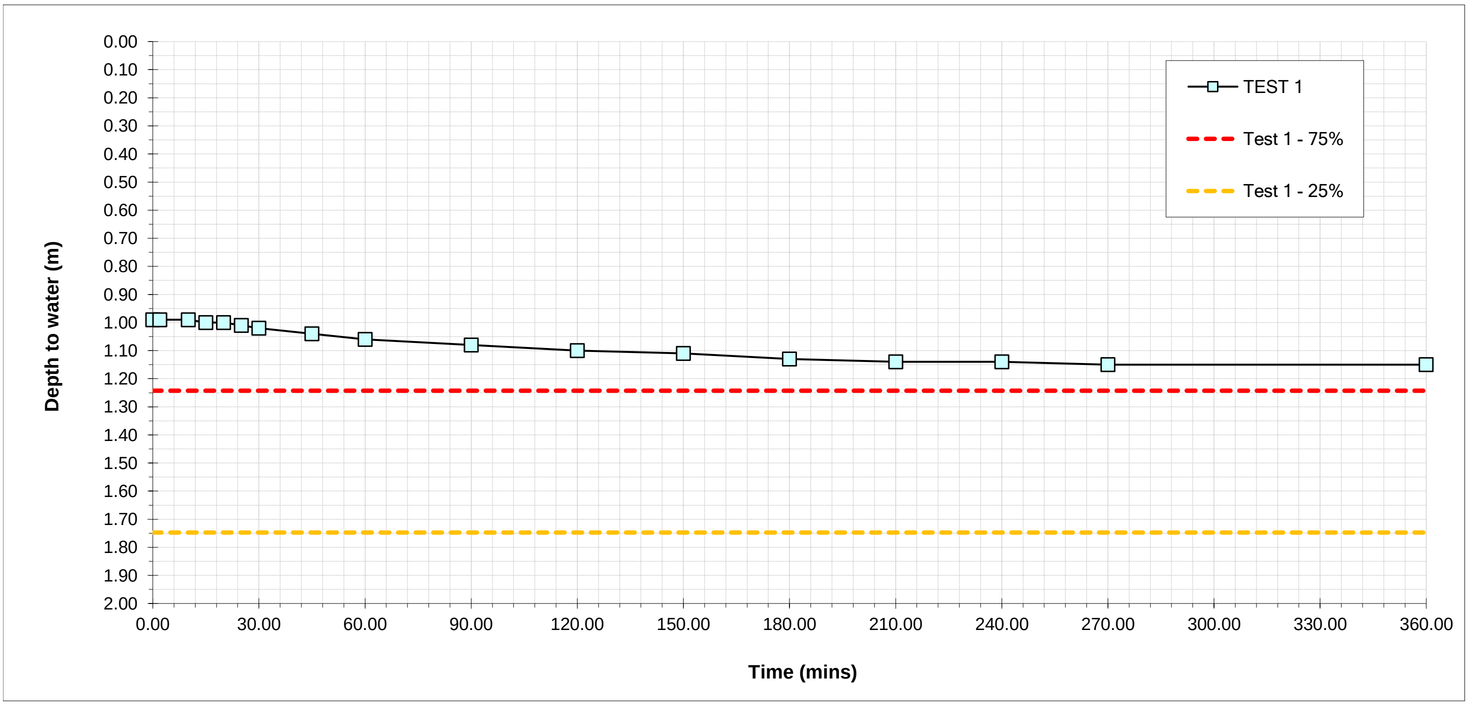


Compiled By:	Date:	Checked By:	Date:	Approved By:	Date:
K. Cordes	18.03.25	D.James	19.03.25	S.Rhodes	19.03.25

enzygo	Site........................ Littlehampton, Waitrose Job Number........... SHF.1995.004 Date of Test............ 18/03/2025	Soakaway Number........... SA03 Length.............................. 1.40 m Width................................ 0.40 m Depth................................ 2.00 m
	SOIL INFILTRATION RATE TEST See B.R.E. Digest 365, 1991, Soakaway Design.	Groundwater Level........... Dry m

Remarks -		TEST 1		TEST 2		TEST 3	
		Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
		0.0	0.99				
		2.0	0.99				
		10.0	0.99				
		15.0	1.00				
		20.0	1.00				
		25.0	1.01				
		30.0	1.02				
		45.0	1.04				
		60.0	1.06				
		90.0	1.08				
		120.0	1.10				
		150.0	1.11				
		180.0	1.13				
		210.00	1.14				
		240.00	1.14				
		270.00	1.15				
		360.00	1.15				
Effective Storage Depth	m		1.01				
75% Effective Storage Depth	m		0.76				
(i.e. depth below GL)	m		**1.24**				
25% Effective Storage Depth	m		0.25				
(i.e. depth below GL)	m		**1.75**				
Effective Storage Depth 75%-25%	m		0.51				
Time to fall to 75% effective depth	mins		N/A				
Time to fall to 25% effective depth	mins		N/A				
V (75%-25%)	m3		0.28				
a (50%)	m2		2.38				
t (75%-25%)	mins		N/A				
SOIL INFILTRATION RATE	m/s		N/A				

DESIGN SOIL INFILTRATION RATE, f	**Insufficient uptake to calculate infiltration rate**	**m/s**



Compiled By:	Date:	Checked By:	Date:	Approved By:	Date:
K. Cordes	18.03.25	D.James	19.03.25	S.Rhodes	19.03.25

Appendix C
Site Plan

N

0 10 20 30 40 m

Rev	Date	Description	By	Chk

Client
Premier Inn Hotels

1 Brooklands Yard
Southover High Street
Lewes
East Sussex BN7 1HU

01273 479434
www.axiomarchitects.co.uk

AXIOM ARCHITECTS

Project
Anchor Springs
Littlehampton
Premier Inn

Drawing
Proposed Site Plan

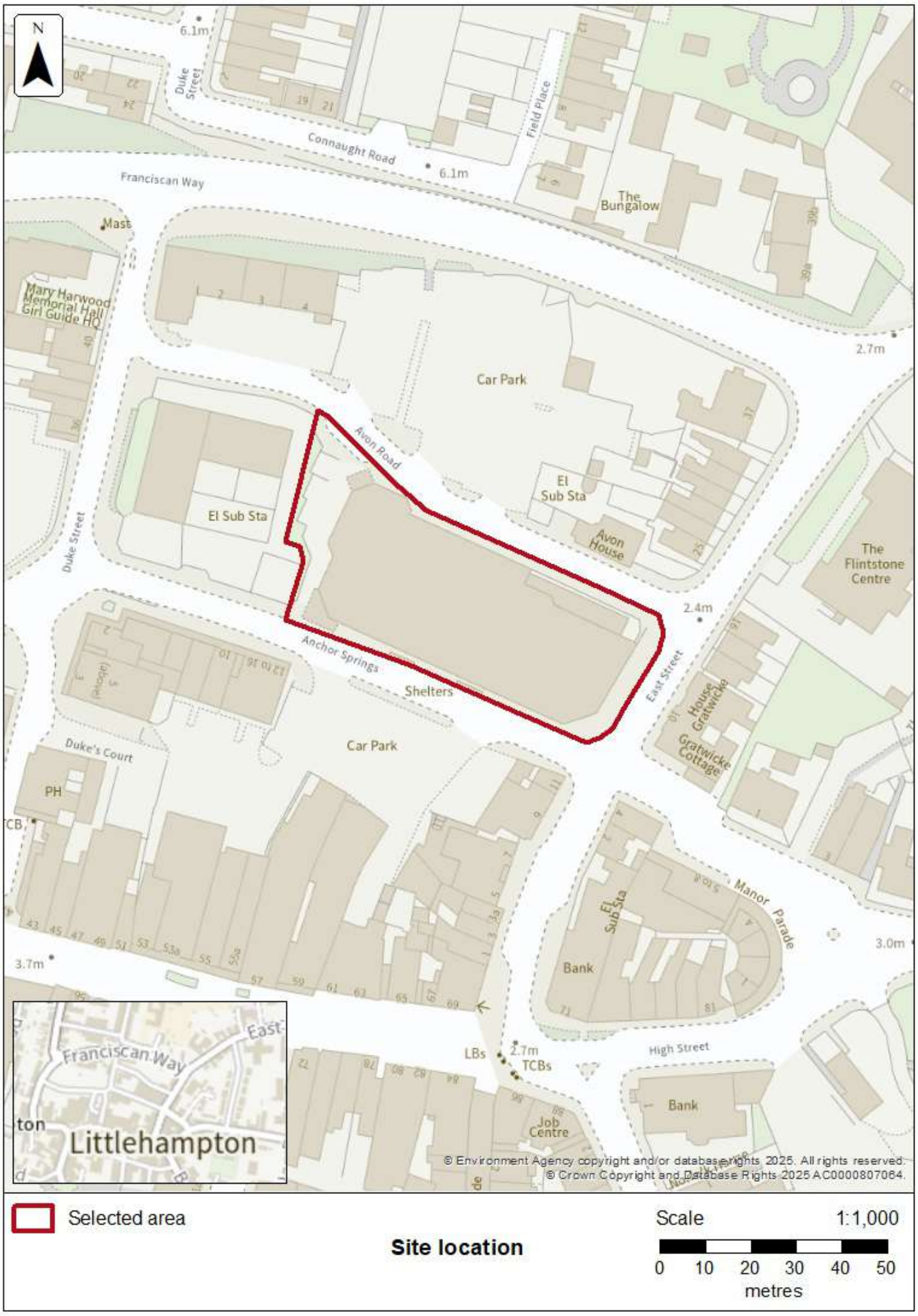
Drawing No.	Revision	Date	Scale	Drawn	Checked	Status
6122-P- 002		08/04/25	1:200 @ A1	LB	LB	PLANNING

Appendix D
EA Flood Risk Data

Flood risk assessment data

Location of site: Anchor Springs, Littlehampton, BN17 6AT
Document created on: 6 February 2025
This information was previously known as a product 4.
Customer reference number: SSD394530

Map showing the location that flood risk assessment data has been requested for.



How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

We recommend that you work with a flood risk consultant to get your flood risk assessment.

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- information on the models used
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- past floods
- flood defences and attributes
- information to help you assess if there is a reduced flood risk from rivers and the sea because of defences
- modelled data
- climate change modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Surface water and other sources of flooding

Use the long term flood risk service to find out about the risk of flooding from:

- surface water
- ordinary watercourses
- reservoirs

Or you can contact your Lead Local Flood Authority for further information.

Your Lead Local Flood Authority is West Sussex County.

For information about sewer flooding, contact the relevant water company for the area.

About the models used

Model name: Arun Coastal Model, 2012
Scenario(s): Undefended tidal
Date: 20 August 2012

Model name: Littlehampton Update 2017 - River Arun Modelling Study
Scenario(s): Defended tidal
Date: 1 March 2017

These models contain the most relevant data for your area of interest.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occuring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 3.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change

The flood zones are not currently being updated. The last update was in November 2023. Some of the flood zones may have changed, however all source data is included in the models below.

Environment Agency

Flood map for planning

Location (easting/northing)
502890/102201

Scale
1:10,000

Created
6 Feb 2025

Legend
Selected area
Main river
Flood defence
Flood zone 3
Flood zone 2

0 100 200 300 400 500
metres

Past floods

Past flood events included in this document

The recorded flood outlines included in this document are for areas of land local to your site location that have been flooded by any of these sources:

- ephemeral water
- main rivers
- ordinary watercourses
- the sea
- unknown

Data limitations

The outlines do not include flooding from:

- drainage where rainfall has led to surface water ponding or overland runoff
- artificial, water-bearing sewer, water supply and wastewater treatment pipelines

Changes to flood defences

The defences (also known as assets) that were in place may also have changed. For example, assets may have been built more recently than the last recorded flood outline.

What the recorded flood outlines dataset is

The recorded flood outlines are a geographical information system (GIS) data layer that show our verified records of areas that have flooded in the past from:

- rivers
- the sea
- groundwater
- surface water

Download the complete recorded flood outlines dataset, which includes data quality flags for outlines recorded after April 2020. This indicates the confidence we have in an outline.

Get flood information from other organisations

Contact West Sussex County Lead Local Flood Authority (LLFA) and your drainage board to get information about past flooding caused by surface water or drainage systems.

Environment Agency

Past floods

Location (easting/northing)
502890/102201

Scale
1:10,000

Created
6 Feb 2025

Selected area
Main river
Date of flood event
February, 2020
February, 1983

0 100 200 300 400 500
metres

Data on past flood events

Start date	End date	Source of flood	Cause of flood	Affects location
1 February 2020	1 February 2020	sea	overtopping of defences	No
2 February 1983	2 February 1983	main river	overtopping of defences	No

Flood defences and attributes

The flood defences map shows the location of the flood defences present.

The flood defences data table shows the type of defences, their condition and the standard of protection. It shows the height above sea level of the top of the flood defence (crest level). The height is In mAOD which is the metres above the mean sea level at Newlyn, Cornwall.

It's important to remember that flood defence data may not be updated on a regular basis. The information here is based on the best available data.

Use this information:

- to help you assess if there is a reduced flood risk for this location because of defences
- with any information in the modelled data section to find out the impact of defences on flood risk

Environment Agency

Flood defences

Location (easting/northing)
502890/102201

Scale
1:5,000

Created
6 Feb 2025

Selected area
Main river
Flood defence

0 50 100 150 200 250
metres

Flood defences data

Label	Asset ID	Asset Type	Standard of protection (years)	Current condition	Downstream actual crest level (mAOD)	Upstream actual crest level (mAOD)	Effective crest level (mAOD)
1	330004	Demountable Defence			3.66	3.73	3.66
2	446418	Wall	300		4.40	4.40	4.40
3	446798	Flood Gate	300		4.40	4.40	4.40
4	446678	Flood Gate	300		4.40	4.40	4.40
5	97690	Wall	50		3.77	3.23	
6	156333	Wall	300		4.80	4.80	4.80
7	154863	Wall	75		3.94	3.94	
8	458614	Wall	75		3.94	3.94	3.94
9	183668	Wall	25		3.47	3.41	
10	154859	Wall	300		4.80	4.80	4.80
11	446218	Wall	300		4.80	4.80	4.80
12	154862	Wall	75		3.39	3.94	
13	11139	Embankment	50		2.26	3.77	
14	483081	Wall	75		3.39	3.94	3.39
15	483074	Wall	75		4.30	4.32	4.30

Any blank cells show where a particular value has not been recorded for an asset.

Modelled data

This section provides details of different scenarios we have modelled and includes the following (where available):

- outline maps showing the area at risk from flooding in different modelled scenarios
- modelled node point map(s) showing the points used to get the data to model the scenarios and table(s) providing details of the flood risk for different return periods
- map(s) showing the approximate water levels for the return period with the largest flood extent for a scenario and table(s) of sample points providing details of the flood risk for different return periods

Climate change

The climate change data included in the models may not include the latest flood risk assessment climate change allowances. Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

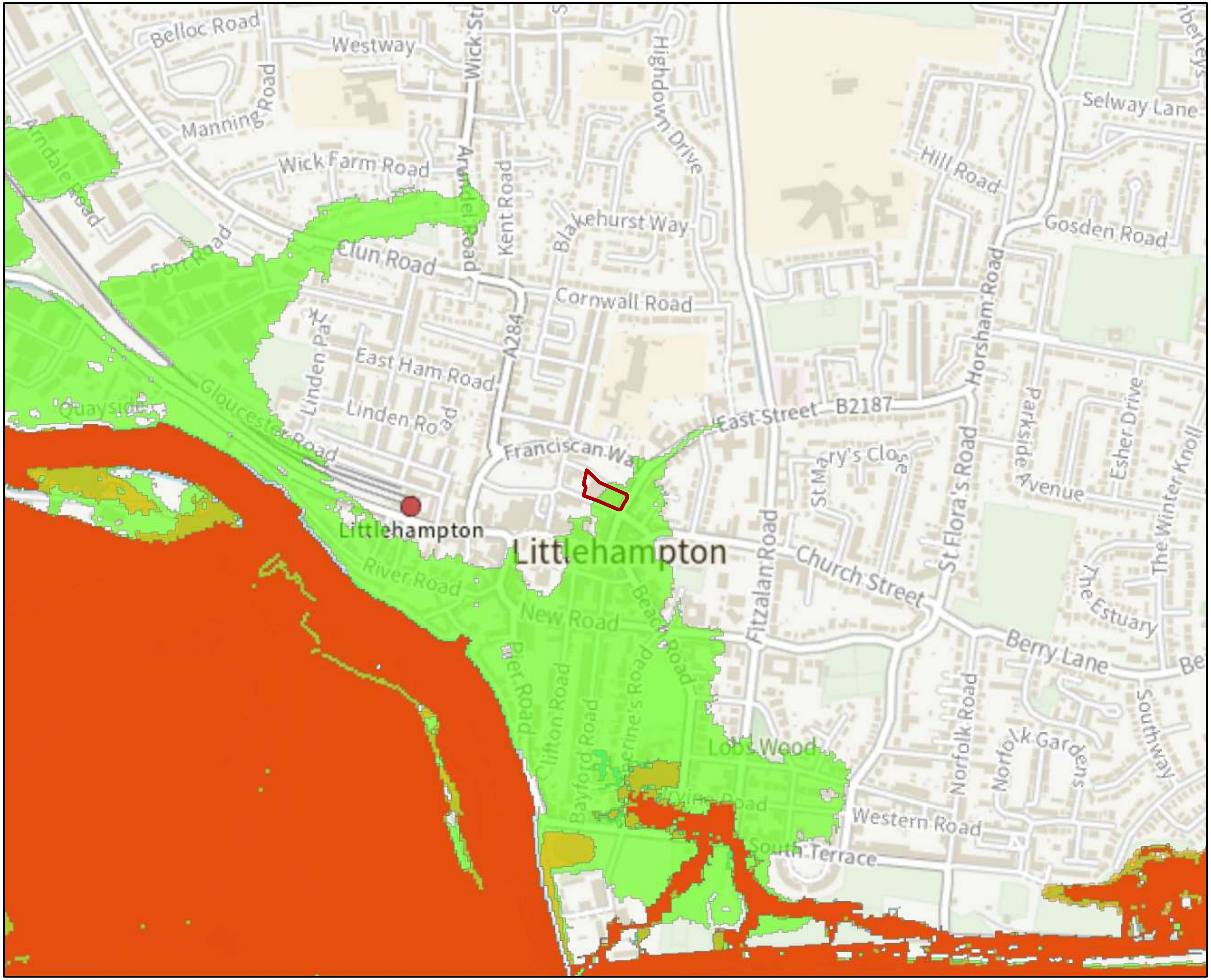
The Environment Agency will incorporate the new allowances into future modelling studies. For now, it's your responsibility to demonstrate that new developments will be safe in flood risk terms for their lifetime.

Modelled scenarios

The following scenarios are included:

- Defended modelled tidal: risk of flooding from the sea where there are flood defences
- Defences removed modelled tidal: risk of flooding from the sea where flood defences have been removed

Modelled Flood Outlines (Defended Tidal). Centred BN17 6AT. Created 06/02/2025.



N

Legend

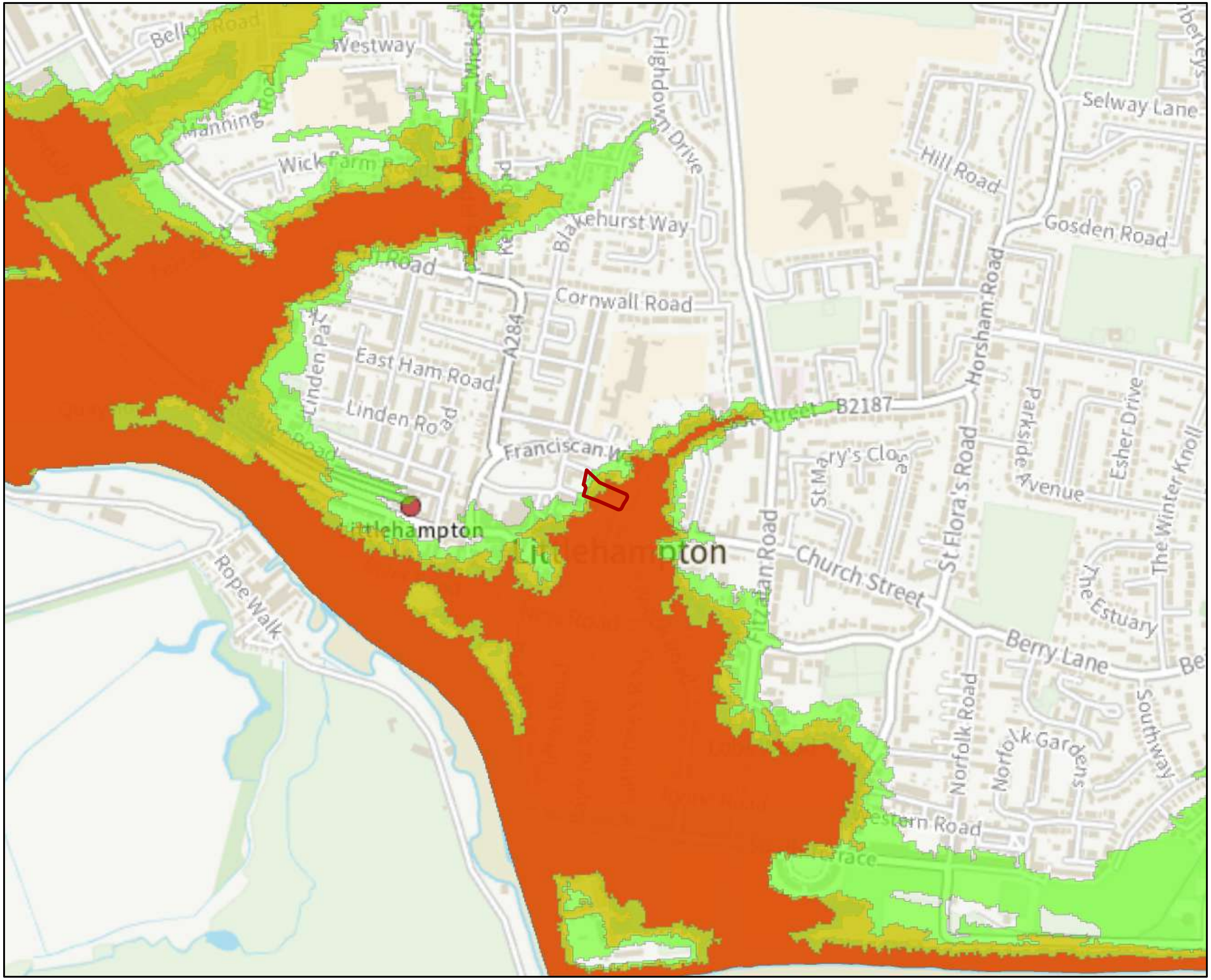
- Site Boundary
- 0.5% AEP Defended Tidal
- 0.5% AEP (2065) Defended Tidal
- 0.5% AEP (2115) Defended Tidal
- 0.1% AEP Defended Tidal

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

Scale: 1:10,000

0 0.225 0.45
Kilometers

Modelled Flood Outlines (Undefended Tidal). Centred BN17 6AT. Created 06/02/2025.



Environment Agency

N

Legend

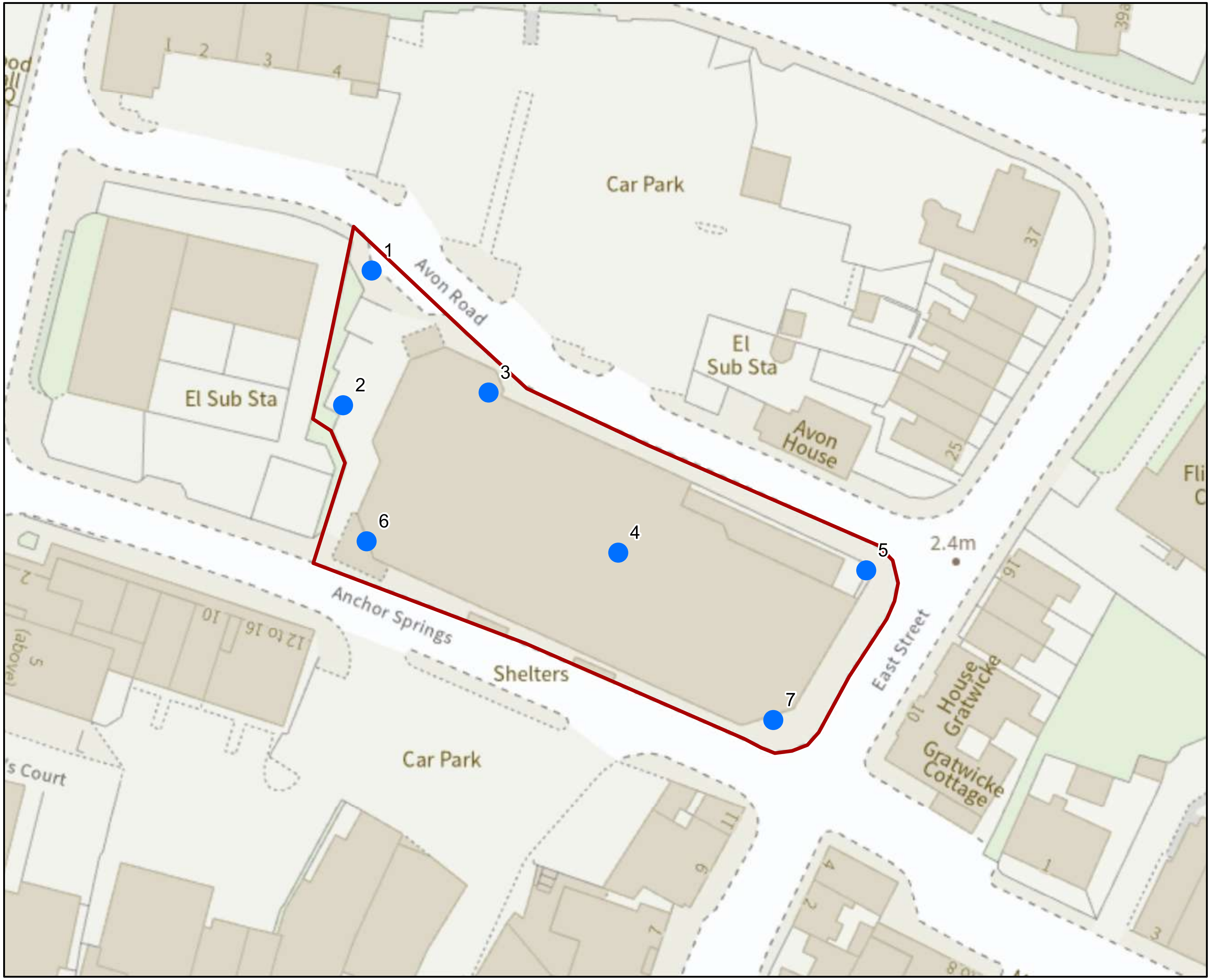
- Site Boundary
- 0.5% AEP (2012) (Undefended)
- 0.5% AEP (2070) (Undefended)
- 0.5% AEP (2115) (Undefended)
- 0.1% AEP (2012) (Undefended)

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

Scale: 1:10,000

0 0.225 0.45
Kilometers

FRA Site Boundary & Node Points. Centred BN17 6AT. Created 06/02/2025.



Environment Agency

N

Legend

Site Nodes

Site Boundary

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

Scale: 1:750

0 0.015 0.03
Kilometers

Product 4 Flood Risk Data Requested by: Simpson Associates Consulting Engineers

Site: Anchor Springs, Littlehampton, BN17 6AT

Table 1: Water Levels: Tidal Undefended

	NGR		Modelled Flood Levels in Metres AOD Undefended Annual Exceedance Probability			
Node Ref	**Eastings**	**Northings**	**0.5%**	**0.5% (2070)***	**0.5% (2115)***	**0.1%**
1	502861	102238	-	-	-	-
2	502857	102219	-	-	4.94	-
3	502878	102221	-	4.35	4.94	-
4	502896	102198	3.74	4.35	4.94	4.05
5	502931	102196	3.74	4.35	4.94	4.05
6	502861	102200	-	4.35	4.94	-
7	502918	102175	3.74	4.35	4.94	4.05

Table 2: Water Levels: Tidal Defended

	NGR		Modelled Flood Levels in Metres AOD Defended Annual Exceedance Probability			
Node Ref	**Eastings**	**Northings**	**0.5%**	**0.5% (2065)***	**0.5% (2115)***	**0.1%**
1	502861	102238	-	-	-	-
2	502857	102219	-	-	-	-
3	502878	102221	-	-	-	-
4	502896	102198	-	-	3.74	-
5	502931	102196	-	-	3.68	-
6	502861	102200	-	-	-	-
7	502918	102175	-	-	3.79	-

[redacted]

Table 3: Water Depths: Tidal Undefended

	NGR		Modelled Flood Depths in Metres Undefended Annual Exceedance Probability			
Node Ref	**Eastings**	**Northings**	**0.5%**	**0.5% (2070)***	**0.5% (2115)***	**0.1%**
1	502861	102238	-	-	-	-
2	502857	102219	-	-	0.27	-
3	502878	102221	-	0.19	0.78	-
4	502896	102198	0.31	0.92	1.51	0.62
5	502931	102196	1.33	1.94	2.53	1.64
6	502861	102200	-	0.05	0.62	-
7	502918	102175	1.25	1.86	2.45	1.57

Table 4: Water Depths: Tidal Defended

	NGR		Modelled Flood Depths in Metres Defended Annual Exceedance Probability			
Node Ref	**Eastings**	**Northings**	**0.5%**	**0.5% (2065)***	**0.5% (2115)***	**0.1%**
1	502861	102238	-	-	-	-
2	502857	102219	-	-	-	-
3	502878	102221	-	-	-	-
4	502896	102198	-	-	0.20	-
5	502931	102196	-	-	1.12	-
6	502861	102200	-	-	-	-
7	502918	102175	-	-	1.26	-

All levels taken from: Arun Coastal Modelling (2012), by JBA Consulting, with updated defended modelling (2017).

Produced on: 06/02/2025

*** The flood risk data provided is based on existing EA hydraulic models with an allowance for climate change. Please note the climate change allowances provided are not up to date. These were updated on 27 July 2021.**

You should refer to ['Flood risk assessments: climate change allowances'] for the most up to date allowances. You will need to undertake further assessment of future flood risk using different allowances to ensure your assessment of future flood risk is based on best available evidence.

There is no additional information or health warnings for these levels/depths or the model from which they have been produced.

[redacted]

Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

Your Lead Local Flood Authority is West Sussex County.

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

Find out more about flood risk activity permits

Help and advice

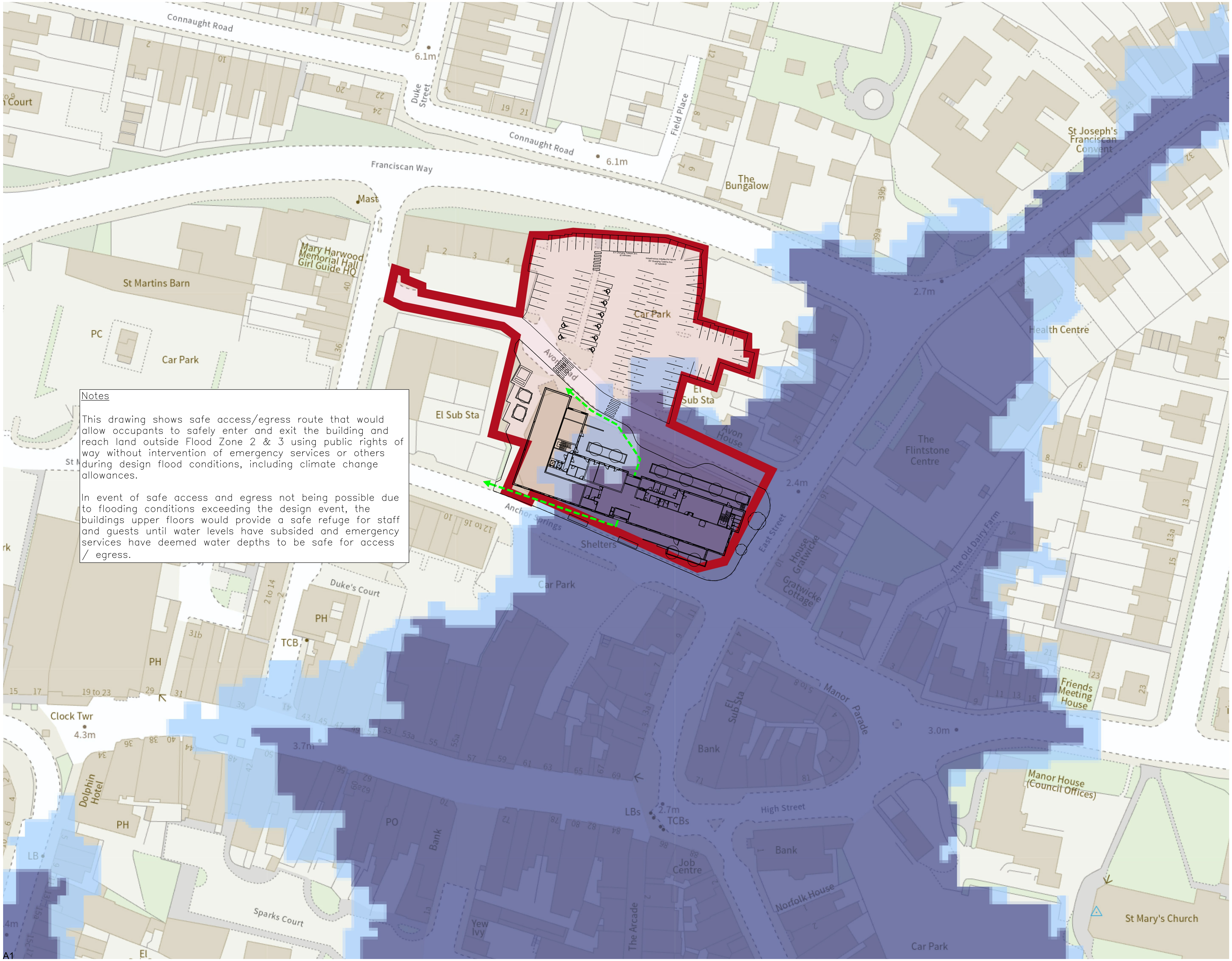
Contact the Solent and South Downs Environment Agency team at ssdenquiries@environment-agency.gov.uk for:

- more information about getting a product 5, 6, 7 or 8
- general help and advice about the site you're requesting data for

Appendix E

Safe Access Egress Route Plan & Flood Risk Management Measures Plan

DO NOT SCALE



Notes

This drawing shows safe access/egress route that would allow occupants to safely enter and exit the building and reach land outside Flood Zone 2 & 3 using public rights of way without intervention of emergency services or others during design flood conditions, including climate change allowances.

In event of safe access and egress not being possible due to flooding conditions exceeding the design event, the buildings upper floors would provide a safe refuge for staff and guests until water levels have subsided and emergency services have deemed water depths to be safe for access / egress.

NOTES

1. This drawing is based on the following survey information:
   - Topgraphical Survey: LS2838/T by Point 2 Surveyors Ltd
2. Flood taken from EA's Flood Zone Map for Planning, with design flood level calculated in conjuction with DEFRA's Peak River Flow Allowances. Refer to Section xx in Simpson TWS's Flood Risk Assessment ref.

LEGEND

- Application boundary
- Safe access egress route
- Flood Zone 3
- Flood Zone 2

MK	REVISION	BY	DATE
P2	SITE LAYOUT UPDATED.	JPC	09.04.25
P1	FIRST ISSUE.	JPC	01.04.25

DRAWING STATUS

PLANNING

DRAWING TITLE

SAFE ACCESS EGRESS ROUTE PLAN

PROJECT

PREMIER INN
ANCHOR SPRINGS
LITTLEHAMPTON

simpson | tws
8 Friday Street
Henley-On-Thames
Oxfordshire, RG9 1AH
T: 01491 576 221
E: mail@simpsoneng.com
W: www.simpsoneng.com

London, Henley-on-Thames and Gloucester

Drawn	Ch'kd	Scales	Date
JPC	GC	1:500@A1	MAR'25

Purpose of Issue

FOR PLANNING

Drawing Number	Revision
P24-0122 SK006	P2

DO NOT SCALE

<u>Current or Future Flooding from any Source</u>

The site has been identified to be at high risk of tidal flooding.

The design flood event and design flood level for the site are established to be:

- Design flood event – 0.5% AEP (2115) defended event
- Design flood level – 3.79m AOD

It has been identified that consideration should also be given to the residual risk of flooding above the design flood event based on an undefended scenario, which could represent the situation of a failure in the defences or a flood event exceeding the design event. A maximum flood level of 4.94m AOD has been identified based on a 0.5% AEP (2115) undefended event.

<u>Flood Risk Management Measures</u>

Measures are required to manage the risk of tidal flooding to the development, but it is not possible to raise the buildings ground floor level above the design flood level due to restrictions on the height of the building and due to level access requirements needed at access / egress points around the building. Therefore, the following measures are proposed in combination with setting the hotels ground floor level at a maximum level of 3.45m AOD.

- All sleeping accommodation would be provided at first floor level and above, while uses at ground floor level would be restricted to less vulnerable, non–residential uses.
- Flood resistance measures are to be used up to a level of 0.6m above the proposed ground floor level, while resilience measures are to be used above this to take account of the residual risk from greater flood depths in the event of breach or failure of the flood defences. An approach should follow The May 2007 Communities and Local Government Report "Improving the Flood Performance of New Buildings" and could comprise of the
  - Floor construction comprising of a solid ground bearing concrete slab on 1200 gauge damp proof membrane.
  - Reinforced concrete external walls and raised DPC to minimum height of 600mm above ground floor level.
  - Demountable barriers at doors / openings at ground floor level to minimum height of 600mm above ground floor level.
  - Appropriate sealing of all service entries (e.g. with expanding foam or similar closed cell material).
  - Setting of water, electricity and gas meters a minimum of 600mm above ground floor level.
  - Raising of electrical sockets a minimum of 600mm above ground floor level.
  - Suspending of electric ring mains from first floor level with drops to ground floor sockets and switches.
  - Raising of heating systems including boiler units and ancillary devices a minimum of 600mm above ground floor level.
  - Protection of communications wiring for telephone, TV, Internet and other services with suitable flood insulation in the distribution ducts agreed with the service provider.
  - Use of floor finishes with water resilient materials including ceramic or concrete–based floor tiles, stone, and sand/cement screeds.

NOTES

1. This drawing is based on the following survey information:

   – Topgraphical Survey: LS2838/T by Point 2 Surveyors Ltd
   – Site Plan: 6122–P–100––Proposed Ground Floor Plan by Axiom Architects

LEGEND

[FFL 3.00]	Proposed finished floor level
(magenta line)	Reinforced concrete external wall & raised DPC to minimum height of 0.6m above ground floor level
(blue line)	Demountable flood barrier at doors/openings at ground floor level to minimum height of 0.6m above ground floor level
(yellow hatch)	Floor construction comprising solid ground bearing concrete slab on 1200 gauge damp proof membrane

MK	REVISION	BY	DATE
P2	SITE LAYOUT UPDATED.	JPC	09.04.25
P1	FIRST ISSUE.	JPC	01.04.25

DRAWING STATUS

PLANNING

DRAWING TITLE

FLOOD RISK MANAGEMENT MEASURES PLAN

PROJECT

PREMIER INN
ANCHOR SPRINGS
LITTLEHAMPTON

simpson | tws
8 Friday Street
Henley-On-Thames
Oxfordshire, RG9 1AH
T: 01491 576 221
E: mail@simpsoneng.com
W: www.simpsoneng.com
London, Henley-on-Thames and Gloucester

Drawn	Ch'kd	Scales	Date
JPC	GC	1:200@A1	FEB'25

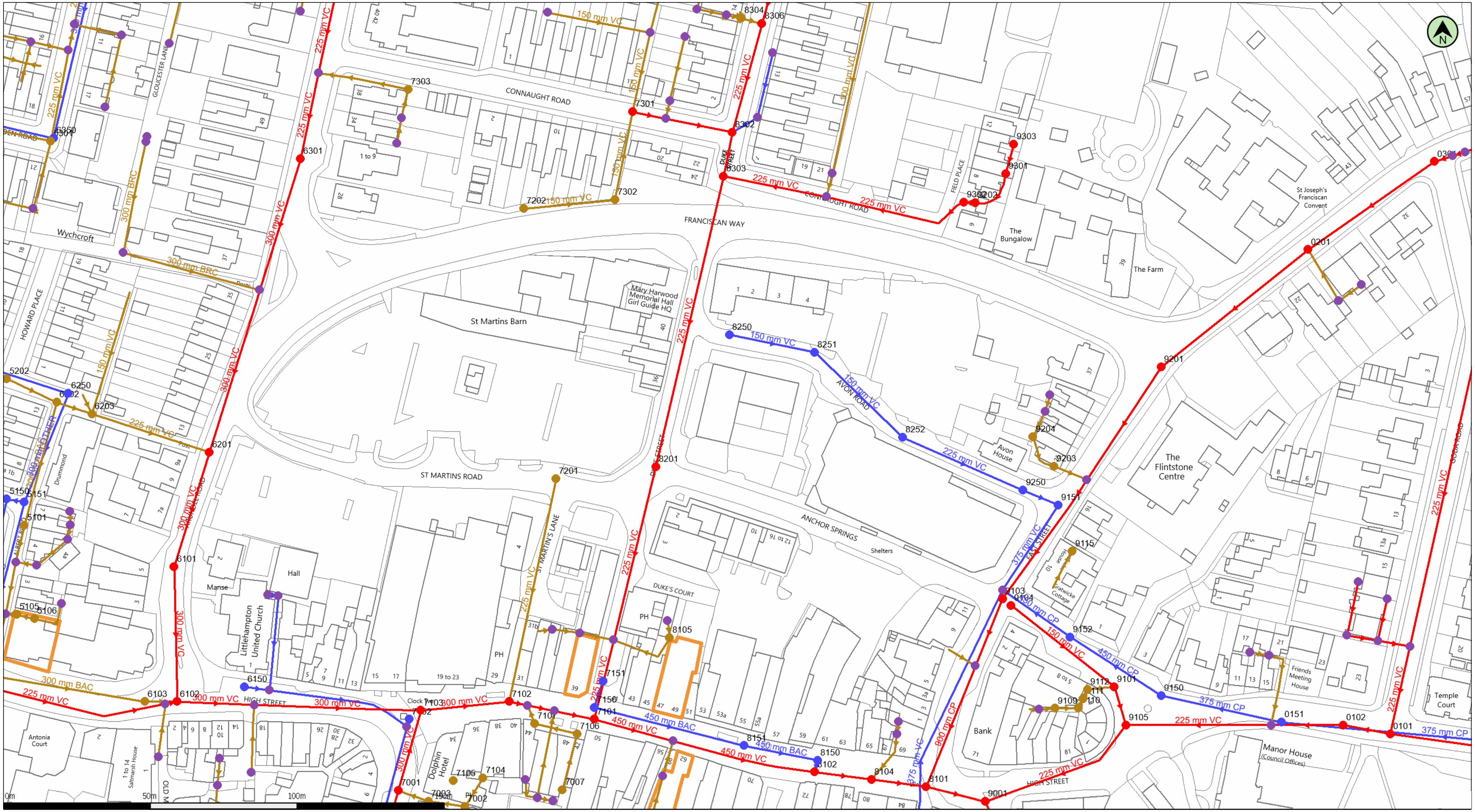
Purpose of Issue

FOR PLANNING

Drawing Number	Revision
P24-0122 SK007	P2

A1

Appendix F
Southern Water Correspondence



(c) Crown copyright and database rights 2024 Ordnance Survey 100031673 | Date: 03/05/24 | Scale: 1:1250 | Map Centre: 502833,102231 | Data updated: 12/04/24 | Our Ref: 1461411 - 3 | Wastewater Plan A3

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

Foul Gravity Sewer
Combined Gravity Sewer
Culverted Water Course or Treated Effluent
Surface Water Gravity Sewer
Rising Main, Vacuum or Syphon
Combined Outfall
Surface Water Outfall
Foul Outfall
Surface Water Inlet
Combined Pumping Station
Surface Water Pumping Station
Foul Pumping Station
Water Treatment Works
Section 104 Area
Building Over Agreement Area
Foul Manhole
Combined Manhole
Surface Water Manhole
Side Entry Manhole, Decarcation Chamber, Dummy Manhole or Surface Water Soakaway

dan@360hq.co.uk

Waitrose

WATER for LIFE

from Southern Water.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0101	C	4.64	1.46	
0102	C	4.28	0.00	
0201	C	3.26	0.66	
0301	C	3.61	0.73	
6101	C	0.00	1.85	
6102	C	4.93	0.00	
6201	C	0.00	2.15	
6301	C	5.60	0.00	
7001	C	0.00	0.00	
7101	C	3.79	0.85	
7102	C	4.18	1.11	
7103	C	4.55	1.17	
7301	C	6.34	3.21	
8101	C	2.71	0.21	
8102	C	3.03	0.62	
8104	C	0.00	0.00	
8201	C	5.16	1.88	
8302	C	6.28	2.87	
8303	C	6.16	2.77	
8306	C	0.00	0.00	
9001	C	2.39	0.20	
9101	C	2.60	0.00	
9103	C	2.29	0.45	
9104	C	0.00	0.00	
9105	C	2.49	0.00	
9201	C	3.21	0.00	
9202	C	0.00	0.00	
9301	C	0.00	0.00	
9302	C	0.00	0.00	
9303	C	0.00	0.00	
5101	F	5.23	1.89	
5105	F	0.00	0.00	
5106	F	0.00	0.00	
5202	F	5.84	2.73	
5301	F	6.33	4.53	
6103	F	5.01	1.47	
6202	F	5.94	2.60	
6203	F	6.14	2.46	
7002	F	0.00	0.00	
7003	F	0.00	0.00	
7007	F	0.00	0.00	
7104	F	0.00	0.00	
7105	F	0.00	0.00	
7106	F	0.00	0.00	
7107	F	0.00	0.00	
7201	F	5.34	2.18	
7202	F	6.87	4.37	
7302	F	6.69	3.71	
7303	F	0.00	0.00	
8105	F	0.00	0.00	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
8304	F	6.74	5.46	
9109	F	0.00	0.00	
9110	F	0.00	0.00	
9111	F	0.00	0.00	
9112	F	0.00	0.00	
9115	F	0.00	0.00	
9203	F	0.00	0.00	
9204	F	0.00	0.00	
0151	S	3.56	1.77	
5150	S	5.76	2.93	
5151	S	5.79	3.09	
6150	S	4.43	0.00	
6250	S	5.98	3.16	
6350	S	6.33	3.76	
7150	S	3.84	2.18	
7151	S	3.92	2.83	
7152	S	4.59	0.00	
8150	S	2.98	1.25	
8151	S	3.35	1.82	
8250	S	5.55	4.14	
8251	S	5.39	3.43	
8252	S	3.81	2.33	
9150	S	2.65	1.25	
9151	S	2.34	0.00	
9152	S	2.52	1.15	
9250	S	2.58	0.87	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

from Southern Water

Your ref
19338

Our ref
DSA000041389

Date
10/04/2025

[redacted]

Dear **James Chodorowski,,**

Proposal: Premier Inn Littlehampton

Site Address: Premier Inn, Anchor Springs, Littlehampton, West Sussex, BN17 6BP

There is currently adequate capacity in the local sewerage network to accommodate a foul flow of 2.152 l/s for the above development at manhole reference TQ02029102.

Southern Water is content to accept 1.9 l/s into the surface sewer network, providing that you provide evidence of an existing connection with a betterment proposal via an S106 application (means and mode) agreement.

For further advice, please contact Southern Water, Southern House, Yeoman Road, Worthing, West Sussex, BN13 3NX (T[redacted]

Website: southernwater.co.uk or by email at: SouthernWaterPlanning@southernwater.co.uk

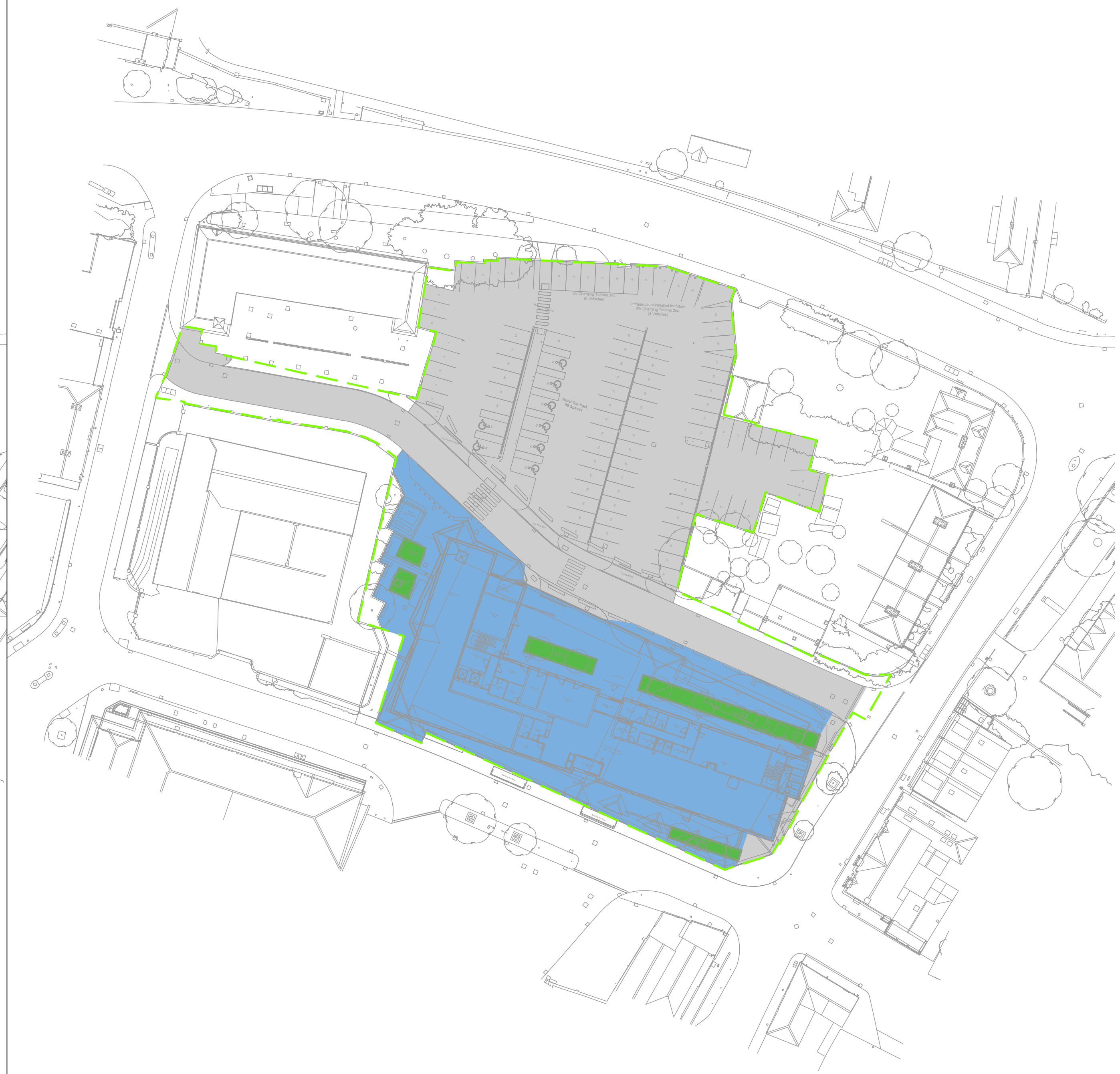
Yours faithfully,
Future Growth Planning Team
Developer Services

southernwater.co.uk/developing-building/planning-your-development

Appendix G
Drained Area Plan & Runoff Estimates

DO NOT SCALE

EXISTING DRAINED AREAS



PROPOSED DRAINED AREA

NOTES

1. This drawing is based on the following survey information:

- Topgraphical Survey: LS2838/T by Point 2 Surveyors Ltd
- Site Plan: 6122-P-100--Proposed Ground Floor Plan by Axiom Architects

LEGEND

- Application boundary
- Retained car park & road (0.322Ha)
- Existing drained area (0.236Ha)
- Proposed drained area (0.218Ha)
- Proposed landscaping (0.018Ha)

MK	REVISION	BY	DATE
P2	SITE LAYOUT UPDATED.	JPC	09.04.25
P1	FIRST ISSUE.	JPC	01.04.25

DRAWING STATUS

PLANNING

DRAWING TITLE

DRAINED AREA PLAN

PROJECT

PREMIER INN
ANCHOR SPRINGS
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London, Henley-on-Thames and Gloucester

Drawn	Ch'kd	Scales	Date
JPC	GC	1:500@A1	MAR'25

Purpose of Issue

FOR PLANNING

Drawing Number	Revision
P24-0122 SK004	P2

A1

P24-0122 - PI Littlehampton - Modified Rational Method Runoff Estimate (Pre Development)

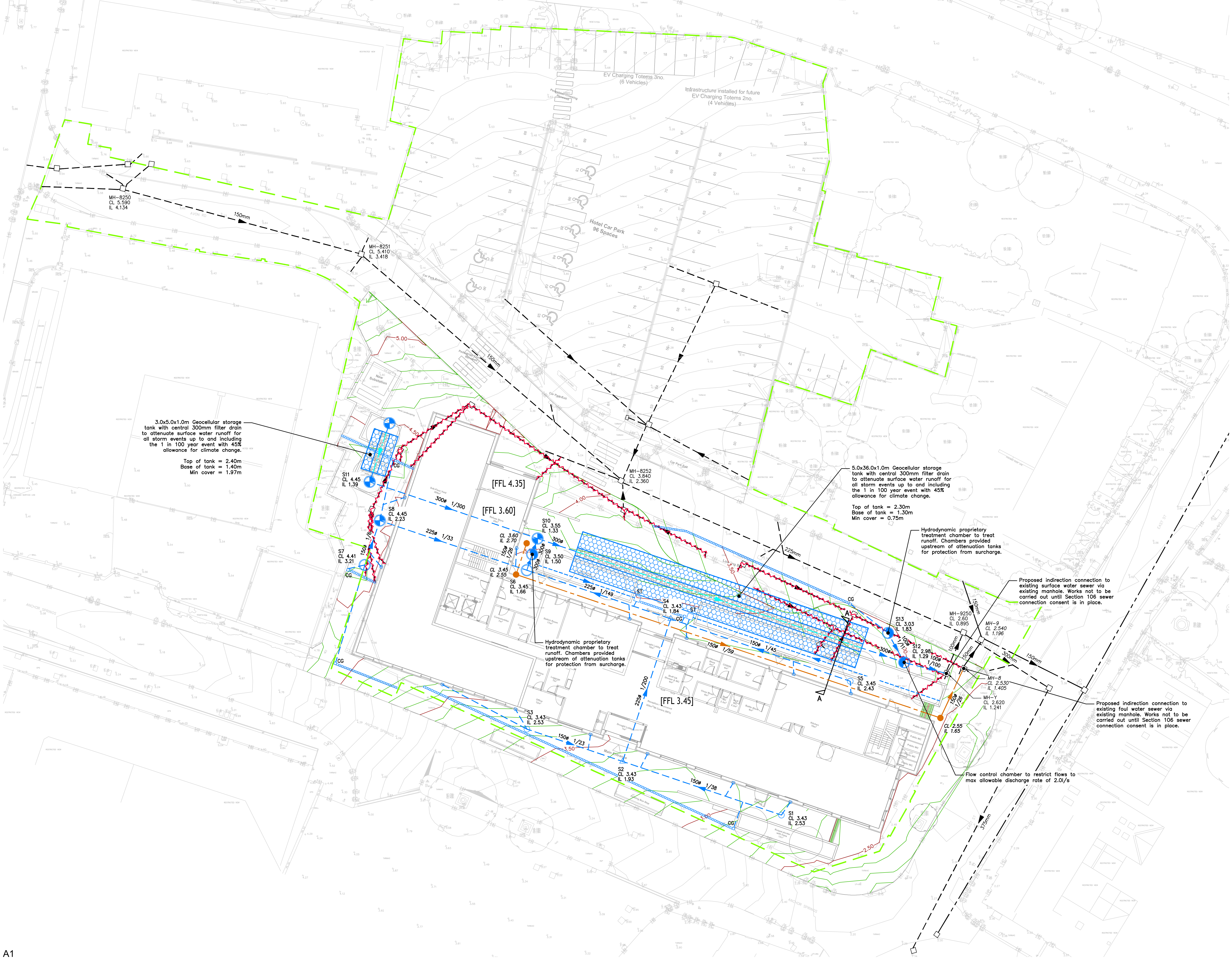
Peak Runoff Rate = 2.78 x Volume Runoff Coefficient (Cv) x Area (A) x Peak Rainfall Intensity (I_{peak})

Runoff Volume = 2.78 x Volume Runoff Coefficient (Cv) x Area (A) x Peak Rainfall Intensity (I_{avg}) x Storm Duration

Return Period	Cv	$I_{(peak)}$ (mm)	$I_{(ave)}$ (mm)	A (Ha)	Peak Runoff Rate (l/s)	Runoff Volume (m^3)
2	1.0	17.076	4.394	0.236	11.2	62.2
30	1.0	35.249	9.071	0.236	23.1	128.4
100	1.0	43.993	11.321	0.236	28.9	160.3

Appendix H
Drainage Scheme & Drainage Construction Details

DO NOT SCALE



NOTES

1. This drawing is based on the following survey information:
   - Topgraphical Survey: LS2838/T by Point 2 Surveyors Ltd
   - Site Plan: 6122-P-100--Proposed Ground Floor Plan by Axiom Architects
   - Underground Utility Survey: 4565/P01 by Three Sixty Group
   - Sewer Records: 1461411-3 by Southern Water

LEGEND

- Application boundary
- Surface water drainage
- Foul water drainage
- 300mm fully perforated collector pipe in granular surround
- Fully perforated collector pipe in granular surround
- Surface water inspection chamber
- Foul water inspection chamber
- Surface water reduced access chamber
- Surface water catchpit manhole
- Flow control chamber
- Proprietary treatment chamber
- CG Channel drain and trapped outfall unit
- Geocellular storage tank
- Existing surface water drainage
- Existing foul water drainage
- Existing combined water drainage
- Redundant drainage to be removed
- [FFL 3.00] Proposed finished floor level
- 3.00 Existing level
- Proposed contour at 0.1m intervals
- 3.00 Proposed contour at 0.5m intervals
- Existing contour at 0.1m intervals

MK	REVISION	BY	DATE
P3	SITE LAYOUT UPDATED.	JPC	09.04.25
P2	WESTERN STORAGE TANK REDUCED IN SIZE, ISSUED FOR PLANNING.	JPC	03.04.25
P1	FIRST ISSUE.	JPC	03.03.25

DRAWING STATUS
PLANNING

DRAWING TITLE
DRAINAGE SCHEME

PROJECT
PREMIER INN
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London, Henley-on-Thames and Gloucester

Drawn	Ch'kd	Scales	Date
JPC	GC	1:200@A1	MAR'25

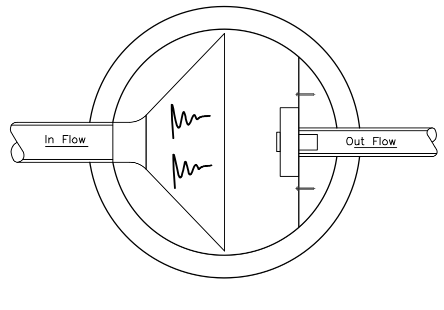
Purpose of Issue
FOR PLANNING

Drawing Number	Revision
P24-0122 SK002	P3

A1

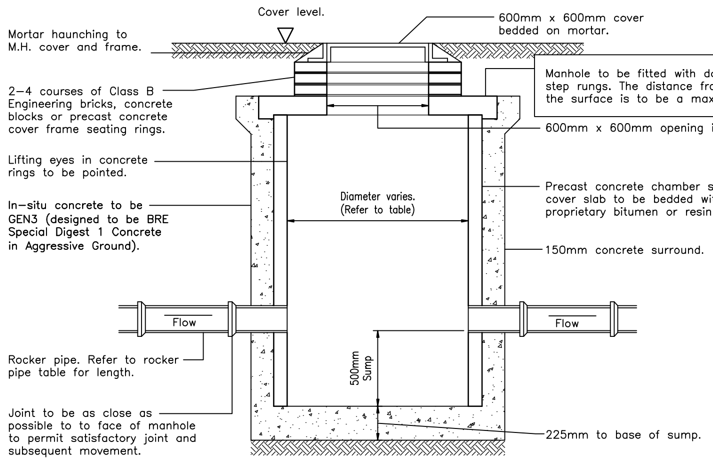
DO NOT SCALE

N.B TO BE INSTALLED TO MANUFACTURES SPECIFICATION.



HYDROBRAKE CHAMBER (PLAN)

SCALE 1:25

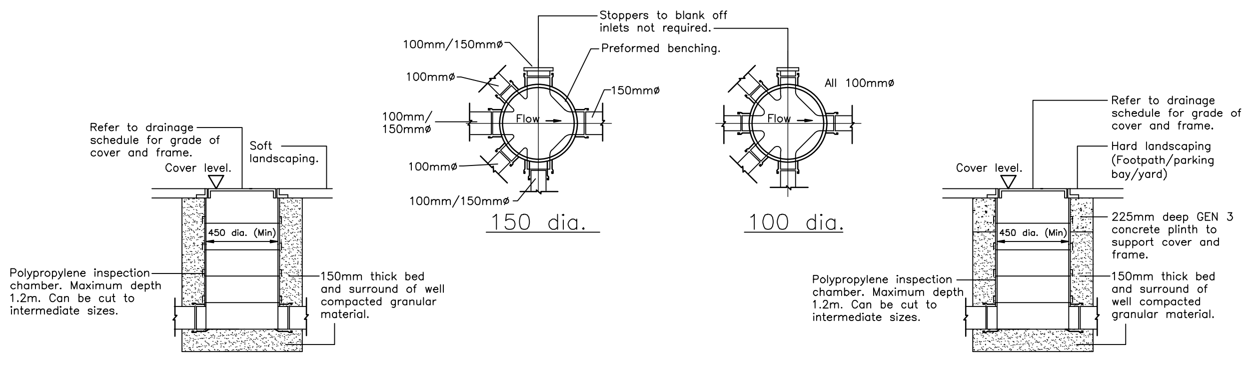


CONCRETE CATCHPIT MANHOLE

SCALE 1:25

Rocker Pipes	
Nominal dia. (mm)	Effective length (m)
150 – 600	0.6
601 – 750	1.0
Over 750	1.25

Manhole Diameters	
Diameter of largest pipe in manhole (mm)	Internal diameter of manhole (mm)
Less than 300	1200
375 – 450	1350
500 – 700	1500
750 – 900	1800
Greater than 900	Consult Undertaker

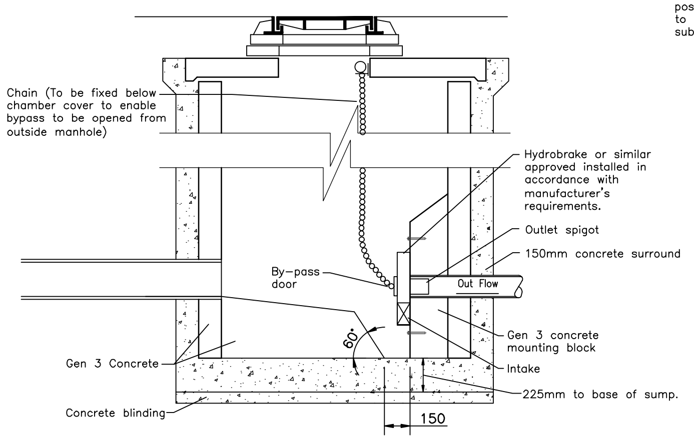


UIC SITED IN SOFT LANDSCAPING

UIC SITED IN HARD LANDSCAPING

UNIVERSAL INSPECTION CHAMBER (UIC) – POLYPROPYLENE

Max. Depth from cover level to invert of pipe 1.2m

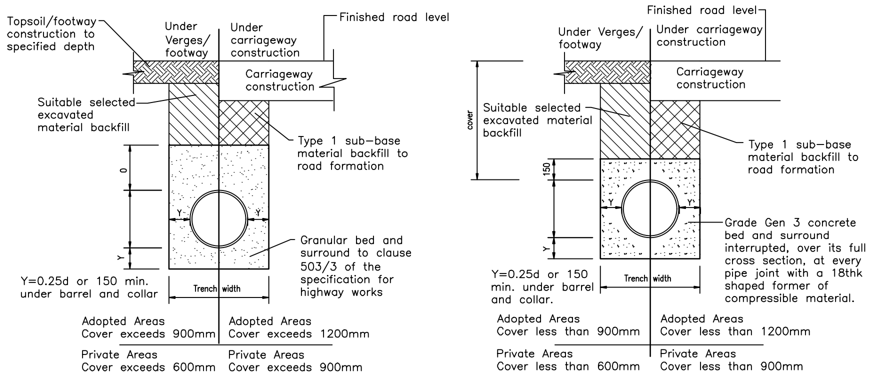


HYDROBRAKE CHAMBER (SECTION)

SCALE 1:25

Notes:

1. Chamber cover to be positioned directly above by-pass door.
2. Dimensions are indicative only and are dependant on type of control device used. Refer to manufacturer's specifications for details.
3. Hydrobrake flow control chamber to limit flows to 2.0 l/s for all storm events up to & including the 1 in 100 year storm plus 45% allowance for climate change.
hydrobrake type – CTL-SCU-0042-2000-1110-2000
design head – 1.11m
orifice diameter – 0.042m
4. For chamber construction details refer to surface water catchpit manhole construction details.



Class S Granular Surround

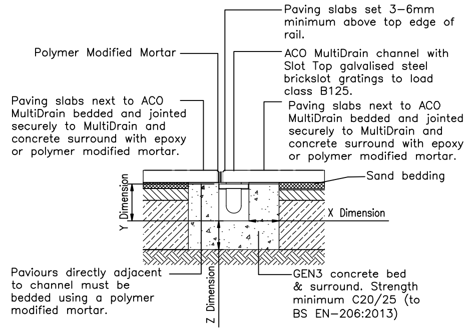
Class Z Concrete surround

PIPE BEDDING DETAILS

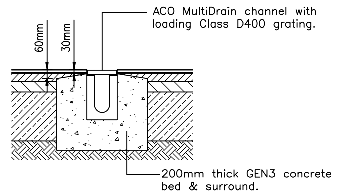
Load Class		A15	B125	C250	D400*
Minimum Dimensions (mm)	X	100	150	150	200
	Y	Full Channel Height (Less Y2 where applicable)			
	Z	100	150	150	200

NOTE

- For slot drains in the circulation areas please refer to Load Class B125.
- For slot drains in the outdoor terrace please refer to Load Class A15.
- Installer must ensure finished surface level lies above the top of the edge rail (by at least 3–6mm.



TYPICAL ACO MULTIDRAIN CHANNEL SECTION WITH BRICK SLOT GRATING DETAIL WITHIN PAVING SLAB AREAS



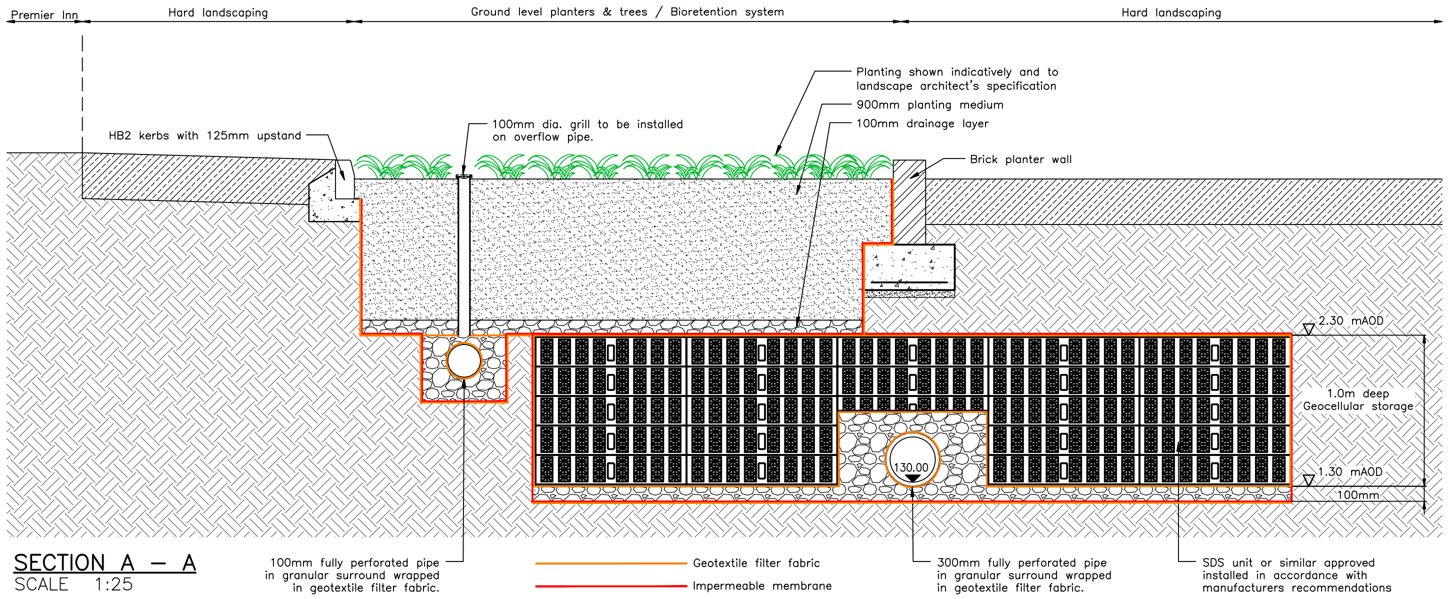
TYPICAL ACO MULTIDRAIN CHANNEL SECTION WITHIN TARMAC CIRCULATION AREAS

NOTE

Adoptable sewers and manholes to be constructed in accordance with "Approved Design and Construction Guidance", and to the approval of the adopting water authority.

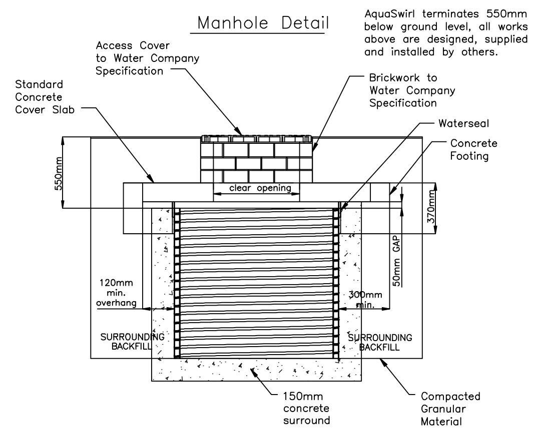
Private drainage to be constructed in accordance with the Building Regulations "Approved Document H".

Refer to P24-0122 SK002 Drainage Scheme for Section A-A.



SECTION A – A

SCALE 1:25



SDS AQUASWIRL AS-2

SCALE 1:25

MK	REVISION	BY	DATE
P2	SECTION A-A AMENDED.	JPC	09.04.25
P1	FIRST ISSUE.	JPC	01.04.25

DRAWING STATUS

PLANNING

DRAWING TITLE

DRAINAGE CONSTRUCTION DETAILS

PROJECT

PREMIER INN
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Drawn	Ch'kd	Scales	Date
JPC	GC	AS SHOWN	MAR'25

Purpose of Issue

FOR PLANNING

Drawing Number	Revision
P24-0122 SK005	P2

A1

Appendix I

Surface Water Drainage Network Simulation Results

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1		5.00	3.430	1200	502909.222	102179.634	0.900
S2	0.062	5.00	3.430	1200	502890.246	102186.045	1.500
S3		5.00	3.430	1200	502878.825	102189.905	0.900
S4			3.400	1200	502895.799	102202.478	1.557
S5		5.00	3.400	1200	502917.415	102195.058	0.970
S6	0.098	5.00	3.450	1200	502879.853	102207.953	1.790
S7		5.00	4.410	1200	502859.451	102209.507	1.200
S8	0.050	5.00	4.450	1200	502861.070	102214.299	2.220
S9			3.450	1200	502880.621	102210.227	1.950
S10			3.500	1200	502881.408	102212.521	2.170
S11		5.00	4.450	1200	502863.206	102218.644	3.060
S12			2.980	1200	502923.972	102198.112	1.690
S13	0.010	5.00	3.030	1200	502921.954	102201.392	1.200
MH-Y			2.620	1200	502928.920	102196.554	1.379

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S2	20.030	0.600	2.530	2.000	0.530	37.8	150	5.20	50.0
2.000	S3	S2	12.056	0.600	2.530	2.000	0.530	22.7	150	5.09	50.0
1.001	S2	S4	17.346	0.600	1.930	1.843	0.087	200.0	225	5.52	50.0
3.000	S5	S4	22.854	0.600	2.430	1.918	0.512	44.6	150	5.25	50.0
1.002	S4	S6	16.860	0.600	1.843	1.730	0.113	149.2	225	5.78	50.0
4.000	S7	S8	5.058	0.600	3.210	2.310	0.900	5.6	150	5.02	50.0
4.001	S8	S6	19.826	0.600	2.230	1.740	0.490	40.5	225	5.18	50.0
1.003	S6	S9	2.400	0.600	1.660	1.500	0.160	15.0	300	5.79	50.0
1.004	S9	S10	2.425	0.600	1.500	1.330	0.170	14.3	300	5.80	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.642	29.0	0.0	0.750	1.280	0.000	0.0	0	0.000
2.000	2.120	37.5	0.0	0.750	1.280	0.000	0.0	0	0.000
1.001	0.921	36.6	11.2	1.275	1.332	0.062	0.0	86	0.813
3.000	1.510	26.7	0.0	0.820	1.332	0.000	0.0	0	0.000
1.002	1.068	42.5	11.2	1.332	1.495	0.062	0.0	79	0.904
4.000	4.279	75.6	0.0	1.050	1.990	0.000	0.0	0	0.000
4.001	2.062	82.0	9.0	1.995	1.485	0.050	0.0	51	1.373
1.003	4.079	288.3	37.9	1.490	1.650	0.210	0.0	73	2.854
1.004	4.183	295.7	37.9	1.650	1.870	0.210	0.0	72	2.901

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
5.000	S11	S10	19.204	0.600	1.390	1.330	0.060	320.1	300	5.37	50.0
1.005	S10	S12	44.937	0.600	1.330	1.290	0.040	1123.4	300	7.43	48.0
6.000	S13	S12	3.851	0.600	1.830	1.490	0.340	11.3	100	5.03	50.0
1.006	S12	MH-Y	5.187	0.600	1.290	1.241	0.049	105.9	100	7.54	47.6

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
5.000	0.873	61.7	0.0	2.760	1.870	0.000	0.0	0	0.000
1.005	0.461	32.6	36.4	1.870	1.390	0.210	0.0	300	0.467
6.000	2.309	18.1	1.8	1.100	1.390	0.010	0.0	21	1.479
1.006	0.747	5.9	37.9	1.590	1.279	0.220	0.0	100	0.767

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
30	40	0	0
100	0	0	0
100	45	0	0

Node S12 Online Hydro-Brake® Control

Flap Valve	x	Objective	(CU) Linear Discharge
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	1.290	Product Number	CTL-SCU-0042-2000-1110-2000
Design Depth (m)	1.110	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node S11 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	1.400
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	984

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	15.0	0.0	1.000	15.0	0.0	1.001	0.0	0.0

Node S12 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	1.300
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	144.0	0.0	0.500	144.0	0.0	0.501	0.0	0.0

Node S12 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Link	1.005
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	1.290	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	1008	Diameter (mm)	1000

Node S12 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	1.800
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	512

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	180.0	0.0	0.500	180.0	0.0	0.501	0.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	114.502	32.400
2 year 15 minute winter	80.352	32.400
2 year 30 minute summer	74.329	21.033
2 year 30 minute winter	52.161	21.033
2 year 60 minute summer	50.327	13.300
2 year 60 minute winter	33.436	13.300
2 year 120 minute summer	34.834	9.206
2 year 120 minute winter	23.143	9.206
2 year 180 minute summer	27.763	7.144
2 year 180 minute winter	18.047	7.144
2 year 240 minute summer	22.267	5.885
2 year 240 minute winter	14.794	5.885
2 year 360 minute summer	17.076	4.394
2 year 360 minute winter	11.100	4.394
2 year 480 minute summer	13.383	3.537
2 year 480 minute winter	8.891	3.537
2 year 600 minute summer	10.889	2.978
2 year 600 minute winter	7.440	2.978
2 year 720 minute summer	9.641	2.584
2 year 720 minute winter	6.480	2.584
2 year 960 minute summer	7.827	2.061
2 year 960 minute winter	5.185	2.061
2 year 1440 minute summer	5.633	1.510
2 year 1440 minute winter	3.786	1.510
2 year 2160 minute summer	4.051	1.120
2 year 2160 minute winter	2.792	1.120
2 year 2880 minute summer	3.415	0.915
2 year 2880 minute winter	2.295	0.915
2 year 4320 minute summer	2.702	0.706
2 year 4320 minute winter	1.779	0.706
2 year 5760 minute summer	2.337	0.598
2 year 5760 minute winter	1.512	0.598
2 year 7200 minute summer	2.084	0.532

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 7200 minute winter	1.345	0.532
2 year 8640 minute summer	1.906	0.486
2 year 8640 minute winter	1.230	0.486
2 year 10080 minute summer	1.778	0.453
2 year 10080 minute winter	1.147	0.453
30 year 15 minute summer	294.886	83.443
30 year 15 minute winter	206.938	83.443
30 year 30 minute summer	195.202	55.236
30 year 30 minute winter	136.984	55.236
30 year 60 minute summer	132.612	35.046
30 year 60 minute winter	88.105	35.046
30 year 120 minute summer	80.470	21.266
30 year 120 minute winter	53.462	21.266
30 year 180 minute summer	60.875	15.665
30 year 180 minute winter	39.570	15.665
30 year 240 minute summer	47.430	12.534
30 year 240 minute winter	31.511	12.534
30 year 360 minute summer	35.249	9.071
30 year 360 minute winter	22.913	9.071
30 year 480 minute summer	27.142	7.173
30 year 480 minute winter	18.033	7.173
30 year 600 minute summer	21.813	5.966
30 year 600 minute winter	14.904	5.966
30 year 720 minute summer	19.130	5.127
30 year 720 minute winter	12.856	5.127
30 year 960 minute summer	15.302	4.029
30 year 960 minute winter	10.136	4.029
30 year 1440 minute summer	10.747	2.880
30 year 1440 minute winter	7.223	2.880
30 year 2160 minute summer	7.505	2.074
30 year 2160 minute winter	5.171	2.074
30 year 2880 minute summer	6.175	1.655
30 year 2880 minute winter	4.150	1.655
30 year 4320 minute summer	4.684	1.225
30 year 4320 minute winter	3.085	1.225
30 year 5760 minute summer	3.915	1.002
30 year 5760 minute winter	2.534	1.002
30 year 7200 minute summer	3.397	0.867
30 year 7200 minute winter	2.192	0.867
30 year 8640 minute summer	3.036	0.775
30 year 8640 minute winter	1.960	0.775
30 year 10080 minute summer	2.775	0.708
30 year 10080 minute winter	1.791	0.708
30 year +40% CC 15 minute summer	412.840	116.820
30 year +40% CC 15 minute winter	289.713	116.820
30 year +40% CC 30 minute summer	273.283	77.330
30 year +40% CC 30 minute winter	191.778	77.330
30 year +40% CC 60 minute summer	185.657	49.064
30 year +40% CC 60 minute winter	123.346	49.064
30 year +40% CC 120 minute summer	112.658	29.772
30 year +40% CC 120 minute winter	74.847	29.772
30 year +40% CC 180 minute summer	85.225	21.931

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +40% CC 180 minute winter	55.398	21.931
30 year +40% CC 240 minute summer	66.401	17.548
30 year +40% CC 240 minute winter	44.116	17.548
30 year +40% CC 360 minute summer	49.348	12.699
30 year +40% CC 360 minute winter	32.078	12.699
30 year +40% CC 480 minute summer	37.999	10.042
30 year +40% CC 480 minute winter	25.246	10.042
30 year +40% CC 600 minute summer	30.538	8.353
30 year +40% CC 600 minute winter	20.865	8.353
30 year +40% CC 720 minute summer	26.782	7.178
30 year +40% CC 720 minute winter	17.999	7.178
30 year +40% CC 960 minute summer	21.422	5.641
30 year +40% CC 960 minute winter	14.191	5.641
30 year +40% CC 1440 minute summer	15.046	4.032
30 year +40% CC 1440 minute winter	10.112	4.032
30 year +40% CC 2160 minute summer	10.507	2.904
30 year +40% CC 2160 minute winter	7.240	2.904
30 year +40% CC 2880 minute summer	8.645	2.317
30 year +40% CC 2880 minute winter	5.810	2.317
30 year +40% CC 4320 minute summer	6.557	1.714
30 year +40% CC 4320 minute winter	4.318	1.714
30 year +40% CC 5760 minute summer	5.481	1.403
30 year +40% CC 5760 minute winter	3.548	1.403
30 year +40% CC 7200 minute summer	4.756	1.213
30 year +40% CC 7200 minute winter	3.069	1.213
30 year +40% CC 8640 minute summer	4.251	1.084
30 year +40% CC 8640 minute winter	2.744	1.084
30 year +40% CC 10080 minute summer	3.885	0.991
30 year +40% CC 10080 minute winter	2.507	0.991
100 year 15 minute summer	370.669	104.887
100 year 15 minute winter	260.119	104.887
100 year 30 minute summer	248.124	70.211
100 year 30 minute winter	174.122	70.211
100 year 60 minute summer	169.543	44.805
100 year 60 minute winter	112.641	44.805
100 year 120 minute summer	101.019	26.696
100 year 120 minute winter	67.115	26.696
100 year 180 minute summer	76.017	19.562
100 year 180 minute winter	49.413	19.562
100 year 240 minute summer	59.139	15.629
100 year 240 minute winter	39.291	15.629
100 year 360 minute summer	43.993	11.321
100 year 360 minute winter	28.597	11.321
100 year 480 minute summer	33.947	8.971
100 year 480 minute winter	22.553	8.971
100 year 600 minute summer	27.330	7.475
100 year 600 minute winter	18.673	7.475
100 year 720 minute summer	24.002	6.433
100 year 720 minute winter	16.131	6.433
100 year 960 minute summer	19.232	5.064
100 year 960 minute winter	12.739	5.064
100 year 1440 minute summer	13.500	3.618

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year 1440 minute winter	9.073	3.618
100 year 2160 minute summer	9.386	2.594
100 year 2160 minute winter	6.467	2.594
100 year 2880 minute summer	7.680	2.058
100 year 2880 minute winter	5.161	2.058
100 year 4320 minute summer	5.750	1.503
100 year 4320 minute winter	3.787	1.503
100 year 5760 minute summer	4.748	1.215
100 year 5760 minute winter	3.073	1.215
100 year 7200 minute summer	4.077	1.040
100 year 7200 minute winter	2.631	1.040
100 year 8640 minute summer	3.611	0.921
100 year 8640 minute winter	2.330	0.921
100 year 10080 minute summer	3.273	0.835
100 year 10080 minute winter	2.112	0.835
100 year +45% CC 15 minute summer	537.470	152.086
100 year +45% CC 15 minute winter	377.172	152.086
100 year +45% CC 30 minute summer	359.780	101.805
100 year +45% CC 30 minute winter	252.477	101.805
100 year +45% CC 60 minute summer	245.838	64.968
100 year +45% CC 60 minute winter	163.329	64.968
100 year +45% CC 120 minute summer	146.478	38.710
100 year +45% CC 120 minute winter	97.316	38.710
100 year +45% CC 180 minute summer	110.225	28.365
100 year +45% CC 180 minute winter	71.649	28.365
100 year +45% CC 240 minute summer	85.751	22.662
100 year +45% CC 240 minute winter	56.971	22.662
100 year +45% CC 360 minute summer	63.790	16.415
100 year +45% CC 360 minute winter	41.465	16.415
100 year +45% CC 480 minute summer	49.223	13.008
100 year +45% CC 480 minute winter	32.702	13.008
100 year +45% CC 600 minute summer	39.628	10.839
100 year +45% CC 600 minute winter	27.076	10.839
100 year +45% CC 720 minute summer	34.804	9.328
100 year +45% CC 720 minute winter	23.390	9.328
100 year +45% CC 960 minute summer	27.886	7.343
100 year +45% CC 960 minute winter	18.472	7.343
100 year +45% CC 1440 minute summer	19.575	5.246
100 year +45% CC 1440 minute winter	13.156	5.246
100 year +45% CC 2160 minute summer	13.610	3.761
100 year +45% CC 2160 minute winter	9.378	3.761
100 year +45% CC 2880 minute summer	11.136	2.984
100 year +45% CC 2880 minute winter	7.484	2.984
100 year +45% CC 4320 minute summer	8.337	2.180
100 year +45% CC 4320 minute winter	5.490	2.180
100 year +45% CC 5760 minute summer	6.884	1.762
100 year +45% CC 5760 minute winter	4.456	1.762
100 year +45% CC 7200 minute summer	5.911	1.508
100 year +45% CC 7200 minute winter	3.815	1.508
100 year +45% CC 8640 minute summer	5.235	1.336
100 year +45% CC 8640 minute winter	3.379	1.336
100 year +45% CC 10080 minute summer	4.746	1.211

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +45% CC 10080 minute winter	3.063	1.211

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.31%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	1	2.530	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S2	10	2.020	0.090	11.6	0.1014	0.0000	OK
15 minute summer	S3	1	2.530	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S4	11	1.926	0.083	11.4	0.0936	0.0000	OK
15 minute summer	S5	1	2.430	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S6	10	1.755	0.095	38.6	0.1080	0.0000	OK
15 minute summer	S7	1	3.210	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S8	10	2.282	0.052	9.4	0.0594	0.0000	OK
15 minute summer	S9	11	1.601	0.101	38.6	0.1143	0.0000	OK
360 minute winter	S10	344	1.560	0.230	9.5	0.2605	0.0000	OK
360 minute winter	S11	344	1.559	0.169	0.5	2.4636	0.0000	OK
360 minute winter	S12	344	1.559	0.269	5.8	38.3451	0.0000	SURCHARGED
15 minute summer	S13	10	1.853	0.023	1.9	0.0260	0.0000	OK
360 minute winter	MH-Y	344	1.269	0.028	1.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	S2	0.0	0.000	0.000	0.0136	
15 minute summer	S2	1.001	S4	11.4	0.824	0.312	0.2409	
15 minute summer	S3	2.000	S2	0.0	0.000	0.000	0.0082	
15 minute summer	S4	1.002	S6	11.4	0.889	0.269	0.2162	
15 minute summer	S5	3.000	S4	0.0	0.000	0.000	0.0039	
15 minute summer	S6	1.003	S9	38.6	1.935	0.134	0.0478	
15 minute summer	S7	4.000	S8	0.0	0.000	0.000	0.0000	
15 minute summer	S8	4.001	S6	9.3	1.351	0.113	0.1362	
15 minute summer	S9	1.004	S10	38.4	1.338	0.130	0.0788	
360 minute winter	S10	1.005	S12	5.5	0.285	0.170	2.8012	
360 minute winter	S11	5.000	S10	-0.5	-0.041	-0.009	0.9497	
360 minute winter	S12	1.006	MH-Y	1.0	0.545	0.171	0.0096	56.8
15 minute summer	S13	6.000	S12	1.9	1.440	0.104	0.0050	

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.31%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	1	2.530	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S2	10	2.093	0.163	29.9	0.1841	0.0000	OK
15 minute summer	S3	1	2.530	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S4	11	1.991	0.148	29.2	0.1669	0.0000	OK
15 minute summer	S5	1	2.430	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S6	11	1.874	0.214	99.5	0.2425	0.0000	OK
15 minute summer	S7	1	3.210	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S8	10	2.313	0.083	24.1	0.0943	0.0000	OK
480 minute winter	S9	464	1.860	0.360	25.5	0.4072	0.0000	SURCHARGED
240 minute winter	S10	172	1.872	0.542	30.1	0.6127	0.0000	SURCHARGED
480 minute winter	S11	464	1.860	0.470	5.4	7.0916	0.0000	SURCHARGED
480 minute winter	S12	464	1.860	0.570	10.3	85.9674	0.0000	SURCHARGED
15 minute summer	S13	10	1.868	0.038	4.8	0.0434	0.0000	OK
480 minute winter	MH-Y	464	1.275	0.034	1.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	S2	0.0	0.000	0.000	0.1146	
15 minute summer	S2	1.001	S4	29.2	1.014	0.799	0.5035	
15 minute summer	S3	2.000	S2	0.0	0.000	0.000	0.0690	
15 minute summer	S4	1.002	S6	29.0	1.103	0.683	0.4596	
15 minute summer	S5	3.000	S4	0.0	0.000	0.000	0.0965	
15 minute summer	S6	1.003	S9	98.4	2.006	0.341	0.1492	
15 minute summer	S7	4.000	S8	0.0	0.000	0.000	0.0002	
15 minute summer	S8	4.001	S6	24.1	1.589	0.294	0.3732	
480 minute winter	S9	1.004	S10	22.6	0.516	0.076	0.1708	
240 minute winter	S10	1.005	S12	17.5	0.531	0.537	3.1644	
480 minute winter	S11	5.000	S10	-5.4	-0.076	-0.087	1.3523	
480 minute winter	S12	1.006	MH-Y	1.4	0.599	0.245	0.0124	114.2
15 minute summer	S13	6.000	S12	4.8	1.833	0.263	0.0117	

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 98.31%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	1	2.530	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S2	12	2.370	0.440	41.8	0.4974	0.0000	SURCHARGED
15 minute summer	S3	1	2.530	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S4	12	2.272	0.429	36.6	0.4857	0.0000	SURCHARGED
15 minute summer	S5	1	2.430	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S6	12	2.170	0.510	128.5	0.5770	0.0000	SURCHARGED
15 minute summer	S7	1	3.210	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S8	10	2.330	0.100	33.7	0.1127	0.0000	OK
15 minute summer	S9	12	2.077	0.577	125.7	0.6521	0.0000	SURCHARGED
480 minute winter	S10	464	2.072	0.742	31.3	0.8397	0.0000	SURCHARGED
480 minute winter	S11	464	2.072	0.682	3.7	10.3611	0.0000	SURCHARGED
480 minute winter	S12	464	2.072	0.782	13.8	125.4036	0.0000	SURCHARGED
480 minute winter	S13	464	2.072	0.242	0.7	0.2741	0.0000	SURCHARGED
480 minute winter	MH-Y	464	1.277	0.036	1.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	S2	0.0	0.000	0.000	0.1763	
15 minute summer	S2	1.001	S4	36.6	1.053	1.001	0.6899	
15 minute summer	S3	2.000	S2	0.0	0.000	0.000	0.1061	
15 minute summer	S4	1.002	S6	35.5	1.036	0.836	0.6705	
15 minute summer	S5	3.000	S4	0.0	0.000	0.000	0.2012	
15 minute summer	S6	1.003	S9	125.7	2.007	0.436	0.1690	
15 minute summer	S7	4.000	S8	0.0	0.000	0.000	0.0034	
15 minute summer	S8	4.001	S6	33.6	1.542	0.409	0.5623	
15 minute summer	S9	1.004	S10	124.2	1.764	0.420	0.1708	
480 minute winter	S10	1.005	S12	13.1	0.384	0.403	3.1644	
480 minute winter	S11	5.000	S10	4.3	0.061	0.069	1.3523	
480 minute winter	S12	1.006	MH-Y	1.7	0.623	0.284	0.0139	143.2
480 minute winter	S13	6.000	S12	0.7	0.923	0.039	0.0301	

Results for 100 year Critical Storm Duration. Lowest mass balance: 98.31%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	1	2.530	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S2	12	2.215	0.285	37.5	0.3220	0.0000	SURCHARGED
15 minute summer	S3	1	2.530	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S4	12	2.137	0.294	36.4	0.3325	0.0000	SURCHARGED
15 minute summer	S5	1	2.430	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S6	12	2.055	0.395	123.9	0.4464	0.0000	SURCHARGED
15 minute summer	S7	1	3.210	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S8	10	2.324	0.094	30.3	0.1062	0.0000	OK
600 minute winter	S9	585	1.995	0.495	44.6	0.5600	0.0000	SURCHARGED
600 minute winter	S10	585	1.995	0.665	19.8	0.7522	0.0000	SURCHARGED
600 minute winter	S11	585	1.995	0.605	3.3	9.1719	0.0000	SURCHARGED
600 minute winter	S12	585	1.995	0.705	10.9	111.0547	0.0000	SURCHARGED
600 minute winter	S13	585	1.995	0.165	0.5	0.1867	0.0000	SURCHARGED
600 minute winter	MH-Y	585	1.276	0.035	1.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	S2	0.0	0.000	0.000	0.1763	
15 minute summer	S2	1.001	S4	36.4	1.041	0.995	0.6899	
15 minute summer	S3	2.000	S2	0.0	0.000	0.000	0.1061	
15 minute summer	S4	1.002	S6	34.5	1.072	0.812	0.6705	
15 minute summer	S5	3.000	S4	0.0	0.000	0.000	0.2012	
15 minute summer	S6	1.003	S9	114.0	2.007	0.395	0.1690	
15 minute summer	S7	4.000	S8	0.0	0.000	0.000	0.0021	
15 minute summer	S8	4.001	S6	30.2	1.600	0.368	0.5486	
600 minute winter	S9	1.004	S10	18.5	0.464	0.063	0.1708	
600 minute winter	S10	1.005	S12	10.4	0.404	0.320	3.1644	
600 minute winter	S11	5.000	S10	4.1	0.058	0.066	1.3523	
600 minute winter	S12	1.006	MH-Y	1.6	0.615	0.270	0.0134	140.9
600 minute winter	S13	6.000	S12	0.5	0.851	0.028	0.0301	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.31%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	12	2.760	0.230	6.0	0.2596	0.0000	SURCHARGED
15 minute summer	S2	12	2.766	0.836	54.4	0.9459	0.0000	SURCHARGED
15 minute summer	S3	12	2.774	0.244	2.9	0.2757	0.0000	SURCHARGED
15 minute summer	S4	12	2.628	0.785	43.5	0.8873	0.0000	SURCHARGED
15 minute summer	S5	12	2.648	0.218	5.5	0.2463	0.0000	SURCHARGED
15 minute summer	S6	12	2.486	0.826	159.6	0.9339	0.0000	SURCHARGED
15 minute summer	S7	1	3.210	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S8	11	2.604	0.374	43.9	0.4231	0.0000	SURCHARGED
15 minute summer	S9	12	2.339	0.839	154.8	0.9494	0.0000	SURCHARGED
480 minute winter	S10	472	2.300	0.970	40.6	1.0969	0.0000	SURCHARGED
480 minute winter	S11	472	2.300	0.910	1.4	13.8597	0.0000	SURCHARGED
480 minute winter	S12	472	2.300	1.010	17.6	167.6331	0.0000	SURCHARGED
480 minute winter	S13	472	2.300	0.470	0.9	0.5314	0.0000	SURCHARGED
480 minute winter	MH-Y	472	1.280	0.039	1.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	S2	-6.0	-0.339	-0.206	0.3526	
15 minute summer	S2	1.001	S4	43.5	1.093	1.188	0.6899	
15 minute summer	S3	2.000	S2	4.0	-0.271	0.106	0.2122	
15 minute summer	S4	1.002	S6	43.9	1.103	1.033	0.6705	
15 minute summer	S5	3.000	S4	-5.5	-0.373	-0.205	0.4023	
15 minute summer	S6	1.003	S9	154.8	2.199	0.537	0.1690	
15 minute summer	S7	4.000	S8	0.0	0.000	0.000	0.0445	
15 minute summer	S8	4.001	S6	40.5	1.625	0.494	0.7885	
15 minute summer	S9	1.004	S10	151.9	2.157	0.514	0.1708	
480 minute winter	S10	1.005	S12	16.9	0.484	0.519	3.1644	
480 minute winter	S11	5.000	S10	4.1	0.058	0.067	1.3523	
480 minute winter	S12	1.006	MH-Y	1.9	0.643	0.321	0.0152	168.0
480 minute winter	S13	6.000	S12	0.9	0.925	0.050	0.0301	

Appendix J

Pre and Post Development Exceedance Flow Path Plans

DO NOT SCALE

PRE DEVELOPMENT EXCEEDANCE FLOW PATHS

POST DEVELOPMENT EXCEEDANCE FLOW PATHS

NOTES

1. This drawing is based on the following survey information:

- Topgraphical Survey: LS2838/T by Point 2 Surveyors Ltd
- Site Plan: 6122-P-100--Proposed Ground Floor Plan by Axiom Architects

LEGEND

Application boundary

Pre development exceedance flow path

Post development exceedance flow path

MK	REVISION	BY	DATE
P2	SITE LAYOUT UPDATED.	JPC	09.04.25
P1	FIRST ISSUE.	JPC	01.04.25

DRAWING STATUS

PLANNING

DRAWING TITLE

PRE AND POST DEVELOPMENT EXCEEDANCE FLOW PATH PLAN

PROJECT

PREMIER INN
ANCHOR SPRINGS
LITTLEHAMPTON

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Drawn	Ch'kd	Scales	Date
JPC	GC	1:500@A1	MAR'25

Purpose of Issue

FOR PLANNING

Drawing Number	Revision
P24-0122 SK008	P2

A1

Appendix K

Surcharged Outfall Simulation Results

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1		5.00	3.430	1200	502909.222	102179.634	0.900
S2	0.062	5.00	3.430	1200	502890.246	102186.045	1.500
S3		5.00	3.430	1200	502878.825	102189.905	0.900
S4			3.400	1200	502895.799	102202.478	1.557
S5		5.00	3.400	1200	502917.415	102195.058	0.970
S6	0.098	5.00	3.450	1200	502879.853	102207.953	1.790
S7		5.00	4.410	1200	502859.451	102209.507	1.200
S8	0.050	5.00	4.450	1200	502861.070	102214.299	2.220
S9			3.450	1200	502880.621	102210.227	1.950
S10			3.500	1200	502881.408	102212.521	2.170
S11		5.00	4.450	1200	502863.206	102218.644	3.060
S12			2.980	1200	502923.972	102198.112	1.690
S13	0.010	5.00	3.030	1200	502921.954	102201.392	1.200
MH-Y			2.620	1200	502928.920	102196.554	1.379

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S2	20.030	0.600	2.530	2.000	0.530	37.8	150	5.20	50.0
2.000	S3	S2	12.056	0.600	2.530	2.000	0.530	22.7	150	5.09	50.0
1.001	S2	S4	17.346	0.600	1.930	1.843	0.087	200.0	225	5.52	50.0
3.000	S5	S4	22.854	0.600	2.430	1.918	0.512	44.6	150	5.25	50.0
1.002	S4	S6	16.860	0.600	1.843	1.730	0.113	149.2	225	5.78	50.0
4.000	S7	S8	5.058	0.600	3.210	2.310	0.900	5.6	150	5.02	50.0
4.001	S8	S6	19.826	0.600	2.230	1.740	0.490	40.5	225	5.18	50.0
1.003	S6	S9	2.400	0.600	1.660	1.500	0.160	15.0	300	5.79	50.0
1.004	S9	S10	2.425	0.600	1.500	1.330	0.170	14.3	300	5.80	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.642	29.0	0.0	0.750	1.280	0.000	0.0	0	0.000
2.000	2.120	37.5	0.0	0.750	1.280	0.000	0.0	0	0.000
1.001	0.921	36.6	11.2	1.275	1.332	0.062	0.0	86	0.813
3.000	1.510	26.7	0.0	0.820	1.332	0.000	0.0	0	0.000
1.002	1.068	42.5	11.2	1.332	1.495	0.062	0.0	79	0.904
4.000	4.279	75.6	0.0	1.050	1.990	0.000	0.0	0	0.000
4.001	2.062	82.0	9.0	1.995	1.485	0.050	0.0	51	1.373
1.003	4.079	288.3	37.9	1.490	1.650	0.210	0.0	73	2.854
1.004	4.183	295.7	37.9	1.650	1.870	0.210	0.0	72	2.901

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
5.000	S11	S10	19.204	0.600	1.390	1.330	0.060	320.1	300	5.37	50.0
1.005	S10	S12	44.937	0.600	1.330	1.290	0.040	1123.4	300	7.43	48.0
6.000	S13	S12	3.851	0.600	1.830	1.490	0.340	11.3	100	5.03	50.0
1.006	S12	MH-Y	5.187	0.600	1.290	1.241	0.049	105.9	100	7.54	47.6

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
5.000	0.873	61.7	0.0	2.760	1.870	0.000	0.0	0	0.000
1.005	0.461	32.6	36.4	1.870	1.390	0.210	0.0	300	0.467
6.000	2.309	18.1	1.8	1.100	1.390	0.010	0.0	21	1.479
1.006	0.747	5.9	37.9	1.590	1.279	0.220	0.0	100	0.767

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	0	0	0

Node MH-Y Surcharged Outfall

Overrides Design Area	x	Depression Storage Area (m²)	0	Evapo-transpiration (mm/day)	0
Overrides Design Additional Inflow	x	Depression Storage Depth (mm)	0		

Applies to 30yr 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080 minute storms

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	1.100	1800	1.100	3600	1.100	5400	1.100	7200	1.100	9000	1.100
360	1.100	2160	1.100	3960	1.100	5760	1.100	7560	1.100	9360	1.100
720	1.100	2520	1.100	4320	1.100	6120	1.100	7920	1.100	9720	1.100
1080	1.100	2880	1.100	4680	1.100	6480	1.100	8280	1.100	10080	1.100
1440	1.100	3240	1.100	5040	1.100	6840	1.100	8640	1.100		

Node S12 Online Hydro-Brake® Control

Flap Valve	x	Objective	(CU) Linear Discharge
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	1.290	Product Number	CTL-SCU-0042-2000-1110-2000
Design Depth (m)	1.110	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node S11 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	1.400
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	15.0	0.0	1.000	15.0	0.0	1.001	0.0	0.0

Node S12 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	1.300
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	144.0	0.0	0.500	144.0	0.0	0.501	0.0	0.0

Node S12 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Link	1.005
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	1.290	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)		Diameter (mm)	1000

Node S12 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	1.800
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	180.0	0.0	0.500	180.0	0.0	0.501	0.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 15 minute summer	294.886	83.443	30 year 720 minute winter	12.856	5.127
30 year 15 minute winter	206.938	83.443	30 year 960 minute summer	15.302	4.029
30 year 30 minute summer	195.202	55.236	30 year 960 minute winter	10.136	4.029
30 year 30 minute winter	136.984	55.236	30 year 1440 minute summer	10.747	2.880
30 year 60 minute summer	132.612	35.046	30 year 1440 minute winter	7.223	2.880
30 year 60 minute winter	88.105	35.046	30 year 2160 minute summer	7.505	2.074
30 year 120 minute summer	80.470	21.266	30 year 2160 minute winter	5.171	2.074
30 year 120 minute winter	53.462	21.266	30 year 2880 minute summer	6.175	1.655
30 year 180 minute summer	60.875	15.665	30 year 2880 minute winter	4.150	1.655
30 year 180 minute winter	39.570	15.665	30 year 4320 minute summer	4.684	1.225
30 year 240 minute summer	47.430	12.534	30 year 4320 minute winter	3.085	1.225
30 year 240 minute winter	31.511	12.534	30 year 5760 minute summer	3.915	1.002
30 year 360 minute summer	35.249	9.071	30 year 5760 minute winter	2.534	1.002
30 year 360 minute winter	22.913	9.071	30 year 7200 minute summer	3.397	0.867
30 year 480 minute summer	27.142	7.173	30 year 7200 minute winter	2.192	0.867
30 year 480 minute winter	18.033	7.173	30 year 8640 minute summer	3.036	0.775
30 year 600 minute summer	21.813	5.966	30 year 8640 minute winter	1.960	0.775
30 year 600 minute winter	14.904	5.966	30 year 10080 minute summer	2.775	0.708
30 year 720 minute summer	19.130	5.127	30 year 10080 minute winter	1.791	0.708

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	1	2.530	0.000	0.0	0.0000	0.0000	OK
10080 minute summer	S2	6240	2.403	0.473	0.5	0.5351	0.0000	SURCHARGED
15 minute summer	S3	1	2.530	0.000	0.0	0.0000	0.0000	OK
10080 minute summer	S4	6240	2.403	0.560	0.5	0.6334	0.0000	SURCHARGED
15 minute summer	S5	1	2.430	0.000	0.0	0.0000	0.0000	OK
10080 minute summer	S6	6240	2.403	0.743	4.2	0.8403	0.0000	SURCHARGED
15 minute summer	S7	1	3.210	0.000	0.0	0.0000	0.0000	OK
10080 minute summer	S8	6240	2.403	0.173	0.4	0.1958	0.0000	OK
10080 minute summer	S9	6240	2.403	0.903	6.8	1.0213	0.0000	SURCHARGED
10080 minute summer	S10	6240	2.403	1.073	7.0	1.2136	0.0000	SURCHARGED
10080 minute summer	S11	6240	2.403	1.013	0.9	15.4101	0.0000	SURCHARGED
10080 minute summer	S12	6240	2.403	1.113	1.5	169.2518	0.0000	SURCHARGED
10080 minute summer	S13	6240	2.403	0.573	0.1	0.6480	0.0000	SURCHARGED
15 minute summer	MH-Y	1	2.341	1.100	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	S2	0.0	0.000	0.000	0.1146	
10080 minute summer	S2	1.001	S4	0.5	0.317	0.014	0.6899	
15 minute summer	S3	2.000	S2	0.0	0.000	0.000	0.0690	
10080 minute summer	S4	1.002	S6	0.5	0.315	0.011	0.6705	
15 minute summer	S5	3.000	S4	0.0	0.000	0.000	0.0965	
10080 minute summer	S6	1.003	S9	6.7	0.720	0.023	0.1690	
15 minute summer	S7	4.000	S8	0.0	0.000	0.000	0.0002	
10080 minute summer	S8	4.001	S6	0.4	0.438	0.005	0.7192	
10080 minute summer	S9	1.004	S10	6.8	0.190	0.023	0.1708	
10080 minute summer	S10	1.005	S12	1.5	0.109	0.045	3.1644	
10080 minute summer	S11	5.000	S10	-0.9	-0.013	-0.015	1.3523	
10080 minute summer	S12	1.006	MH-Y	0.6	0.072	0.095	0.0406	58.6
10080 minute summer	S13	6.000	S12	0.1	0.021	0.006	0.0301	

Appendix L

Drainage Maintenance Plan

Drainage Management & Maintenance Plan
Premier Inn Anchor Springs, Littlehampton

Whitbread PLC run a national chain of hotels under the Premier Inn brand which are maintained by their estate maintenance team. The developments drainage system would be maintained as part of the estate and this plan sets out the maintenance approach.

The drainage system comprises separate foul water and surface water drainage networks that comprise of traditional systems of below ground pipework. The systems discharge to foul and surface water sewers that are owned and operated by Southern Water. The surface water drainage system is designed to control, treat and attenuate surface water runoff as follows:

- Surface water runoff from the development discharges to the surface water sewer in Avon Road via an existing connection fitted with a flow control chamber that restrictS surface water flows from the development to a maximum allowable discharge rate of 2.0 l/s.
- Runoff is conveyed by a traditional network of below ground pipework that is designed to surcharge into a below ground attenuation tank located in the area of hard/soft landscaping between the hotel building and Avon Road. The attenuation tank provides capacity to store runoff on site for a required 1 in 100 year rainfall event with 45% allowance for climate change.
- The attenuation tank is laid on a protective geotextile filter fabric and wrapped in an impermeable geomembrane to prevent groundwater from entering.
- The attenuation tank has been fully co-ordinated with the soft landscaping design with areas of planting above the attenuation tank designed as bioretention areas with 850mm minimum planting depth and filtration / protective geotextiles including drainage layer. These areas also drain areas of surrounding hard landscaping, which have been designed with falls towards the areas of planting as shown by design contours on the drainage scheme drawing.
- Remaining areas of hard landscaping are drained using linear drainage channels to prevent runoff from discharging on to the public highway. The linear drainage in turn discharges to the network of below ground pipework.
- All roofwater runoff is drained by rainwater down pipes to the network of below ground pipework.
- The network of below ground pipework discharges through a hydrodynamic proprietary treatment chamber, which would prevent silt and sediment from entering the attenuation tank.

The Maintenance Contractor tasked with carrying out any maintenance works should provide a risk assessment and method statement that adopts best practice health and safety policies for maintenance personnel throughout the duration of any maintenance works. Measures may include:

- Ensure the use of safe systems of work and procedures are followed.

- Certificated operatives only to be used for all confined space entry.
- Ensure appropriate PPE is worn at all times including the use of safety goggles, ear defenders and other relevant equipment when using high pressure jetting.
- Do not work in weather conditions where flooding or surging is likely.
- Erect barriers where appropriate and provide adequate lighting.
- No operations to be carried out by operatives working alone.
- Time maintenance to not conflict with other on-site activities.
- Method statement to be prepared and approved prior to entry into confined space.

The drainage system should be operated and maintained in accordance with the regime set out in the *Tables 1* to *5* below.

Table 1: Below Ground Drainage System - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Remove all litter and debris from external hard landscaped areas and adjacent landscaping, which may pose a risk to the performance of the system.	Monthly.
	Remove build-up of sediment / silt in catch-pits and dispose of oils / petrol residues using safe standard practices.	As required.
	Stabilise and mow adjacent landscaped areas and remove weeds.	
Remedial actions	Repair or rehabilitate inlet and outlets to ensure they are in good condition and operating as designed.	
	Remediate any landscaping, which has raised to within 50mm of the level of adjacent hard landscaping.	
Monitoring	Check of all inlets / outlets for blockages or evidence of physical damage with any necessary remedial action or clearance carried out if required.	Monthly for first 3 months of operation, then every 6 months & following severe rainfall events.
	Inspect all surfaces for ponding, or silt accumulation. Record areas where water is ponding for more than 48 hours and carry out any remedial work deemed necessary.	After severe storms.

Table 2: Geocellular Storage Tanks - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for first 3 months of operation, then every 6 months.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly.
	Where rainfall infiltrates into blocks from above, check surface of filter for blockage by silt, algae or other matter. Remove and replace surface infiltration medium as necessary.	Monthly / after severe storms.
	Remove sediment from pre-treatment structures.	Annually, or as required.
Remedial actions	Repair/rehabilitation of inlets, outlet, overflows and vents.	As required.
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually and after large storms.

Table 3: Bioretention Rain Garden - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for first 3 months of operation, then every 6 months.
	Debris removal from catchment surface (where may	Monthly.

	cause risks to performance).	
	Where rainfall infiltrates into blocks from above, check surface of filter for blockage by silt, algae or other matter. Remove and replace surface infiltration medium as necessary.	Monthly / after severe storms.
	Remove sediment from pre-treatment structures.	Annually, or as required.
Remedial actions	Repair/rehabilitation of inlets, outlet, overflows and vents.	As required.
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually and after large storms.

Table 4: Flow Control Chambers - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Cleaning off the flow control device of any debris/ sediment	As required
Remedial Actions	Flow control device repairs.	As required
	Repair of erosion damage, or damage to chamber.	
Monitoring	Inspection of the chamber for debris and sediment build up.	Monthly for first 3 months, thereafter, every 6 months and following severe storm events.

Table 5: Proprietary Treatment Chamber - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove, sediment, oil, grease and floatable	As necessary – indicated by system inspections or immediately following significant spill
Remedial Actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

Appendix M
Levels Scheme

DO NOT SCALE

NOTES

1. This drawing is based on the following survey information:
   - Topgraphical Survey: LS2838/T by Point 2 Surveyors Ltd
   - Site Plan: 6122–P–100––Proposed Ground Floor Plan by Axiom Architects

LEVELS LEGEND

[FFL 3.00]	Proposed finished floor level
3.00	Proposed level
3.00	Existing level
1 in 40	Proposed gradient
R600	Denotes extent of retaining wall with max. retaining height shown.
	Proposed contour at 0.1m intervals
3.00	Proposed contour at 0.5m intervals
	Existing contour at 0.1m intervals

MK	REVISION	BY	DATE
P3	SITE LAYOUT UPDATED.	JPC	09.04.25
P2	SITE LAYOUT UPDATED.	JPC	03.04.25
P1	FIRST ISSUE.	JPC	03.03.25

DRAWING STATUS

PLANNING

DRAWING TITLE

LEVELS SCHEME

PROJECT

PREMIER INN
WAITROSE SITE
LITTLEHAMPTON

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Drawn	Ch'kd	Scales	Date
JPC	GC	1:200@A1	FEB'25

Purpose of Issue

FOR PLANNING

Drawing Number	Revision
P24-0122 SK001	P3

A1

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Our Services

- Structural Engineering
- Civil & Infrastructure
- Temporary Works
- Flood Risk Assessments
- Sustainable Drainage (SuDS)
- Feasibility Studies
- Site Appraisals
- Conservation
- Transport Planning