



FLOOD RISK ASSESSMENTS



Flood Risk Assessment and Surface Water Drainage Strategy

2509-1061 – 37 Albion Street, Southwick, Brighton

DOCUMENT CONTROL SHEET

REV	ISSUE PURPOSE	AUTHOR	CHECKED	APPROVED	DATE
-	Submission to Client	RLP	SDM	DW	14.05.2026

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1. INTRODUCTION

1.1 Project

Ingent Consulting Engineers have been asked to produce a Flood Risk Assessment to support an Outline Planning Application in relation to the proposed residential development at 37 Albion Street, Southwick, Brighton, West Sussex, BN42 4DN.

The development is to comprise of the erection of 32 no. flats [C3] and associated works, following demolition of existing commercial building. (Please refer to **Appendix A** for the proposed site location plan and proposed site layout). The development land is within the red line boundary.

1.2 Site Location and Characteristics

The site is located to the west of Southwick, just north of the River Adur. The closest significant water feature is the River Adur which is measured as 50m south of the development through third party land.

The site is bound to the west by new residential flats, to the east by a used car dealer garage and forecourt, to the south is Albion Street, and to the north is mature trees which borders the West Coastway railway line.

The land is brownfield, made up completely of existing buildings or hardstanding.

The existing site falls southerly, either falling into the hardstanding area near the southern boundary or exiting the site in the south east corner into Albion Street. There is approximately 0.37m of fall from the north west corner to the southern boundary. (See **Appendix B** for Topographical Survey).

1.3 Aims and Objectives

The purpose of this assessment is to review the proposed development and to consider the risk to it of flooding, also the effect it may have on existing flood flows and flood storage within adjacent floodplains.

The risks of flooding and potential impact of alterations to the existing flood flow and storage regime and surface run-off characteristics are considered within the scope and parameters set out in the National Planning Policy Framework (NPPF) alongside the West Sussex County Council's "Water. People. Places." guide. Consideration is also given to the ODPM document "Preparing for Floods".

The Environment Agency website, flood mapping was accessed for the purpose of this assessment. (Please refer to **Appendix C** for flood mapping data).

2. FLOOD ANALYSIS

2.1 Flood Level

The Environment Agency flood mapping that the development site lies in Zone 1, outside any floodplain with <1 in 1,000-year probability of river or sea flooding.

2.2 Flood Protection

Although within Flood Zone 1, consideration is also required of the flood risk presented from other potential sources such as overland water, groundwater, sewers and retained water features. The site, proposed levels and existing topography of the site have been assessed for these threats, such that in the event of large storm events, surface water flows would not threaten life or property. A detailed list of the flood risks considered is as follows:

Fluvial Flooding:

The Environment Agency flood mapping for risk of flooding from reservoirs, rivers or the sea does not indicate any major risks to the site or within close proximity of the development site. Therefore, is no threat to life or the surrounding areas.

Groundwater:

Where the water table rises to such a height where flooding occurs. Most common in low-lying areas underlain by permeable ground (aquifers), usually due to extended periods of wet weather. Ground Water flooding is not considered to be significant for this development with the existing topographic falls across the site. Groundwater Vulnerability Mapping also shows the development to be Medium risk with Soluble Rock Risk.

Surface Water:

The net rainfall falling on a surface (on or off the site) which acts as runoff having not infiltrated into the ground or entered a drainage system. As shown on the appended mapping of flood risk from surface water there is a small area of surface water flood risk identified on site in the north-east corner where it comes off Victoria Road and through the neighbouring site. There are no areas that would cause concern to the site from local areas.

EA Flood Mapping Continued

Details of the above three flood risk types have been assessed against the Environment Agency Flood Mapping, found on the government's website. Copies of the mapping can be found within **Appendix C** of this report.

Sewer & Highway Drains:

Where the local drainage infrastructure and associated highway drains cannot cope with the capacity and intensity of heavy rainfall events. There is a small parcel of highway on Victoria Road which is to the east of the development which has a high chance of surface water flooding.

Infrastructure Failure:

Where the existing private drainage infrastructure and features on-site, are unable to convey/attenuate the volumes of the rainfall events. Any existing drainage features will either be removed or made redundant so there will be no risk of infrastructure failure from the existing network.

2.3 Extreme Flood Events

Consideration is given to flood events over and above the 1 in 100-year rainfall event and exceedance flow routes assessed. All flows will be directed away from properties with finished floor levels set to a minimum of 150mm above ground level, low spots will be designed in the hard standing directed away from buildings, ponding will give warning if failure of the drainage system occurs.

The drainage strategy accommodates all surface water runoff up to 1 in 100-year rainfall event plus 45% climate change within the sub-base of parking areas and the proposed attenuation feature utilising the car park sub-base. This will be expanded upon further throughout the next section, in particular under **Section 3.2 Surface Water Strategy**.

3. SURFACE WATER DRAINAGE

3.1 Existing Drainage

During the design of a surface water drainage strategy for the development, all methods of runoff disposal have been considered in the order advised by the LLFA's design document.

The LLFA's guide states the hierarchy for discharge of surface water to be: -

1. Rainwater Harvesting/Re-Use Onsite.
2. Shallow infiltration (circa 2.0m, see section on infiltration systems).
3. Gravity discharge to a watercourse.
4. Gravity discharge to a surface water sewer/highway drain.
5. Gravity discharge to a combined sewer.

Following the above hierarchy for discharge, water re-use could be applied by water butts or similar systems, however, as with any harvesting or re-use system; these cannot be associated with attenuation reduction and disposal for large rainfall events. In addition to the high costs involved, this form of disposal has been discounted.

BGS mapping suggests that the development sits on a mix of Head-Clay, silt and gravel and soft white chalk. It is part of the Polymictic deposit which comprises gravel, sand and clay. There have been no Site Investigation Reports undertaken. Due to the Head-clay, silt and gravel mix being deposited by solifluction and gelifluction processes, infiltration has not been deemed suitable. This has been confirmed by the direct discharge of the new neighboring development into Southern Water assets rather than infiltrating to the ground. The neighboring development undertook infiltration testing, with one being located on the boundary between the developments. This showed that infiltration is not possible with a rate during Test 1 of 9.54×10^{-7} . These can be found in **Appendix D**. It was therefore decided that it was not necessary to undertake testing on this development site.

Mapping services show that there are no existing watercourses within the red line boundary, the closest river located 50m away is not deemed suitable due to crossing an existing highway and the Shoreham Terminal site.

There is an existing connection into the Southern Water Surface Water network, brownfield run off calculations indicate an existing run off rate of 13.9l/s during the 1 in 1 year storm event, 54.6l/s during the 1 in 30 year storm event, and 66.9l/s during the 1 in 100 year storm event. As can be seen below using the MRM method with the full existing site being hardstanding.

Pre-development discharge

Site Makeup: Brownfield

Brownfield Method: MRM

Contributing Area (ha): 0.131

PIMP (%): 100

CV: 0.840

Time of Concentration (mins): 5.00

Betterment (%): 0

Calc

Return Period (years)	Q (l/s)
1	13.9
30	54.6
100	66.9

Figure 1 – Existing Surface Water brownfield discharge rate (Causeway Flow+ Software)

3.2 Site Analysis and Surface Water Strategy

From the site analysis, there is presently 1306.8m² of existing buildings and concrete forecourt picked up by the topographical survey across the development site, which post development the total impermeable area will decrease to approximately 1150.5m².

The proposed drainage strategy is to capture rainfall landing on the roofs by downpipes and connecting into the sub-base of the permeable car parking. Rainfall landing on the permeable surfaced car park captured within the sub-base, there are perforated pipes which will convey through the network to the flow control chamber. The water will then back up into the Type 3 sub-base until discharging into a Southern Water surface water sewer. These drainage principles have been proposed as they match the granted planning permission for the adjacent site. A Section 106 application is required at detailed design stage in order to connect into the Southern Water sewer. The existing connection will not be reused due to the outfall location on site; therefore, a new connection is required.

The proposed permeable surfaced car park will allow for sufficient water quality treatment prior to entering the surface water piped network. A flow control device will be installed over the outlet to restrict the discharge to 1l/s. This has been deemed a suitably low discharge rate whilst allowing a small enough orifice size on the flow control to not block too easily. The 1-year Greenfield Runoff Rate is 0.1l/s which has been deemed as requiring an orifice size too small for maintenance, a copy of the greenfield runoff calculations can be found within **Appendix E**. All design rainfall events, inclusive of climate change (45%). The modelling has been designed using a CV of 1 and using FEH 2022 rainfall data. The 1l/s discharge rate has been used to size the required attenuation and discharge into the Southern Water system.

Figure 2 below highlights the estimated storage required for all storms up to and including the 1 in 100-year rainfall event plus an allowance of 45% for climate change. The proposed attenuation in the sub-base has been designed accordingly to allow for the below suggested volume.

Any existing surface water flooding within the red line boundary will be dealt with wholly within the new drainage system.

Storage Estimate

Return Period (years)	100
Climate Change (%)	45
Impermeable Area (ha)	0.115
Peak Discharge (l/s)	1.000
Infiltration Coefficient (m/hr) (leave blank if no infiltration)	
Required Storage (m³)	Calc
from	99
to	133

Figure 2 – Proposed Surface Water Attenuation – Quick Storage Estimate (Causeway Flow+ Software)

Ingent have produced a strategic surface water drainage layout drawing to highlight the aforementioned details as well as a SuDS construction details drawing. Both drawings produced to support this report can be found within **Appendix F** and the simulation files/calculations can be found within **Appendix G**.

3.3 SuDS Pillars

We have considered the four pillars of SuDS in relation to this development as such:

Water Quantity

All captured rainfall will be accommodated within the sub-base of the permeable surfaced parking, and within the piped drainage network to the final discharge point.

Water Quality

Water quality treatment for rainwater captured within the private trafficked hardstanding areas will be by way of the sub-base below the permeable surfaces this provides a sufficient source of treatment prior to discharge.

Amenity

The permeable paved areas do not bring any amenity benefits; however, they do not take any amenity area away from what has been provided by the use of above ground features. Above ground features would have been preferable but due to lack of available space, these were discounted.

Biodiversity

The development will have soft landscaping in corners of the car parking areas and by the front of the building. This is an improvement from existing where there is no soft landscaping.

4. FOUL WATER DRAINAGE

4.1 Existing Drainage

It is understood that there is an existing private foul water system that drains from the existing property and forecourt out to a Southern Water owned sewer within Albion Street.

4.2 Foul Water Strategy

It is understood the adjacent development has a new connection into the existing Southern Water owned sewer in Albion Street. The proposals for this development will also connect into the existing sewer, this may follow different routing to that of the existing connection, however, the proposed route will follow the same principles. A Section 106 application to Southern Water will be required at the detailed design stage.

5. CONCLUSION AND RECOMMENDATIONS

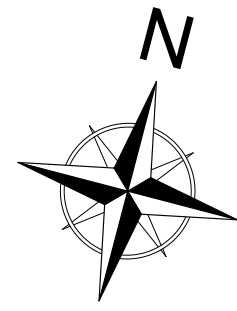
The proposed development has been assessed for the risk to the site from fluvial flooding in accordance with the guidelines of the NPPF. Assessment has also been made of the impact of the proposed development on the existing floodplain storage at this location, and of the risk of pluvial flooding from storm water contribution from the development exacerbating downstream flooding, as directed by the guidance.

The development site has been found to lie within Flood Zone 1 and is therefore not considered to be at risk from fluvial flooding. Other sources of flooding have similarly been assessed and found to pose no minor threat to development on the site.

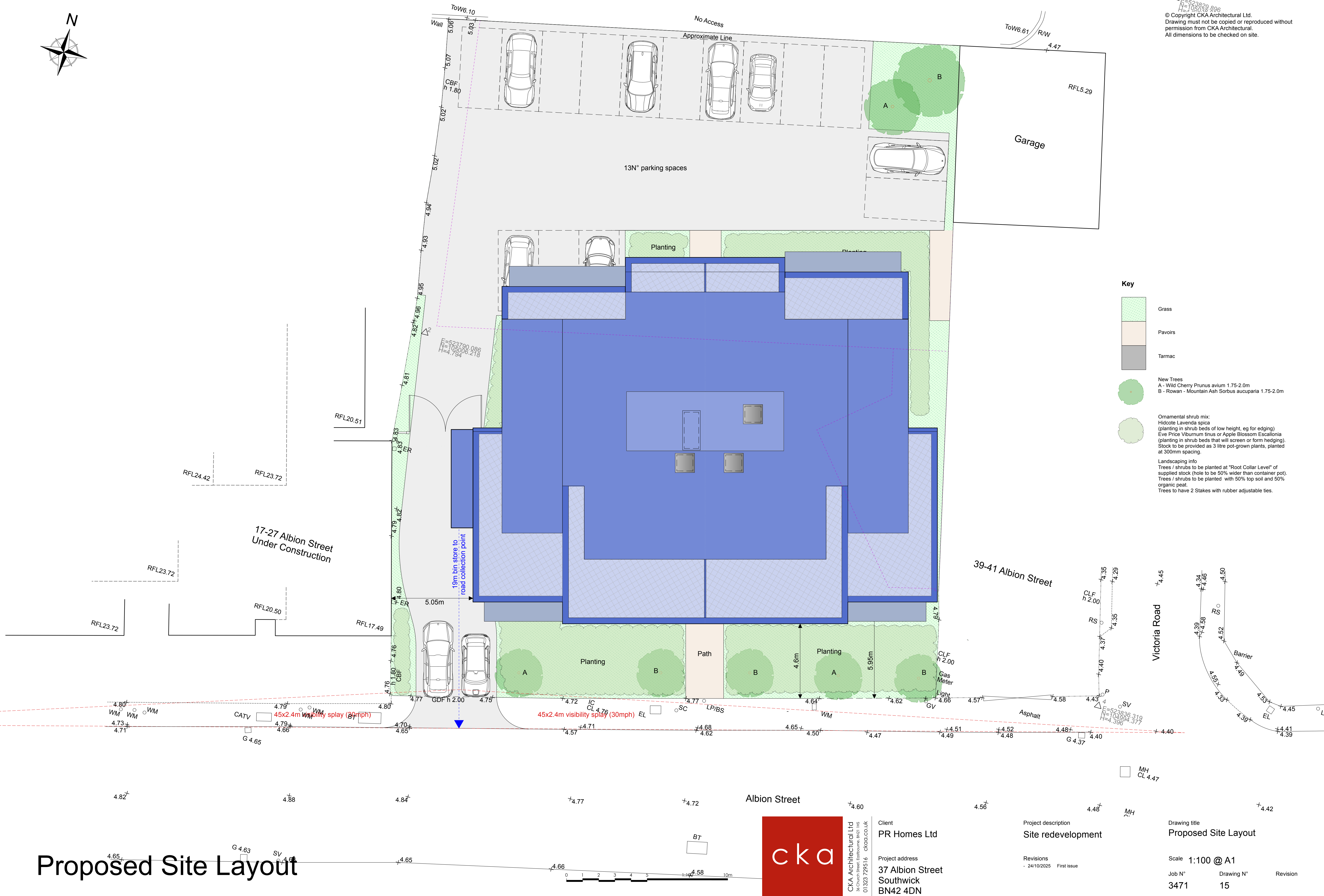
The development site does not affect any flood storage. The peak surface water runoff rate leaving the site will be captured via permeable surfacing and rainwater pipes, storing within the permeable surfacing sub-base, before discharging treated water at 1l/s for all rainfall events up to and including the design event plus climate change, to the existing Southern Water surface water network.

It is considered from this assessment that the level of risk of flooding to and from the proposed development is of an acceptable level and in keeping with current policy.

APPENDIX A – SITE LAYOUT



△⁵
E=523829.896
N=108058.896
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All dimensions to be checked on site.





South Elevation (Front)

Material schedule

- Brick, Buff
- Brick pattern, Buff
- Cladding
- Powdercoated fascia
- uPVC window & doors
- Powdercoated aluminium balcony, stainless steel and glass

outline of existing building to be demolished



East Elevation (Side)



North Elevation (Rear)



West Elevation (Side)

Proposed Elevations

0 1 2 3 4 5 1:100 10m



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Client
PR Homes Ltd

Project address
37 Albion Street
Southwick
BN42 4DN

Project description
Site redevelopment

Revisions
- 24/10/2025 First issue
A 21/01/2026 Updated

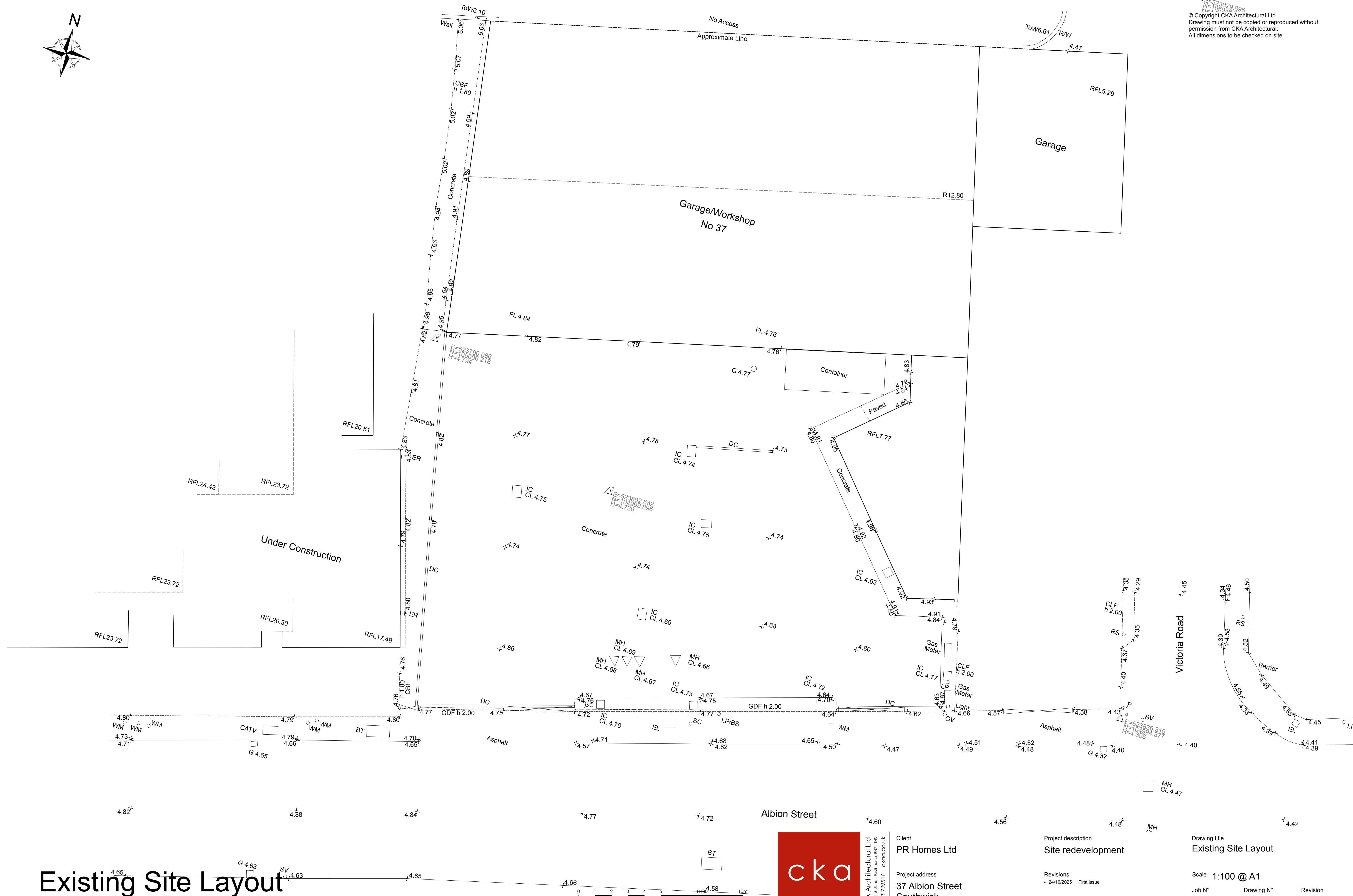
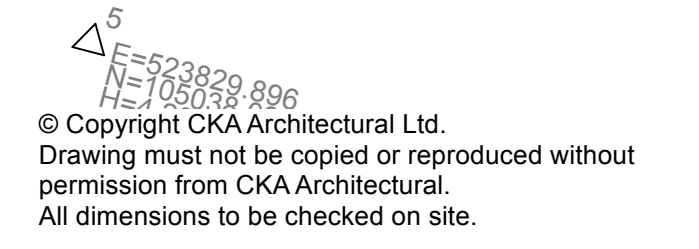
Drawing title
Proposed Elevations

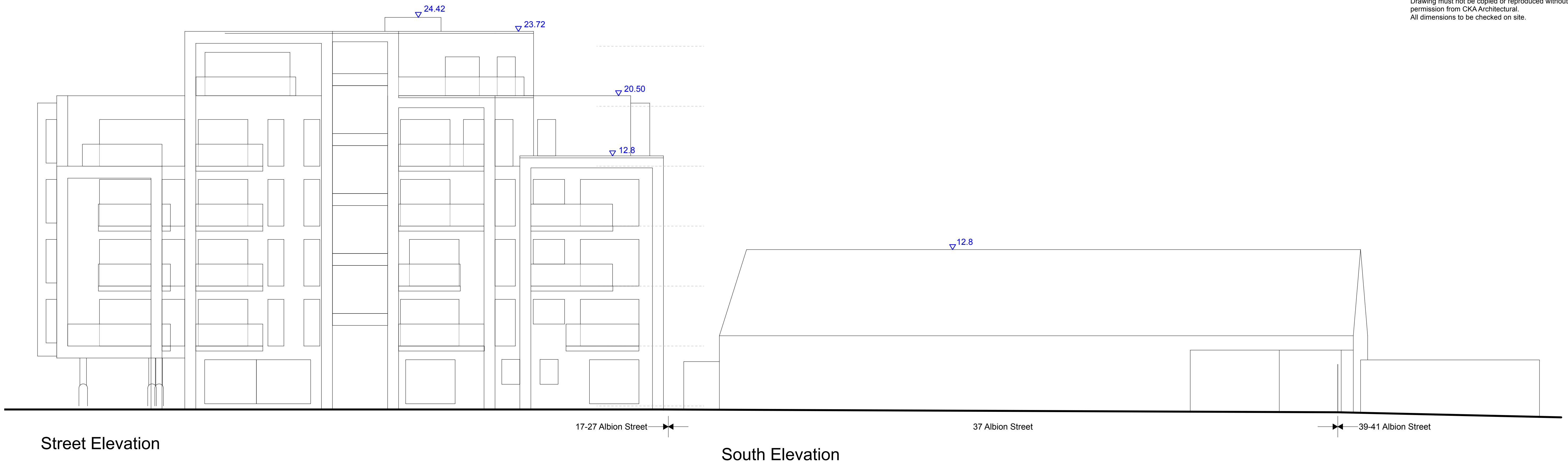
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Job N°	Drawing N°	Revision
3471	18	A

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All dimensions to be checked on site.

APPENDIX B – TOPOGRAPHICAL SURVEY





Existing Street Elevation

0 1 2 3 4 5 1:100 10m



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Client
PR Homes Ltd

Project address
37 Albion Street
Southwick
BN42 4DN

Project description
Site redevelopment

Revisions
- 24/10/2025 First issue

Drawing title
Existing Street Elevation

Scale 1:100 @ A1

Job N°	Drawing N°	Revision
3471	14	

APPENDIX C – EA FLOOD MAPPING

EA Flood Mapping



Surface water map

Yearly chance of flooding

Extent

- High chance
More than 3.3% chance each year
- Medium chance
Between 1% and 3.3% chance each year
- Low chance
Between 0.1% and 1% chance each year



Rivers and sea map

Yearly chance of flooding

Extent

- High chance
More than 3.3% chance each year
- Medium chance
Between 1% and 3.3% chance each year
- Low chance
Between 0.1% and 1% chance each year
- Very low chance
Less than 0.1% chance each year



Yearly chance of flooding between 2040 and 2060

Extent

- High chance
More than 3.3% chance each year
- Medium chance
Between 1% and 3.3% chance each year
- Low chance
Between 0.1% and 1% chance each year



Yearly chance of flooding between 2036 and 2069

Extent

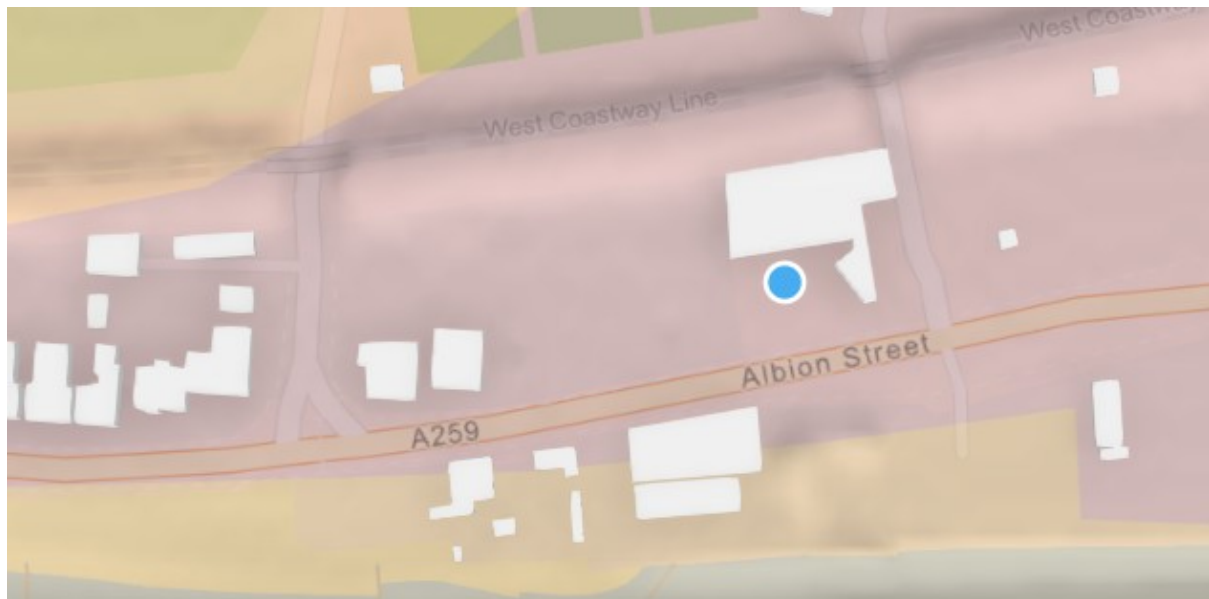
- High chance
More than 3.3% chance each year
- Medium chance
Between 1% and 3.3% chance each year
- Low chance
Between 0.1% and 1% chance each year
- Very low chance
Less than 0.1% chance each year
- No data available



Reservoirs map

Extent

- When river levels are normal
- When there is also flooding from rivers



Geology

Bedrock geology

Tarrant Chalk Member-Chalk. These sedimentary rocks are shallow-marine in origin. They are biogenic and detrital, generally comprising carbonate material (coccoliths), forming distinctive beds of chalk.

[More Information](#)

Superficial deposits

Head-Clay, silt, sand and gravel. These sedimentary deposits are subaerial in origin. They are detrital, comprising coarse- to fine- grained materials, forming down-slope layers and fans of accumulated material.

[More Information](#)

APPENDIX D – ADJACENT SITE INFILTRATION TESTING

PHASE I AND PHASE II GEO-ENVIRONMENTAL INVESTIGATION

for the

PROPOSED RESIDENTIAL DEVELOPMENT

at

ALBION STREET, SOUTHWICK, BN42 4DN

on behalf of

ALBION STREET DEVELOPMENT

Land
Science



Brighton | London | Bristol | Kent

0845 604 6494 | www.landscience.co.uk

The Old Police Station, Jobs Lane, Sayers Common, West Sussex, BN6 9HE

Title: PHASE I AND PHASE II GEO-ENVIRONMENTAL INVESTIGATION

Site: ALBION STREET, SOUTHWICK, BN42 4DN

Development: RESIDENTIAL DEVELOPMENT

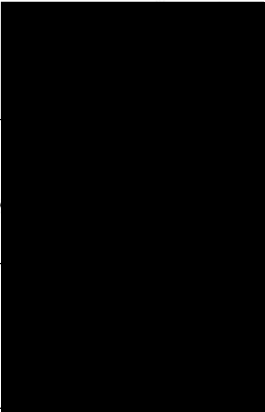
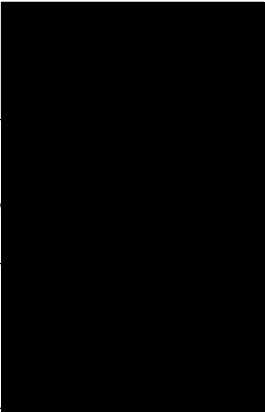
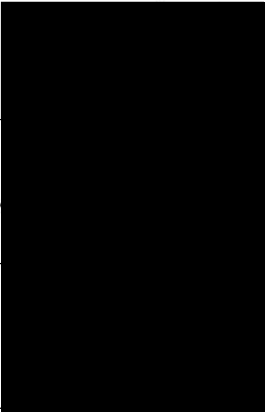
Client: ALBION STREET DEVELOPMENTS

Architect: LIAM RUSSELL ARCHITECT

Date: 30th APRIL 2018

Reference: LS 3528

Version: V1.0

Prepared by:		LUKE STOCK M.Sc., B.Sc. (Hons), FGS, AMIEnvSci <u>Geo-Environmental Consultant</u>
Checked by:		MARTIN WEIL MA, B.Sc. (Hons.), C.WEM, CEnv, CSci <u>Principal Geo-Environmental Consultant</u>
Authorised by:		ELLIOT TOMS CEnv M.Sc., B.Sc. (Hons.), FGS, MIEnvSci <u>Managing Director</u>

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Monitoring wells were installed in WS1, WS3 and WS7. The installations were generally sealed through the Made Ground with the response zone in the Head Deposits. The pipework comprised 50mm diameter HDPE, sealed using hydrated bentonite pellets and the response zone comprised slotted pipework with 10mm pea shingle filter pack.

4.2 Soils Encountered

Generally, the investigation confirmed the anticipated geological succession, comprising Head Deposits; over Tarrant Chalk Member. Engineering logs are provided as Appendix C.

Made Ground is described on logs for WS3, WS4, WS5, WS6, WS7, and WS8 to a maximum depth of 1.40 m below ground level (bgl) and generally comprised reworked clay with brick and concrete fragments. Ashy material is described on logs for WS5, WS7 and WS8.

A summary of the encountered conditions is presented below.

Base Depth Ranges m	Strata	Summary description
0.05	Hardstanding	Paving slab identified in two locations WS3 and WS4.
0.20	Topsoil	Grass over brown clayey loam with fine to medium sub-rounded flint gravels and rootlets were identified in WS5, WS7 and WS8.
0.70 to 1.40	Made Ground	Made Ground was identified in all locations with base depths ranging from 0.70 m (WS4) to 1.40 m (WS1 and WS7, respectively). The unit is typically described as brown gravelly CLAY to brown sandy gravelly CLAY. Gravels are described as fine to coarse subrounded flint with occasional brick and concrete gravels.
2.10 to 5.00	Head Deposits	Head Deposits were identified in all locations and were typically described as follows: Firm to stiff dark brown to yellowish brown sandy gravelly CLAY. Gravels of fine to coarse subrounded flint and calcareous material. Stiff to firm yellowish brown to orangish brown gravelly CLAY. Gravels are fine to coarse flint. Occasional flint cobbles are recorded. Yellowish brown clayey GRAVEL. Gravels are fine to medium flint.
+5.00	Tarrant Chalk Member	Chalk deposits were only encountered in two locations, namely WS1 and WS8. The stratum was described as cream,

Base Depth Ranges m	Strata	Summary description
		sandy gravelly silt. Structureless CHALK (grade Dm). Gravels are weak, low density.

The identification of materials encountered as specific geological strata is tentative and should be used as a guide, and interpolation between or below investigation points should be treated with caution.

4.2.1 Roots and Rootlets

Rootlets were recorded in the following locations

Position	Roots	Rootlets
WS5	-	0.0-0.20 m fine rootlets
WS7	-	0.0-0.20 m fine rootlets
WS8	-	0.0-0.20 m fine rootlets

4.2.2 Field Evidence of Contamination

No evidence of possible soil contamination (such as staining, malodours, or brightly coloured soils) was identified in the field.

4.3 Groundwater

Groundwater was not encountered during excavation of any of the investigative positions. However, during the post ground investigation monitoring visits groundwater was encountered in the three monitoring wells and the results are summarised in the following table. Monitoring records are provided in Appendix D.

Date	Depth (m bgl)		
	WS1 (4.80)	WS3 (5.00)	WS7 (5.00)
18/04/18	4.00	4.20	Not accessible
26/04/18	4.18	4.34	4.46

Values in brackets correspond to the base depth of standpipe

On the second monitoring visit all wells were purged 'dry' and left to recover. Slow recharge rates were noted in WS3 and WS7 with in sufficient water remaining in the wells to collect a sample from. On the basis of the limited water in boreholes following purging and relatively low recharge rates recorded groundwater samples were not collected for laboratory analysis.

Due to the proximity to Shoreham Harbour it is likely that groundwater is influenced by tidal variation.

5.0 CONCEPTUAL SITE MODEL

5.1 General

A preliminary geo-environmental Conceptual Site Model (CSM) was formulated for the site based on the desk study, site walkover, site investigation and in light of the proposed development. The model may require revision where the development proposals differ and should be reviewed in light of any additional data or where unexpected conditions are encountered.

The model has been designed primarily in accordance with established procedures in BS5930, BS10175, CLR11, and also ISO/CD 21365 (Soil quality - Guidance on establishing conceptual site models for potentially contaminated sites). In accordance with best practice, the model has been used to identify possible contamination risks following a source-pathway-receptor ('SPR') approach.

5.2 Site Setting

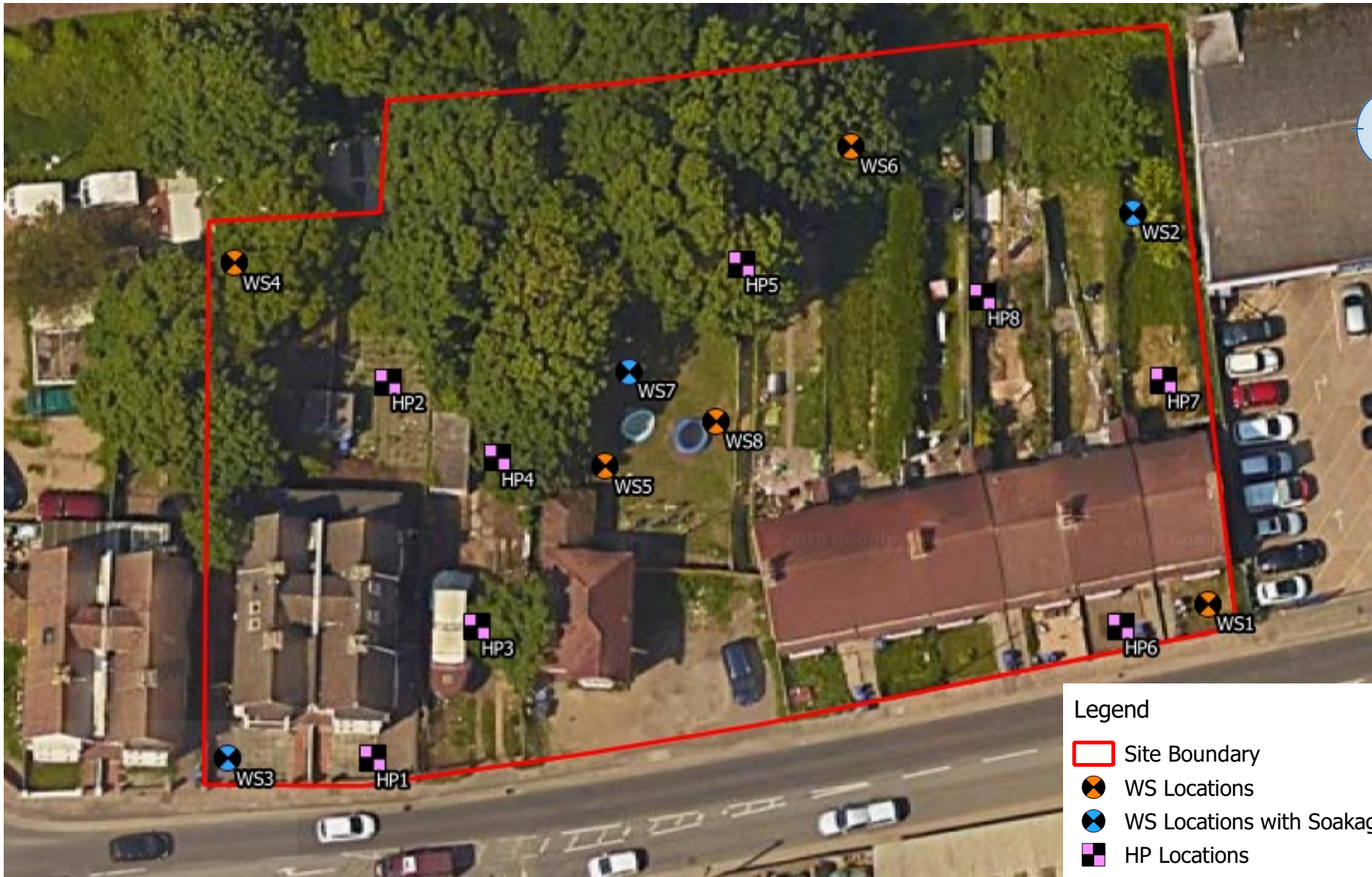
Based on the ground conditions revealed the following generalised soil and groundwater model is summarised:

Strata	Base depths (m)	Soil types	Groundwater (m bgl)
Made Ground	0.70 to 1.40	Generally gravelly CLAY with brick and concrete gravels, ash was identified in two locations	-
Head Deposits	2.10 to 5.00	Firm to stiff gravelly CLAY or Clayey GRAVEL	4.20 to 4.46
Tarrant Chalk Member	+5.00	Chalk putty (Grade Dm)	4.00 to 4.18

5.3 Potential Sources

Identified sources of possible contamination arising in soils on site are summarised on the following table.

Source	Description	Contaminants
Made Ground	Made Ground exists across the site Fill may also occur under buildings and hardstanding etc. The provenance of such materials is unknown and may be contaminated.	Wide range of possible metals, non-metals, organic contaminants, asbestos, etc.



Legend

- Site Boundary
- WS Locations
- WS Locations with Soakage Test
- HP Locations



Title: Exploratory Hole Location Plan

Project: Albion Street, Southwick, BN42 4DN

Client: Albion Street Developments

Reference: LS3528

Figure: 2

Date: 27/04/2018

Prepared by: SP

Checked by: MW

Version: 1

Excavation Method

Drive-in Windowless Sampler

Dimensions
Location

Southeast corner of site

Ground Level (mOD)
Dates

12/04/2018

Client

Richard Gillam

Project Contractor

A&A

Job
Number
 LS3528

Sheet
 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.20	ES		PID = 0.1 ppm		(0.20)	Dark brown sandy gravelly CLAY. Gravel comprises fine to medium subrounded flint (TOPSOIL)			
0.50	ES					Brown very gravelly CLAY Gravel comprises fine to medium subrounded flint (MADE GROUND)			
1.00	ES				(1.20)				
1.50	ES		PID = 0.0 ppm		1.40	Dark brown sandy gravelly CLAY. Gravel comprises fine to coarse subrounded flint and calcareous gravels (HEAD DEPOSITS)			
					(0.90)				
					2.30	Yellowish brown clayey GRAVEL comprising fine to medium subrounded flint (HEAD DEPOSITS)			
					(0.40)				
					2.70	Greyish brown very silty slightly gravelly CLAY. Gravel comprises fine to medium subrounded flint and chalk gravels (HEAD DEPOSITS)			
					(1.20)				
					3.90	Yellowish brown clayey GRAVEL comprising fine to medium subrounded flint (HEAD DEPOSITS)			
					(0.20)				
					4.10	Structureless CHALK comprised of cream sandy gravelly silt. Gravels are weak, white with frequent black specks and angular. (Grade Dm) (TARRANT CHALK MEMBER)			
					(0.90)				
					5.00	Complete at 5.00m			

Remarks

 GROUNDWATER: None encountered
 CASING: No casing used.
 INSTALLATION: 50mm diameter HDPE standpipe to 5.0m; plain casing to 1.0m, slotted response zone 1.0mm to 4.0m.
 BACKFILL: Bentonite sealing pellets to 1.0m. 10mm washed pea gravel filter pack 1.0m to 4.0m.

Scale
 (approx)

1:50

Logged
By

LS

Figure No.

LS3528.WS1

Excavation Method Borehole excavated using a hand auger	Dimensions	Ground Level (mOD)	Client Richard Gillam	Job Number LS3528
	Location Northeast corner of site	Dates 13/04/2018	Project Contractor A&A	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.15	ES		PID = 0.0 ppm		(0.20) 0.20	Dark brown sandy gravelly CLAY. Gravel comprises fine to medium subrounded flint (TOPSOIL)		
0.50	ES		PID = 0.0 ppm		(0.70)	Brown slightly sandy gravelly CLAY. Gravel comprises fine to coarse subrounded flint and chalk gravels (HEAD DEPOSITS)		
0.70	ES				0.90	Orangish brown sandy gravelly CLAY. Gravel comprises fine to coarse subrounded flint and chalk gravels (HEAD DEPOSITS)		
					(1.20)			
					2.10	Becoming very gravelly Refusal at 2.10m Terminated at 2.10m		

Remarks GROUNDWATER: None encountered CASING: No casing used. INSTALLATION: None BACKFILL: Backfilled with arisings	Scale (approx) 1:50	Logged By LS
Figure No. LS3528.WS2		

Site Albion Street, Southwick	Number WS3
Client Richard Gillam	Job Number LS3528
Project Contractor A&A	Sheet 1/1

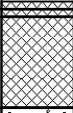
Excavation Method Drive-in Windowless Sampler	Dimensions	Ground Level (mOD)
	Location Southwest corner of site	Dates 12/04/2018- 13/04/2018

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.20	ES				0.05 (0.20) 0.30	Paving slab (MADE GROUND)			
0.50	ES					Ballast (MADE GROUND)			
					(0.80)	Firm dark brown sandy gravelly CLAY. Gravel comprises fine to medium sized brick and concrete fragments (MADE GROUND)			
					1.10	Reworked firm brown sandy CLAY with occasional fine to medium brick, concrete and flint gravel (MADE GROUND)			
1.20	ES		PID = 0.0 ppm		(0.80)	Firm dark brown gravelly CLAY. Gravel comprises fine to medium subrounded flint (HEAD DEPOSITS)			
					1.90	Stiff yellowish brown gravelly CLAY. Gravel comprises fine chalk gravels and fine to medium flint. (HEAD DEPOSITS)			
					(3.10)				
					5.00	Complete at 5.00m			

Remarks BACKFILL: Bentonite sealing pellets to 1.0m. 10mm washed pea gravel filter pack 1.0-5.0m. INSTALLATION: 50mm diameter HDPE standpipe to 5.0m; plain casing to 1.0m, slotted response zone 1.0m to 5.0m CASING: No casing used. GROUNDWATER: None Encountered	Scale (approx) 1:50	Logged By LS
	Figure No. LS3528.WS3	

Site Albion Street, Southwick	Number WS4
Client Richard Gillam	Job Number LS3528
Project Contractor A&A	Sheet 1/1

Excavation Method Borehole excavated using a hand auger	Dimensions	Ground Level (mOD)
	Location Northwest corner of site	Dates 12/04/2018- 13/04/2018

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.15	ES		PID = 0.0 ppm		0.05 0.10 (0.60)	Paving slab (MADE GROUND) Ballast (MADE GROUND)		
0.50	ES				0.70	Reworked firm brown sandy CLAY with occasional fine to medium brick, concrete and flint gravel (MADE GROUND)		
0.70	ES		PID = 0.0 ppm		(0.50)	Firm dark brown gravelly CLAY. Gravel comprises fine to medium subrounded flint (HEAD DEPOSITS)		
					1.20	Stiff yellowish brown gravelly CLAY. Gravel comprises fine chalk gravels and fine to medium flint. (HEAD DEPOSITS)		
					(0.90)			
					2.10	Refusal at 2.10m Terminated at 2.10m		

Remarks GROUNDWATER: None encountered CASING: No casing used. INSTALLATION: None BACKFILL: Backfilled with arisings	Scale (approx) 1:50	Logged By LS
	Figure No. LS3528.WS4	

Site Albion Street, Southwick	Number WS5
Client Richard Gillam	Job Number LS3528
Project Contractor A&A	Sheet 1/1

Excavation Method Drive-in Windowless Sampler	Dimensions	Ground Level (mOD)
	Location Centre of site	Dates 12/04/2018- 13/04/2018

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.15	ES				(0.20) 0.20	Grass over dark brown clayey loam with occasional fine to medium subrounded flint gravel and rootlets (TOPSOIL)		
0.50	ES				(0.60)	Soft orange and brown mottled reworked sandy gravelly CLAY with rare fine brick. Frequent chalk fragments and ash. (MADE GROUND)		
0.80	ES		PID = 0.0 ppm		0.80	Soft to firm orange and brown gravelly CLAY. Gravel comprises fine to medium subrounded flint (HEAD DEPOSITS)		
1.00	ES		PID = 0.0 ppm		(1.80)			
					2.60	Firm yellow and brown very gravelly CLAY. Gravel comprises fine to coarse subangular flint gravel and fine to medium chalk gravels. (HEAD DEPOSITS)		
					(2.40)			
					5.00	Complete at 5.00m		

Remarks BACKFILL: Backfilled with arisings INSTALLATION: None CASING: No casing used. GROUNDWATER: None encountered	Scale (approx) 1:50	Logged By LS
	Figure No. LS3528.WS5	

Excavation Method Borehole excavated using a hand auger	Dimensions	Ground Level (mOD)	Client Richard Gillam	Job Number LS3528
	Location North side of site	Dates 12/04/2018- 13/04/2018	Project Contractor A&A	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.15	ES		PID = 0.0 ppm		(0.20)	Dark brown sandy gravelly CLAY. Gravel comprises fine to medium subrounded flint (TOPSOIL)		
0.50	ES		PID = 0.0 ppm		(0.50)	Firm brown sandy CLAY with occasional fine to medium brick, concrete and flint gravel (MADE GROUND)		
0.80	ES		PID = 0.0 ppm		0.70	Firm dark brown gravelly CLAY. Gravel comprises fine to medium subrounded flint (HEAD DEPOSITS)		
					(1.20)			
					1.90	Orangish brown sandy gravelly CLAY. Gravel comprises fine to coarse sized subrounded flint and chalk gravels (HEAD DEPOSITS)		
					(0.80)			
					2.70	Refusal at 2.70m		
						Terminated at 2.70m		

Remarks GROUNDWATER: None encountered CASING: No casing used. INSTALLATION: None BACKFILL: Backfilled with arisings	Scale (approx) 1:50	Logged By LS
Figure No. LS3528.WS6		

Site Albion Street, Southwick	Number WS7
Client Richard Gillam	Job Number LS3528
Project Contractor A&A	Sheet 1/1

Excavation Method Drive-in Windowless Sampler	Dimensions	Ground Level (mOD)
	Location North side of site	Dates 12/04/2018- 13/04/2018

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.15	ES		PID = 0.0 ppm		(0.20) 0.20	Grass over dark brown clayey loam with occasional fine to medium subrounded flint gravel and rootlets (TOPSOIL)			
0.50	ES				(1.20)	Soft dark brown sandy gravelly CLAY with rare fine brick. Frequent chalk fragments and ash. (MADE GROUND)			
1.00	ES		PID = 0.0 ppm						
1.50	HP 75kPa				1.40	Soft to firm orange and brown gravelly CLAY. Gravel comprises fine to medium subrounded flint (HEAD DEPOSITS)			
1.50	ES								
2.00	HP 25kPa								
2.50	HP 25kPa				(1.90)				
3.00	HP 25kPa								
3.50	HP 150kPa				3.30	Firm yellow and brown very gravelly CLAY. Gravel comprises fine to coarse subangular flint gravel and fine to medium chalk gravels. (HEAD DEPOSITS)			
4.00	HP 100kPa				(1.70)				
4.50	HP 175kPa								
5.00	HP 100kPa				5.00	Complete at 5.00m			

Remarks BACKFILL: Bentonite sealing pellets to 1.0m. 10mm washed pea gravel filter pack 1.0m to 4.0m. INSTALLATION: 50mm diameter HDPE standpipe to 5.0m; plain casing to 1.0m, slotted response zone 1.0mm to 4.0m. CASING: No casing used. GROUNDWATER: None encountered	Scale (approx) 1:50	Logged By LS
	Figure No. LS3528.WS7	

Excavation Method Drive-in Windowless Sampler	Dimensions	Ground Level (mOD)	Client Richard Gillam	Job Number LS3528
	Location Centre of site	Dates 12/04/2018- 13/04/2018	Project Contractor A&A	Sheet 1/1

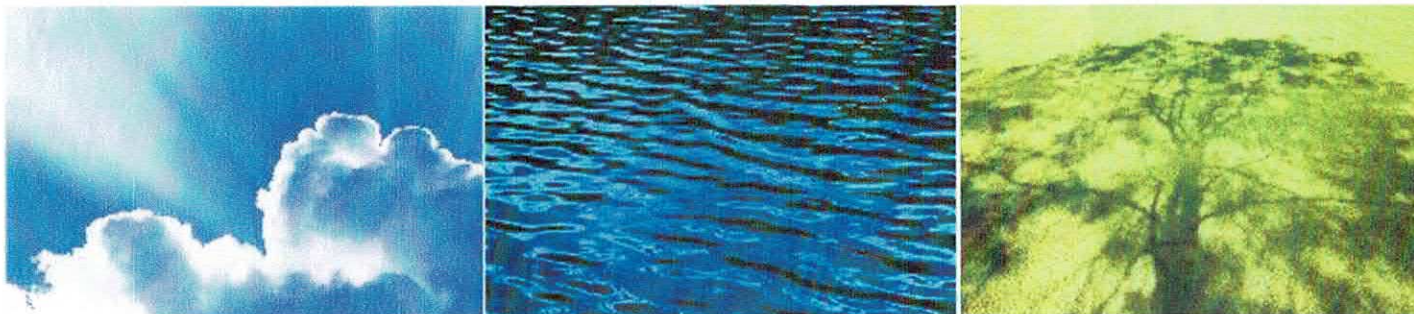
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.15	ES		PID = 0.0 ppm		(0.20) 0.20	Grass over dark brown clayey loam with occasional fine to medium subrounded flint gravel and rootlets (TOPSOIL)		
0.50	ES				(0.70)	Soft dark brown sandy gravelly CLAY with rare fine brick. Frequent calcareous fragments and ash. (MADE GROUND)		
1.00	ES		PID = 0.0 ppm		0.90	Soft to firm orange and brown gravelly CLAY. Gravel comprises fine to medium subrounded flint (HEAD DEPOSITS)		
					(1.90)			
					2.80	Structureless CHALK comprised of cream sandy gravelly silt. Gravels are weak, white with frequent black specks and angular. (Grade Dm) (TARRANT CHALK MEMBER)		
					(2.20)			
					5.00	Complete at 5.00m		

Remarks GROUNDWATER: None encountered CASING: No casing used. INSTALLATION: None BACKFILL: Backfilled with arisings	Scale (approx) 1:50	Logged By LS
	Figure No. LS3528.WS8	

This classification utilises the following guidance and legislation:

WM3 - Waste Classification - May 2015
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004
1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010
2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010

Soakage Test Report



Desk Studies | Risk Assessments | Site Investigations | Geotechnical | Contamination Investigations | Remediation Design and Validation

Site: Albion Street, Southwick, Brighton, BN42 4DN

Client: Westridge Construction

Report Date: 18 June 2021

Project Reference: J14809

A INTRODUCTION

1 Authority

Our authority for carrying out this work is contained in an e-mail instruction, sent on 17/05/2021 with an Order, from Mr J. Noble of Westridge Construction in relation to our quote ref. Q21-0857.

2 Location

The site is located on the north side of Albion Street (A259), midway between Shoreham-by-Sea and Portslade-by-Sea, and is 0.5km west of Southwick railway station. The site was approximately 50m to the north of Shoreham Harbour. The approximate National Grid Reference of the site is TQ 23758 04981. The site location is indicated on Figure 1, within Appendix A.

3 Investigation Brief

In accordance with the Client's instructions, and our quotation, the following was included in our brief for this soakage investigation:

- 1 No. soakage test based on the BRE 365 test method. The Client instructed us just to conduct a test at a single location (instead of the two allowed for), due to limited space.

The fieldwork was carried out on Friday 11th June 2021 at which time the weather was dry. The rainfall in the South of England during the first two months of spring was generally drier than average, for the months of March and April. However, last month was much wetter than normal, with May 2021 having about 165% of the average monthly rainfall (1981-2010 average).

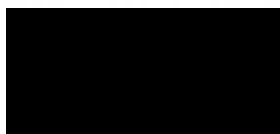
4 Scope

This report presents our exploratory hole logs and test results only. As with any site there may be differences in soil conditions between exploratory hole positions.

This report is not an engineering design and the figures and calculations contained in the report should be used by the Engineer, taking note that variations will apply, according to variations in techniques used, and in site conditions. Our figures therefore should not supersede the Engineer's design.

Contamination issues are not considered in this report.

The site investigation was conducted, and this report has been prepared for the sole internal use and reliance of Westridge Construction and their appointed Engineers. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Southern Testing Laboratories Limited. If an unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill.



P Sugden MSc FGS
(Countersigned)



J Leach MEng (Hons) IEng MICE
(Signed)

For and on behalf of Southern Testing Laboratories Limited

B FIELDWORK

5 General Site Description

The site was located on the north side of Albion Street (A259). At the time of the testing, construction works had commenced at the site, with a new access road and hardstandings laid.

The site and surrounding area were generally flat, with the site levels having been reduced by about 0.5m (near to the test pit, at the south-west corner). The access road was also about 0.5m higher than the general site level. The north of the site was bound by a railway line embankment, and to the south the site was bound by Albion Street. A derelict house was located on the west side and a car garage was located on the east side. Hoarding was located around the perimeter of the site. The River Adur estuary is located about 50m south of the site.

6 Geology

The British Geological Survey mapping indicates that the site geology consists of Head deposits over Tarrant Chalk Member (Upper Chalk), with Tidal Flats Beach Deposits mapped the north and south of the Head deposits. A previous site investigation report (by Risk Management Limited, RML 7338, dated May 2020) recorded Made Ground across the site.

Made Ground

"Fill" and "Made Ground" are terms, which are used interchangeably to describe material that has been placed by man. It may have been placed in a controlled or uncontrolled manner and if the latter term applies then very great variations in material type, depth and density are likely to occur. Old refuse filling often contains sulphate rich materials, heavy metals and other dangerous chemicals, and may produce methane gas.

Many fills are subject to high and variable amounts of settlement when loaded. Apart from the direct effect on foundations and floor slabs this would cause down drag on piled foundations.

The inherent variability means that areas of noxious materials may be found, although careful sampling procedures may have failed to locate them during prior investigations. It is important that a watchful eye is kept during all site works, so that any unusual materials can be spotted and removed from site or analyzed as appropriate.

It is emphasised that there can be great variability in fill depth, sometimes with a vertical interface between fill and natural ground, and this can play havoc with job costings. To safeguard the integrity of a structure it is prudent to probe all foundation excavations with a suitable tool prior to placing foundation concrete. The Perth Penetrometer is a suitable tool but there are many others.

Where excavation is carried out in fill material an allowance should be made for overbreak and for shuttering for subsurface concrete structures where appropriate.

Finally BS8004:1986¹ warns that "All Made Ground should be treated as suspect because of the likelihood of extreme variability". In this respect it is often useful to carry out trial pitting in addition to borings, as the larger exposed section gives a better indication of soil variability.

¹ BS 8004 : 1986 – "British Standard Code of practice for Foundations" (Formerly CP 2004)

Head

Head is a superficial deposit predominantly formed by solifluction processes during cold periglacial periods in the Ice Ages. Shallow soils were frequently waterlogged during these periods and together with freeze/thaw cycles caused a gradual downward migration of shallow soils. Although the climate has since changed, poorly designed engineering works, or periods of adversely high rainfall may still reactivate the relic slip surfaces.

Head soils characteristically comprise sandy silty clay containing randomly oriented fragments of angular materials of local derivation. Stratification, if present, is generally poor and the upper and lower surfaces of the deposits are rarely horizontal.

Upper Chalk (including Tarrant Chalk Member)

Upper Chalk is a well known soft white friable limestone of organic origin which is composed of shell debris embedded in a fine matrix of microscopic calcareous bodies produced by planktonic algae (coccoliths).

Upper Chalk is frequently highly fractured and highly permeable, when excellent drainage can be achieved via soakaways. On the other hand, Chalk Head and Chalk under a cover of Reading Beds may have very poor soakage characteristics.

Chalk is slightly soluble in water and, while it has excellent bearing properties when unweathered, this solubility can lead to deep weathering and softening, producing some undesirable characteristics, as far as a building construction is concerned. The chalk itself may be softened by solution to a depth of 5-15 metres and bearing capacities and engineering properties improve with depth. Where there is an outcrop of impermeable soil overlying the chalk there may be a dramatically increased solution effect. Water may collect over the clay and flow in large quantities to the chalk and cause very rapid solution and settlement at the junction.

Man has worked the chalk for flints, and for other purposes for thousands of years and any signs of old workings should be carefully investigated.

The upper layers of chalk are often highly weathered, softened and remoulded, and form an irregular boundary with the overlying strata. Where the holes are still actively decaying the "holes" are sometimes marked by shallow surface depressions, but they are more commonly bridged by superficial deposits and in which case they are not evident in the topography. They could be termed "invisible".

7 Trial Pit Details

The test pit was pre-excavated by the client at the south-west corner of the site (see Figure 2). The trial pit extended across both the original ground level and the reduced site level; in long-section this formed a stepped excavation profile. The reduced site level was about 0.45m lower than the original ground level, at the northern end of the test pit location. The overall pit depth was about 3.1m, below the original (upper) ground level.

The datum level for the infiltration test measurements was taken as the top of the reduced site level (i.e. 0.45m below the original ground level) and so the relative test pit depth was 2.65m.

8 Soils as Found

The soils encountered are described in detail in the attached exploratory hole logs (Appendix A), but in general comprised Made Ground over Head deposits. A summary is given below.

Depth	Thickness	Soil Type	Description
G.L. – 1.1m (below original ground level)	1.1m	Made Ground	Brown and orange sandy Clay MADE GROUND, with a thin covering of Topsoil and occasional gravel – brick, concrete, flint, charcoal and rare ceramic.
1.1 – 3.1+m (below original ground level)	2.0+	Head deposits	Soft to firm brown silty slightly sandy CLAY, with patches of pale yellowish orange sand/fine gravel, buff pale grey silty and occasional gravel – chalk and flint.

Groundwater was not observed in the pit when we attended site.

A nearby borehole monitoring well was noted to be exposed within the reduced site level. Whilst in attendance on site, we took a couple of water level readings in this borehole installation/well. At 09:30 the water level was at 4.6m (below reduced site level), by 12:30 the water level had risen to 2.9m (below reduced site level) and at 14:00 the water level was at 3.1m (below reduced site level). This indicates that the groundwater levels are likely to have a tidal influence.

9 Soakage Test Method

Soakage Tests after BRE365 (1991)

The BRE365 paper on soakaway design allows for the design of trench soakaways as well as traditional square and circular soakaways.

The test to measure the soil infiltration rate is carried out in pits which are excavated to the full depth of the proposed soakaway. The trial pits are filled and allowed to drain to empty or near empty, three times, on the same day or on consecutive days.

The pit is considered full when the water level is the same as the proposed inlet invert. The time for the water level to fall from $\frac{3}{4}$ full to $\frac{1}{4}$ full is obtained and the soil infiltration rate is obtained from the following formula:

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

Where:

f = soil infiltration rate (in this case expressed in l/m²/minute)

V_{p75-25} = effective storage volume of water in trial pit between 75% and 25% effective depth;

a_{p50} = internal surface area of trial pit up to 50% effective depth and excluding base area;

t_{p75-25} = time for water level to fall from 75% to 25% effective depth.

The soakage rate in this report is expressed as l/m²/minute, which is a convenient rate to use. The BRE use a unit of m/sec, which is the value in l/m²/minute divided by 60,000.

10 Soakage Test Results & Discussion

One (initial) soakage test was conducted, at the location shown on the attached site plan (Figure 2). The full results of the soakage test are appended, however, the soakage rate is summarised in the table below.

Results of BRE 365 Soakage tests				
Pit	Depth (m)	f l/m ² /min	BRE Units (m/sec)	Comments
TP-SA01	2.65*	0.057	9.54x10 ⁻⁰⁷	Pit was not emptied. Non-compliant value was calculated.

* Note depth relates to the test Datum, at circa 0.45m (bgl), with an overall pit depth of 3.1m.

The infiltration test indicates a low soakage rate at this depth, which is not unexpected given the generally clay soils encountered.

Due to the slow infiltration rate, only one water filling could be completed, in the one-day requested. The BRE Digest 365 indicates that 3 fillings must be carried out. Where 3 fillings have not been carried out, a reduction factor should be applied.

The results suggest that the site is not suitable for traditional ring or pit soakaways. These results should be reviewed by the drainage engineer, to establish whether an alternative scheme is viable.

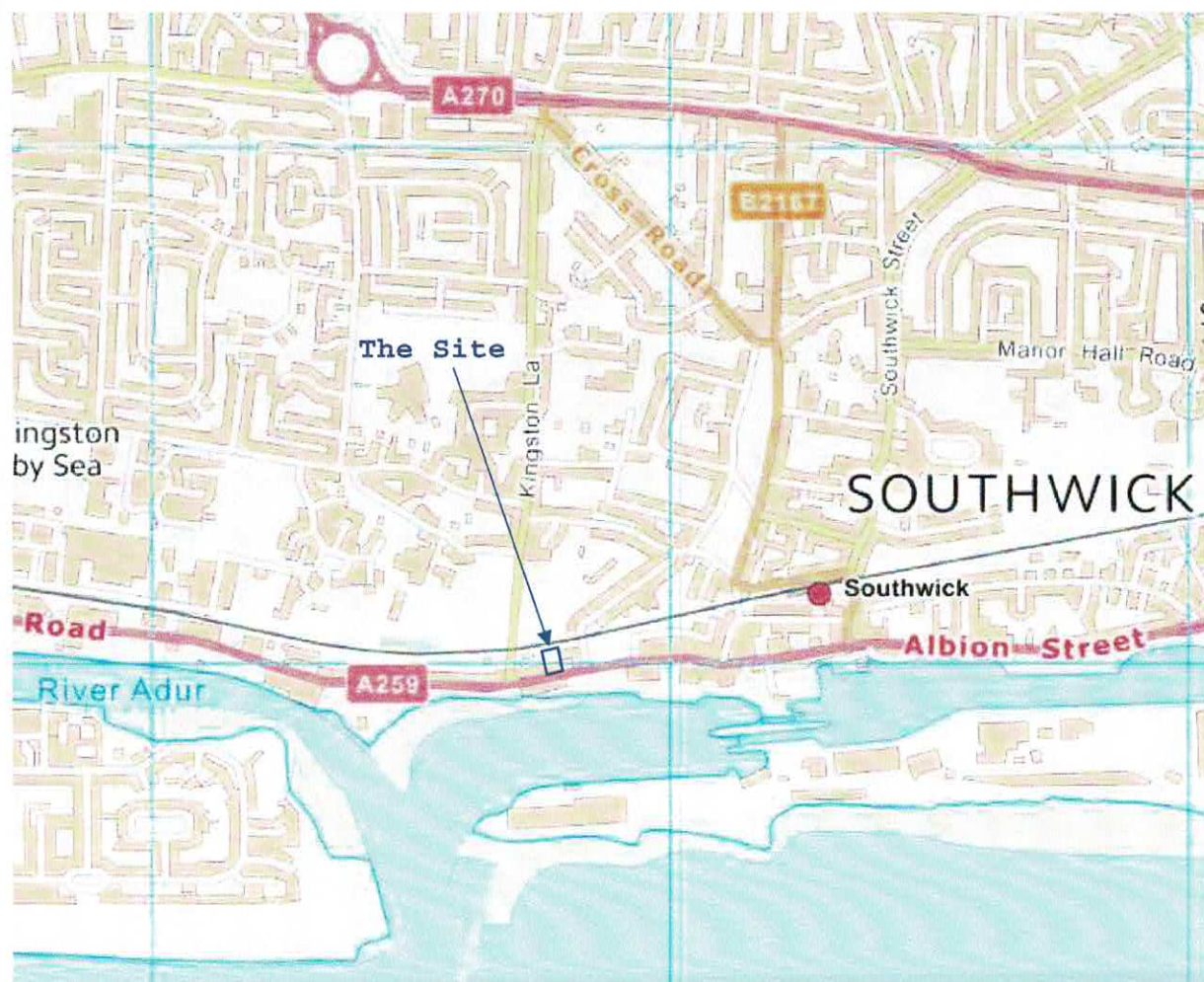
Although, groundwater was not encountered within the trial pit, at the start of the test, shallow ground water conditions were noted to exist, with a probable tidal influence (see Section 8).

Groundwater levels can vary considerably from season to season and year to year, often rising in wet or winter weather, falling in periods of drought, or vary throughout the day with any tidal influence. As such, a high groundwater table may affect the storage capacity of soakaways (where applicable). In addition, it should be noted that an unsaturated zone may be required between the base of the soakaways and the groundwater table, by the Environment Agency.

Any soakaway scheme will require the approval of the Environment Agency, Building Control and, where applicable, the adopting Highways Authority.

In addition, we would recommend that any soakaways underlain by chalk, as at this site, are located at least 10m away from any structures. This is in consideration of the fact that over time dissolution can occur and any pre-existing dissolution features are likely to be in a metastable state, and so changes in drainage or loading can trigger collapse settlements.

APPENDIX A – EXPLORATORY HOLE LOGS & SITE PLAN



Background map contains Ordnance Survey data © Crown copyright and database right 2018

Site: Albion Street, Southwick, Brighton, BN42 4DN

STL: J14809

Fig No: 1

Date: 14 June 2021

Site Location Plan

 Southern Testing

Southern Testing: Keeble House, Stuart Way, East Grinstead, West Sussex RH19 4QA
ST Consult: Twigden Barns, Brixworth Road, Creton, Northampton NN6 8NN

 ST Consult

TP-SA01



NB: Positions of Trial Pits are only indicative unless dimensioned

Site: Albion Street, Southwick, Brighton, BN42 4DN

Date: 14 June 2021

STL: J14809

Fig No: 2

Exploratory Hole Location Plan

 Southern Testing

Southern Testing: Keeble House, Stuart Way, East Grinstead, West Sussex RH19 4QA
ST Consult: Twigden Barns, Brixworth Road, Creton, Northampton NN6 8NN

 ST Consult

Datum for BRE365 Test at approx. 0.45m (bgl), at lower general site formation level.

4

Pit Dimension (m)		Pit Stability:	Water Strikes:
Width:		Pit sides generally stable, with minor a amount of loose material fallen-in from the Made Ground layer.	Pit side dry prior to starting soakage test. Note groundwater at 4.6m, 2.9m and 3.1m depths (at lower level) at 09:30, 12:30 and 14:00, with dips taken in nearby existing borehole.
Length:			
Depth:	3.10		

APPENDIX B – SOAKAGE TEST RESULTS

Summary Sheet

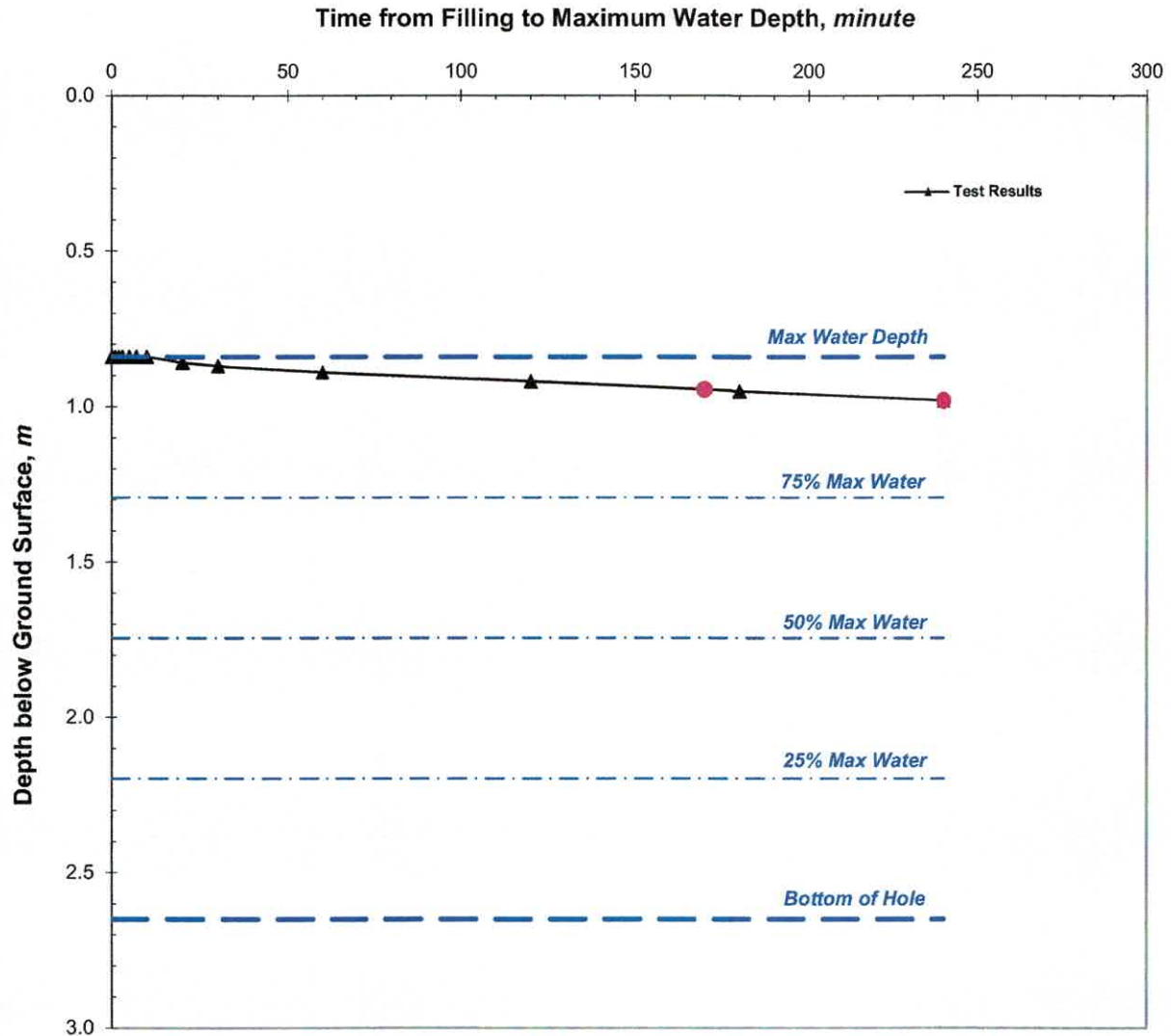
Results of BRE Digest DG365 Soakage Tests

Site : Albion Street, Southwick				Job No : J14809		
Client : Westridge Construction				O S Reference :		
Tested By : OS/GC		Engineer: JAC		Test Date : 11.06.21		
Hole No	Test No	Hole Depth m	Soakage Rate for Each Test litre/m²/min	Soakage Rate for Each Hole litre/m²/min m/sec		Water Level at Finish of Test
TP01	No 1	2.65	0.057	0.057	9.54E-7	Pit was not emptied; Non compliant value was calculated. Test Datum at 0.45m (bgl), 3.1m deep pit. Water: 2000L used, 2.45 mins to fill
Mean Value of All Calculated Soakage Rates :				1.30 litre/m²/min	2.17E-5 m/sec	

BRE Digest DG365 Soakage Test

Test Hole No: TP01

Test No: Test No 1 (Initial)



Pit Length, m	1.600	Depth to Water at Start of Test, m	0.840
Pit Width, m	0.600	Max Water Dropdown during Test, m	0.140
Depth to Pit Base, m	2.650	Total Soakage Test Time, min	240.0
Depth to Top of Permeable Soils, m		Mean Internal Discharge Area, m ²	8.385
Depth to Groundwater Surface, m		Discharge Rate, litre/min	0.480
Depth to Top of Granular Fill, m		Soakage Rate, litre/m ² /min	0.057
Voids Assumed for Granular Fill, %	100%	BRE Soil Infiltration Rate, m/sec	9.54E-07

Comments: Test Datum at 0.45m (bgl), 3.1m deep pit. Water: 2000L used, 2.45 mins to fill.
Water level did not fall to 75% max water depth, calculations were based on actual fall of water level achieved.
Result not compliant with BRE365 requirement since water did not fall to 25% max water depth.

Client: Westridge Construction	Job No: J14809	Test Date: 11.06.21
Site: Albion Street, Southwick	Tested By: OS/GC	Engineer: JAC Fig. S1

APPENDIX E – GREENFIELD RUNOFF CALCULATIONS

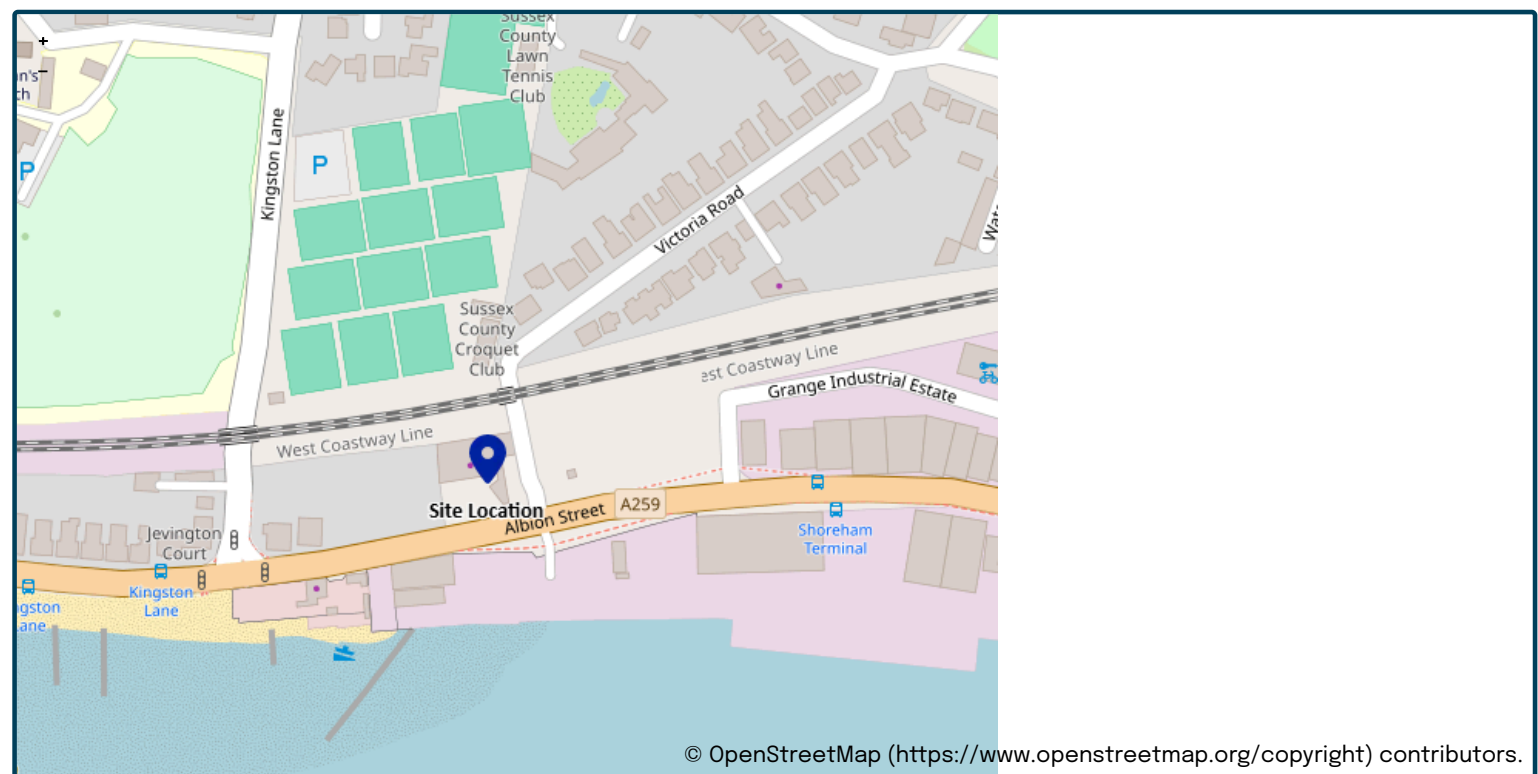
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	12/12/2025
Calculated by	Rachel Park
Reference	2509-1061
Model version	2.2.2

Location

Site name	37 Albion Street
Site location	Southwick



Site easting (British National Grid)	523817
Site northing (British National Grid)	104997

Site details

Total site area (ha)	0.1307	ha
----------------------	--------	----

Greenfield runoff

Method

Method	FEH statistical (2025)
--------	-----------------------------------

FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	787	mm
BFIHOST19scaled	.865	
QMed-QBar conversion	1.136	1.136
QMed (l/s)	0.1	l/s
QBar (FEH statistical 2025) (l/s)	0.1	l/s

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	7	7
1 year growth factor	0.85	
2 year growth factor	0.88	
10 year growth factor	1.62	
30 year growth factor	2.3	
100 year growth factor	3.19	
200 year growth factor	3.74	

Results

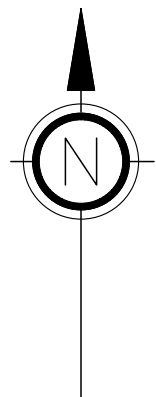
Method	FEH statistical (2025)	
Flow rate 1 year (l/s)	0.1	l/s
Flow rate 2 year (l/s)	0.1	l/s
Flow rate 10 years (l/s)	0.2	l/s
Flow rate 30 years (l/s)	0.2	l/s
Flow rate 100 years (l/s)	0.3	l/s
Flow rate 200 years (l/s)	0.4	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.2) developed by HR Wallingford and available at uksuds.com (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

APPENDIX F – STRATEGIC DRAWINGS



PERMEABLE PAVING STORAGE PROVIDED IN LINED SUB-BASE
DESIGNED FOR 1in100yr+45%CC
IMPERMEABLE AREA 0.115HA
0.660mm OF TYPE 3 STONE TO PROVIDE 103m³ STORAGE.
30% VOIDS
LEVELS ALONG BASE TO FALL MINIMUM 1:40 TO THE PERFORATED PIPE.
LINED IN AN IMPERMEABLE LINER.
STORAGE DOES NOT TAKE INTO ACCOUNT THE BUILD UPS FOR THE PERMEABLE PAVING.

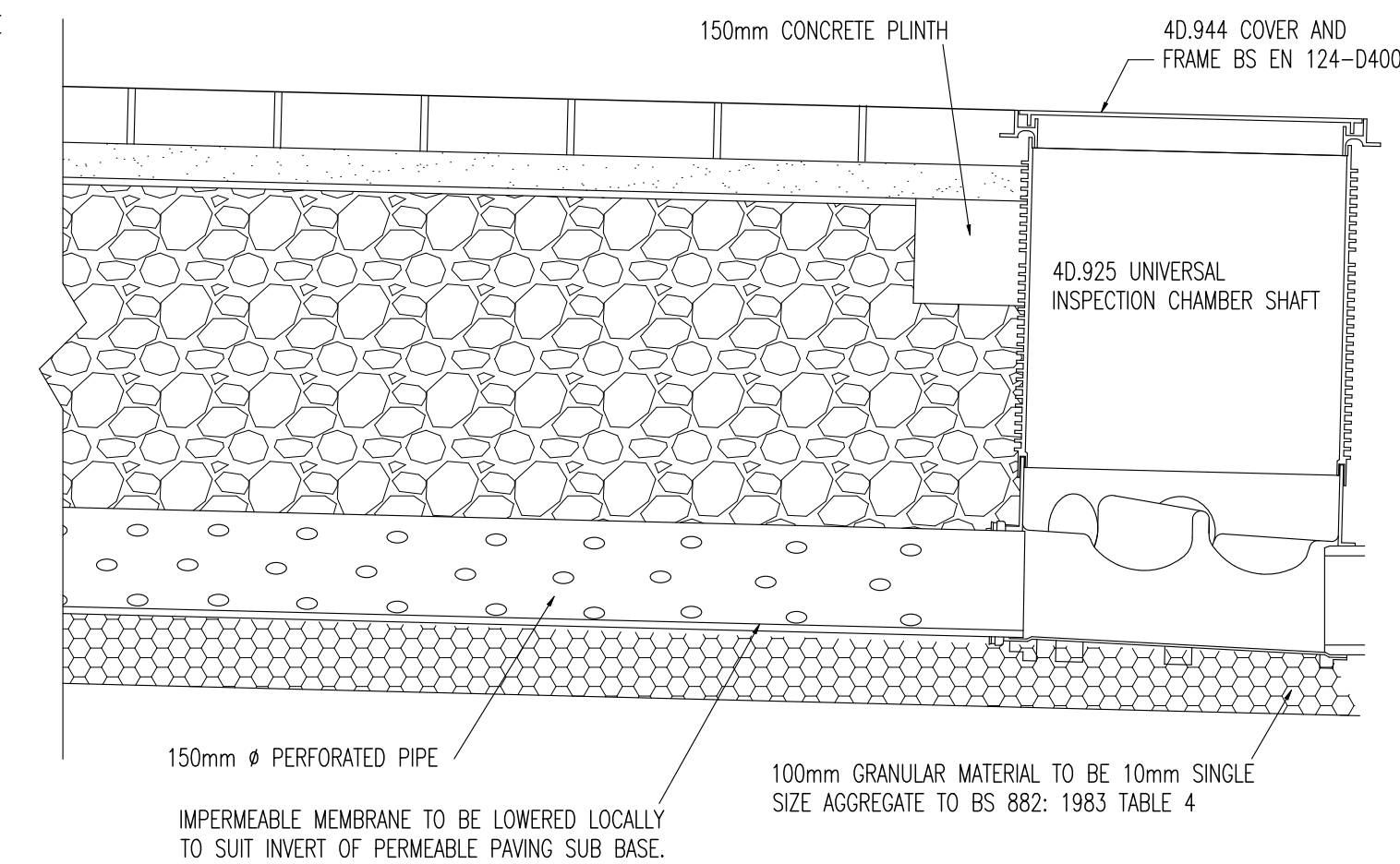
PERFORATED PIPE TO CATCH THE WATER AND TRANSPORT INTO THE DRAINAGE NETWORK.

- GENERAL**
- DO NOT SCALE THIS DRAWING. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED. ANY DISCREPANCIES ARE TO BE RECORDED AND REPORTED TO THE ENGINEERS IMMEDIATELY.
 - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER ENGINEERS AND ARCHITECTS DRAWINGS AND THE SPECIFICATION.
 - ANY EXISTING DETAILS WHICH ARE SHOWN ON THIS DRAWING ARE FOR GUIDANCE ONLY AND ARE TO BE CHECKED ON SITE BY THE CONTRACTOR. ANY VARIATIONS ARE TO BE RECORDED AND REPORTED TO THE ENGINEER IMMEDIATELY.
- NOTES**
- THE SURFACE WATER NETWORK HAS BEEN DESIGNED TO ACCOMMODATE A 1in100YR STORM EVENT TO INCLUDE 45% CLIMATE CHANGE.
 - ALL ADAPTABLE SURFACE WATER SEWERS WITHIN ADAPTABLE HIGHWAYS ARE TO BE A MINIMUM OF 225MM.
 - ALL SEWER WORKS FOR THE WATER AUTHORITY ARE TO BE IN ACCORDANCE WITH 'SEWERAGE SECTOR GUIDANCE APPENDIX C' DESIGN AND CONSTRUCTION GUIDANCE VERSION 1.0 25TH OCTOBER 2019 AND ANY ADDENDUM THEREAFTER.
 - ALL PRIVATE CONNECTIONS TO ADAPTABLE SEWERS SHOULD BE A MINIMUM OF 100MM DIAMETER (FOUL) & 150MM DIAMETER (SURFACE) MADE IN VITRIFIED CLAY CONNECTING SOFFIT TO SOFFIT.
 - THIS DRAWING IS FOR INTENDED FOR STRATEGY PURPOSES ONLY TO ASSIST AND INFORM IN OUTLINING THE INITIAL CONCEPTS AND FEASIBILITY OF THE SCHEME. ANY DETAILS OR INFORMATION ON THIS DRAWING ARE SUBJECT TO CHANGE.

DRAINAGE STRATEGY KEY	
SITE BOUNDARY - RED	
PRIVATE PERMEABLE PAVING AREA 521m²	
PRIVATE ROOFS AREA 614 m²	
PRIVATE HARDSTANDING AREA 14 m²	
ADAPTABLE SURFACE WATER - BLUE	
ADAPTABLE FOUL WATER - BROWN	
PERFORATED SURFACE WATER - BLUE	

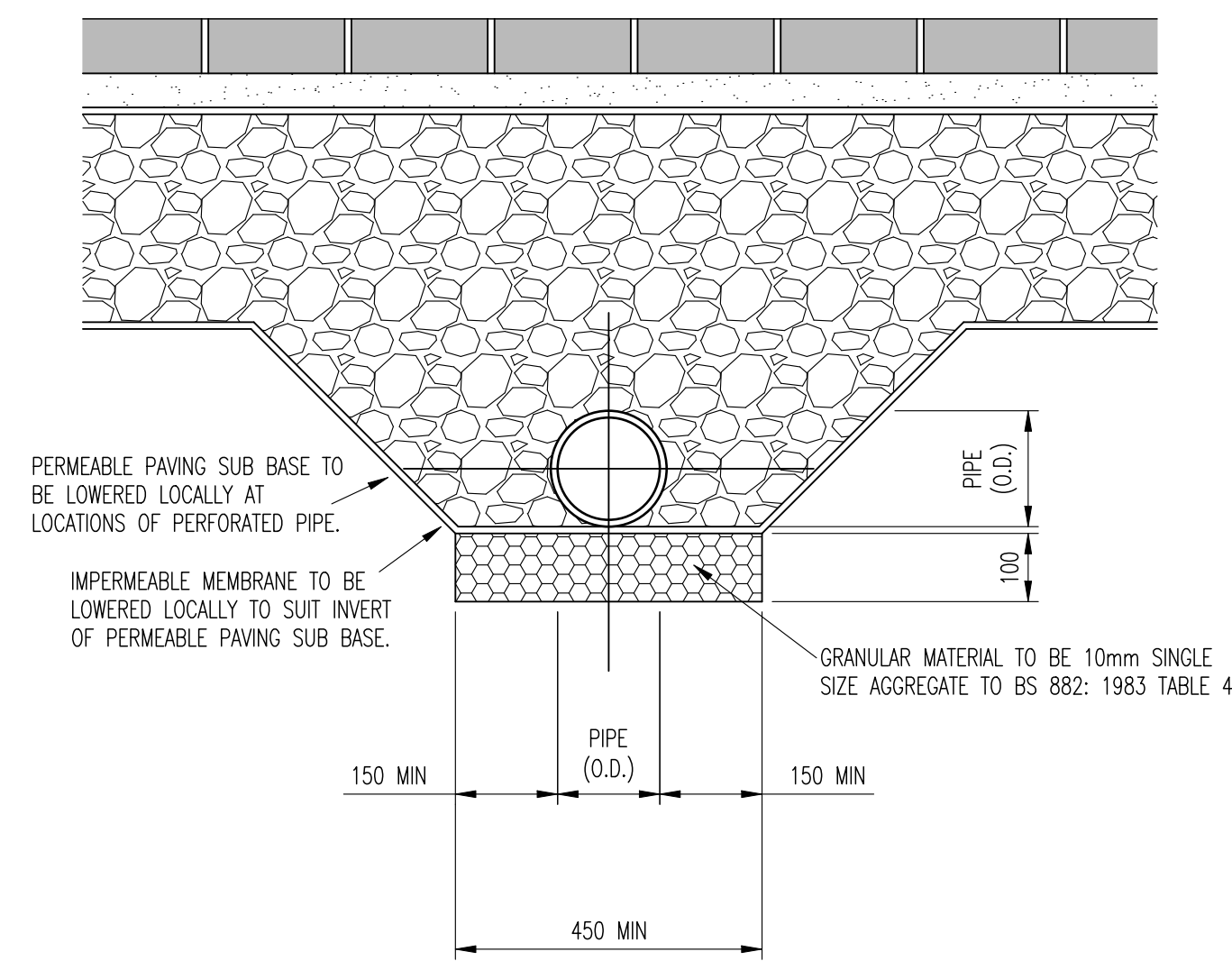


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worksafe consultant SSIP www.smasstf.com	
STRATEGY	
Project: 37 ALBION STREET, SOUTHWICK BRIGHTON, WEST SUSSEX	
Drawing Title: PROPOSED DRAINAGE STRATEGY	
Client: PR HOMES LTD	Date: MAY 26
Drawn: RLP	Designed: RLP
Checked: SDM	Approved: DW
Scale: 1:100 4m 3m 2m 1m 0m 2m 4m	
Project No: 2509-1061	Drawing No & Revision: ST001
Size: A1	



SECTION TROUGH PERFORATED PIPE AND MANHOLE DETAIL

SCALE 1:10



PERFORATED PIPE BEDDING
SCALE 1:10

[illegible]

APPENDIX G – STRATEGIC CALCULATIONS

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	45	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	✓
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)	Invert Level (m)
1	0.115	5.00	4.840	1500	0.011	82.776	0.705	4.135
Attenuation			4.840	1200	42.152	69.398	0.900	3.940
3			4.660	1200	68.406	60.702	0.997	3.663

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	44.214	226.7	300	Circular	4.840	4.135	0.405	4.840	3.940	0.600
1.001	27.657	99.8	150	Circular	4.840	3.940	0.750	4.660	3.663	0.847

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1500	Manhole	Adoptable	Attenuation	1200	Manhole	Adoptable
1.001	Attenuation	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	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	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	35	0	0
100	45	0	0

Node Attenuation Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	3.940	Product Number	CTL-SHE-0051-1000-0700-1000
Design Depth (m)	0.700	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.0	Min Node Diameter (mm)	1200

Node Attenuation Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	3.940
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	1080

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	521.0	521.0	0.660	521.0	574.4	0.661	0.0	574.4

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute summer	1	480	4.391	0.256	12.4	0.4520	0.0000	OK
480 minute summer	Attenuation	480	4.391	0.451	12.4	70.9590	0.0000	SURCHARGED
30 minute summer	3	31	3.687	0.024	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)
480 minute summer	1	1.000	Attenuation	12.4	0.692	0.169	2.9714	
480 minute summer	Attenuation	1.001	3	1.0	0.544	0.056	0.0509	89.2

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	4.596	0.461	100.5	0.8141	0.0000	FLOOD RISK
720 minute winter	Attenuation	690	4.595	0.655	7.8	103.1365	0.0000	FLOOD RISK
15 minute summer	3	17	3.687	0.024	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	1	1.000	Attenuation	99.5	1.796	1.354	2.5533	
720 minute winter	Attenuation	1.001	3	1.0	0.544	0.056	0.0509	112.6



FLOOD RISK ASSESSMENTS

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