Courtwick Park

Courtwick Lane, Littlehampton

Flood Risk Assessment & Drainage Strategy

Issue Date:

28 May 2025

Report Number:

21090-FRA-01

Client:

Caring Homes

Revision:

2

Coast Consulting Engineers Ltd
7 Silverton Court, Northumberland Business Park, NE23 7RY
[redacted]

Contents

Revision	Date	Comments	Prepared by	Checked by
-	08.10.21	Initial issue	PB	RH
1	10.01.23	Appendices D, E & F revised	PB	PB
2	28.05.25	Updated following site-specific ground investigation	PB	KR

Executive Summary

Site Location	The proposed 0.491Ha development is located on land north of Courtwick Lane in Littlehampton, West Sussex. The main vehicular access to the site is from Courtwick Lane.
Site Proposals	The proposed development is a residential development comprising of 4 houses with associated parking and garages. The main entrance to the development will be from Courtwick Lane to the south of the site via the existing stone track to the eastern boundary which serves Coach House.
Ground Conditions	The report by Albury S.I. Ltd states that made ground is present at depths of 0.4m to 0.7m. Granular soils and fine sands were present to depths of up to 4.1m. Underlying bedrock comprises of New Pit Chalk Formation. Envirocheck data indicates there is no hazard from ground dissolution features within the chalk and no natural cavities. Groundwater monitoring was carried out on seven occasions between October 2024 and March 2025 at three locations. No groundwater was encountered with the exception of standing water at 3.27m depth in November at monitoring location B. Soakaway testing was undertaken in January 2025 at three locations.
Nearest Watercourse	Tributary to Black Ditch is classified as a Main River and is located approx. 400m east of the site boundary.
Nearest Surface Water Sewer.	None within or close to site.
Nearest Combined Sewer	None within or close to site.
Nearest Foul Water Sewer	None within site boundary. 150mm diameter foul sewers located within Courtwick Lane & Kingfisher Drive within the residential development to the east.
Flood Zone	EA flood maps indicate that the development boundary is located entirely within an area classified as a **Flood Zone 1**.
Surface Water Flooding	EA surface water flood maps show that the majority of the site is not at risk of surface water flooding. A small area in the south west corner of the site is classified as being of low risk of surface water. Levels in this area of the site will remain as, or close to, existing levels so that flood risk is not increased elsewhere. FFL's will be raised, and hardstanding areas will be directed away from buildings. Post development, the risk of surface water flooding to properties can be considered as **low** throughout the site.
Ground Water	Groundwater monitoring was carried out on seven occasions between October 2024 and March 2025 at three locations. No groundwater was encountered with the exception of standing water at 3.27m depth in November at monitoring location B. The risk of flooding from groundwater is therefore considered to be low.
Sewer Flooding	There are no public surface water, foul water or combined water sewers within or surrounding the site. The risk of sewer flooding can therefore be deemed as **low**.
Surface Water Discharge	Surface water will discharge to ground via geocellular infiltration soakaways or permeable surfacing. Soakaway testing has been undertaken at three locations.
Foul Disposal	A public sewer manhole has been identified in the junction of Courtwick Lane and Kingfisher Drive but would likely require a foul pumping station. Alternatively, it may be possible to discharge to ground with prior treatment subject to the Environment Agency issuing an Environmental Permit.
SUDS	Permeable drive construction Permeable road construction Geocellular soakaways

The above summary should not be used in isolation and reference should be made the full report which provides a detailed assessment of the risks affecting the development.

1. Introduction

Coast Consulting Engineers have been commissioned by Caring Homes to assess the flood risk associated with a proposed development on land north of Courtwick Lane in Littlehampton, West Sussex. This Flood Risk Assessment (FRA) is reviewed in accordance with the National Planning Policy Framework (NPPF) for Development and Flood Risk. In conjunction with assessing the site for flood risk a proposed drainage strategy has been prepared.

This site-specific FRA has been undertaken to determine the risk of flooding to the proposed development from all sources in accordance with the NPPF and to assess the flood risk to others as a result of the development. The assessment will recommend how the risk can be managed in line with planning policy requirements.

One of the key aims of the NPPF is to ensure that 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 away from areas at highest risk. Where new development is necessary in such areas, the policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall.

1.1 National Planning Policy Framework (NPPF)

The NPPF (2024) requires that:

- A site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account the vulnerability of its users, without increasing flood risk elsewhere, and where possible, will reduce flood risk overall.

- A site-specific flood risk assessment is required for proposals greater than 1 ha in size in a Flood Zone 1; all proposals for new development in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems (as identified in the Strategic Flood Risk Assessment).

The following definitions for flood zones are derived from NPPF:

FLOOD ZONE 1:

This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).

FLOOD ZONE 2:

This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.

FLOOD ZONE 3:

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.

In addition to the risk of flooding from rivers or sea, consideration must also be given to surface water flooding, flooding due to ground water and flooding from artificial sources such as sewer failure or overtopping of reservoirs.

2. Site Location, Topographical Features and Proposals

2.1 Site Location

The proposed development is located on land north of Courtwick Lane in Littlehampton, West Sussex. The main vehicular access to the site is from Courtwick Lane.

National Grid Reference: TQ019037

501950mE, 103778mN

Please refer to the site location plan below and in Appendix A.

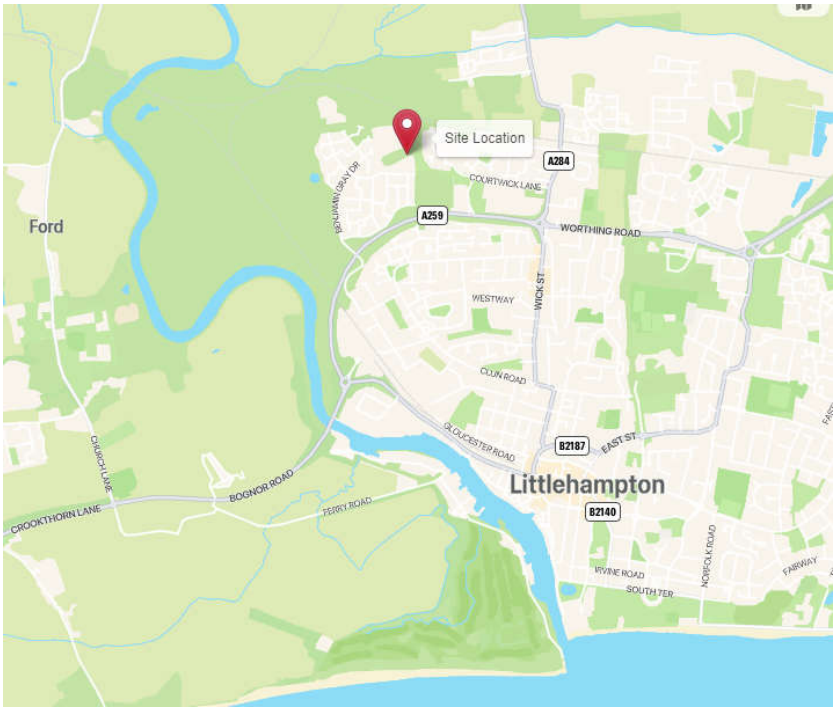

Figure 2.1 - Site Location

2.2 Existing Site Description

The irregular shaped site has a red line boundary area of 0.491Ha which comprises largely of grassland and mature trees.

The site is bound by mature trees and an existing building named Coach House to the north and by Strawberry Fields residence and Courtwick Line beyond to the south. The access road to Coach House defines the eastern boundary. Courtwick Park Cottages are situated to the west.

A topographical survey by Cadmap Ltd dated April 2017 shows that the site falls from a high point of 51.6m Above Ordnance Datum (AOD), located in the north west of the site to a low point of 48.65m AOD found in the south west corner of the site. Please refer to Appendix B.

2.3 Existing Watercourses

The Environment Agency's Statutory Main River Map shows that the closest Main Rivers is approximately 400m east of the site within the residential development accessed from Courtwick Lane and flows northwards to Black Ditch. Black Ditch discharges to the River Arun.

2.4 Existing Sewers

Existing sewer records have been obtained from Southern Water. The sewer records show that there are no public surface water, foul water or combined water sewers within or adjacent to the site.

The closest foul water discharge point is manhole 0701 located in the road named Kingfisher Drive in the residential estate to the east, approximately 75m from the proposed developments site boundary.

An alternative foul discharge point is to manhole 2702 located within the junction of Courtwick Lane and Kingfisher Drive. A connection to this manhole would require an outfall of approximately 275m which may need to be pumped due topography.

A copy of the sewer records can be found in Appendix C.

It is understood that adjacent buildings drain to the septic tank identified on the topographic survey as being located within the site's red line boundary. At the time of writing, it is assumed that treated foul flows discharge to ground via infiltration although further investigation is required to confirm this.

2.5 Existing Ground Conditions

Albury S.I. Ltd have provided a letter report dated December 2024 following on-site borehole sampling in October 2024. The report states that made ground is present at depths of 0.4m to 0.7m. Granular soils and fine sand indicative of River Terrace Deposits were present to depths of up to 4.1m. Underlying bedrock comprises of New Pit Chalk Formation. Envirocheck data indicates there is no hazard from ground dissolution featires within the chalk and no natural cavities.

Groundwater monitoring was carried out on seven occasions between October 2024 and March 2025 at three locations. No groundwater was encountered with the exception of standing water at 3.27m depth in November at monitoring location B.

Soakaway testing was undertaken in January 2025 at three locations. The lowest test result at each location was as follows:

- Test Location A - 3.1×10^{-5}
- Test Location B - 7.45×10^{-6}
- Test Location C - 1.59×10^{-4}

DEFRA's online Magic Map shows that the site is not situated in or close to a Source Protection Zone (SPZ).

2.6 Development Proposals

Drawings by ADG Architects show a residential development comprising of 4 houses with associated parking and garages. The main entrance to the development will be from Courtwick Lane to the south of the site via the existing stone track to the eastern boundary which serves Coach House. Please refer to Appendix D.

3. Potential Sources of Flooding and Proposed Mitigation

As required by the National Planning Policy Framework (NPPF) and Technical Guidance to the NPPF, each potential source of flooding needs to be considered; rivers and sea, land, groundwater, sewers and artificial sources (such as reservoirs and canals). Consideration also needs to be given to the flood risk vulnerability classification for this type of development.

3.1 Flood Zone Classification

The Environment Agency flood maps (updated 25th March 2025) indicate that the development boundary is located entirely within an area classified as a Flood Zone 1. Land located within a flood zone 1 is defined as having less than a 1 in 1,000 annual probability of flooding from rivers or the sea (low risk). Refer to the extract below which identifies the Flood Zones within and in proximity to the development site. The site is not considered to be at risk of flooding from rivers or sea.

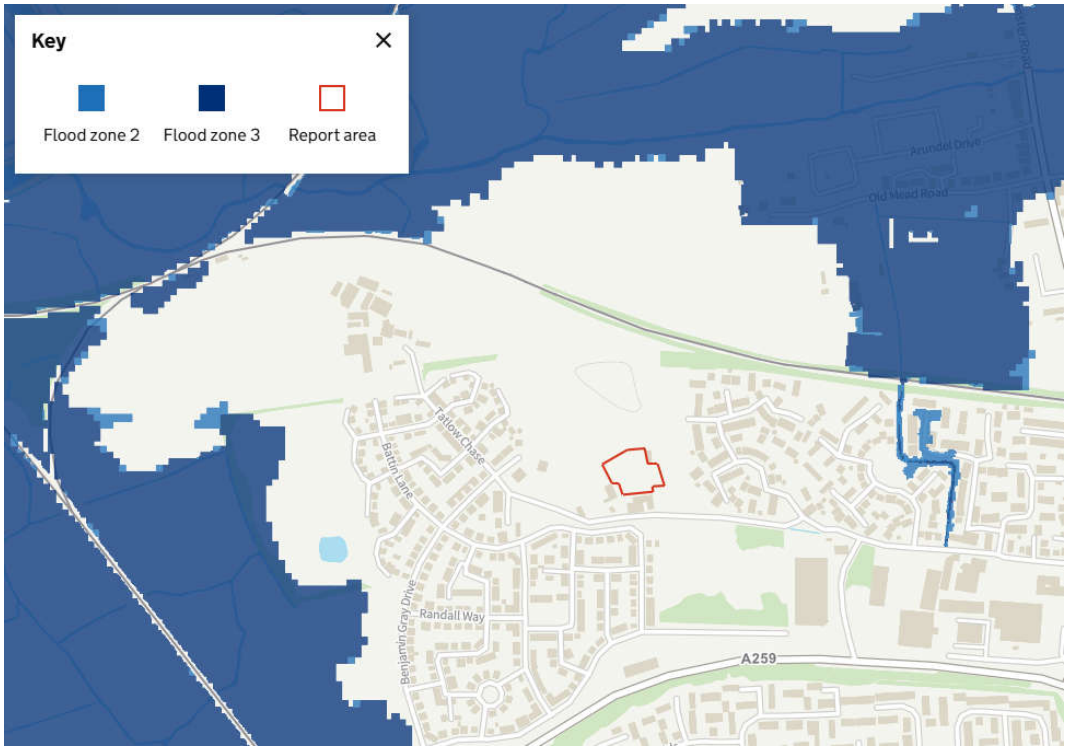

Figure 3.1 – Flood Zone Classification

3.2 Flood Risk Vulnerability Classification

Annex 3 of the National Planning Policy Framework (2024) states the following with respect to flood risk vulnerability classification.

More vulnerable

- Hospitals.
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- **Buildings used for dwelling houses**, student halls of residence, drinking establishments, nightclubs and hotels.
- Non–residential uses for health services, nurseries and educational establishments.
- Landfill and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan

Table 3 of the Technical Guidance to the National Planning Policy Framework states the following with respect to appropriate land uses:

Table 3: flood risk vulnerability and flood zone 'compaibility'

Flood Risk Vulnerability Classification (See Table 2)	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception Test required	✓	✓
Zone 3a	Exception Test required	✓	x	Exception Test required	✓
Zone 3b functional floodplain	Exception Test required	✓	x	x	x

Key: ✓ Development is appropriate.
X Development should not be permitted.

An exception test will not be required in this instance as development is located outside of a flood zone 2 or flood zone 3.

3.3 Surface Water Flood Risk

The topographical survey shows that land within the proposed development falls towards the south west corner of the site. Environment Agency surface water flood maps show that the majority of the site is not at risk of surface water flooding. A small area in the

south west corner of the site is classified as being of low risk of surface water flooding which is consistent with the low spot identified by the topographical survey. Levels in this area of the site will remain as, or close to, existing levels so that flood risk is not increased elsewhere.

Finished floor levels should be raised locally to a minimum of 0.3m above the maximum water level of the proposed drainage system. In addition, proposed site levels should be designed to direct surface water away from dwelling entrances.

Based upon the information outlined above, post development, the risk of surface water flooding to properties can be considered as **low** throughout the site.

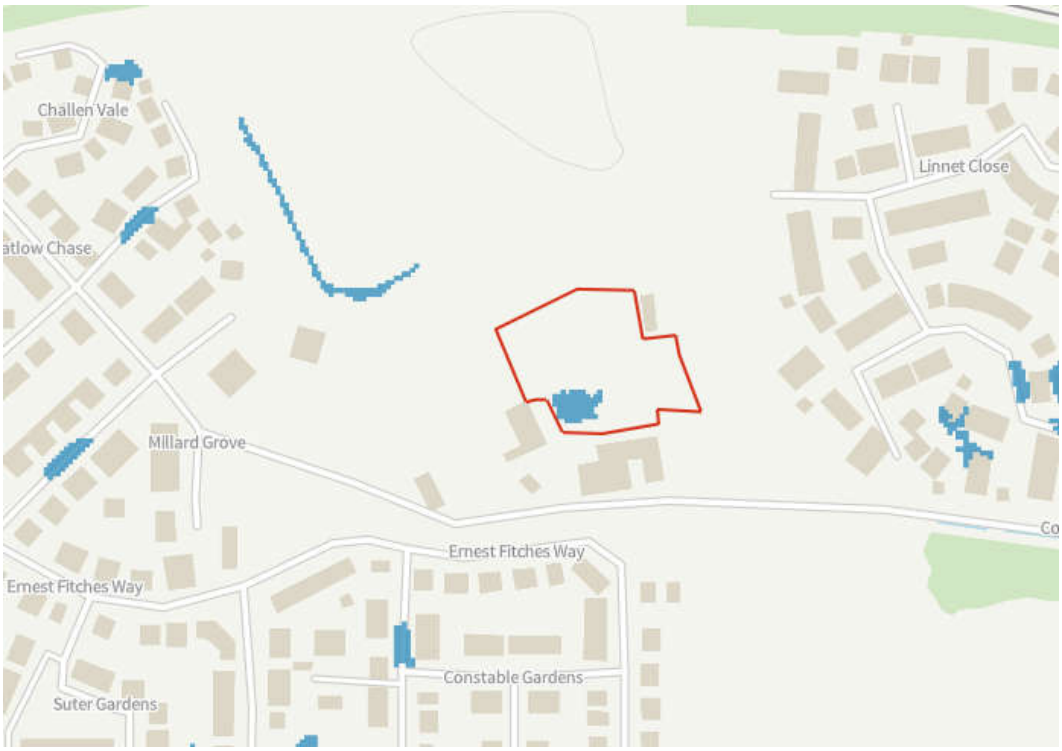

Figure 3.2 – Extent of 1 in 30 year surface water flood risk

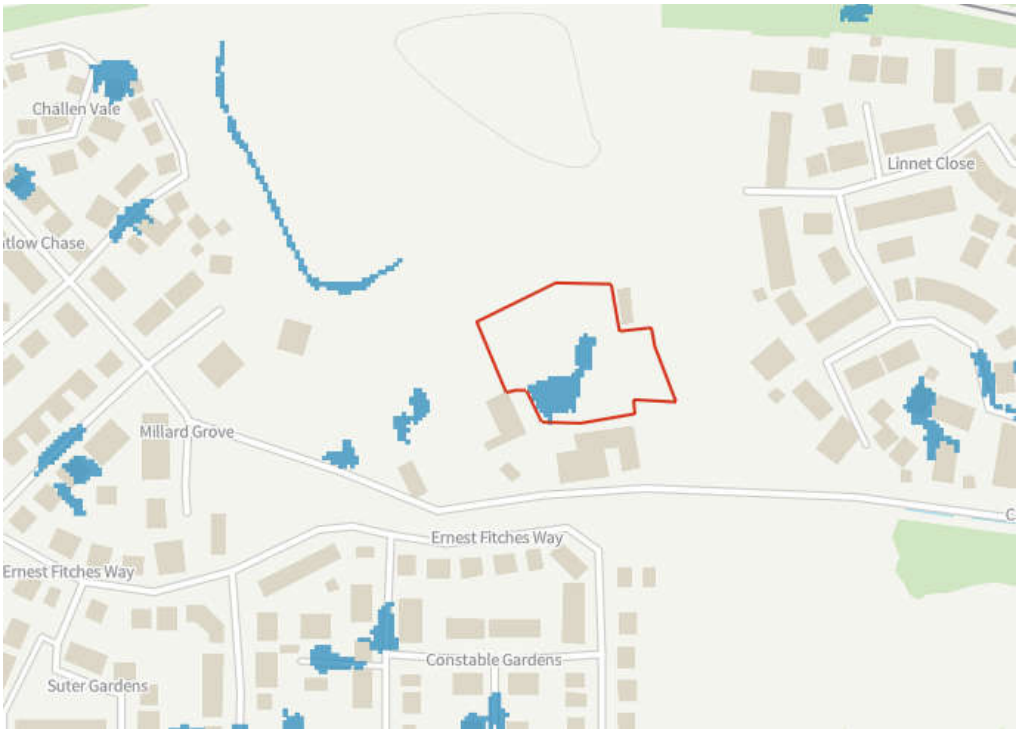

Figure 3.3 – Extent of 1 in 100 year surface water flood risk

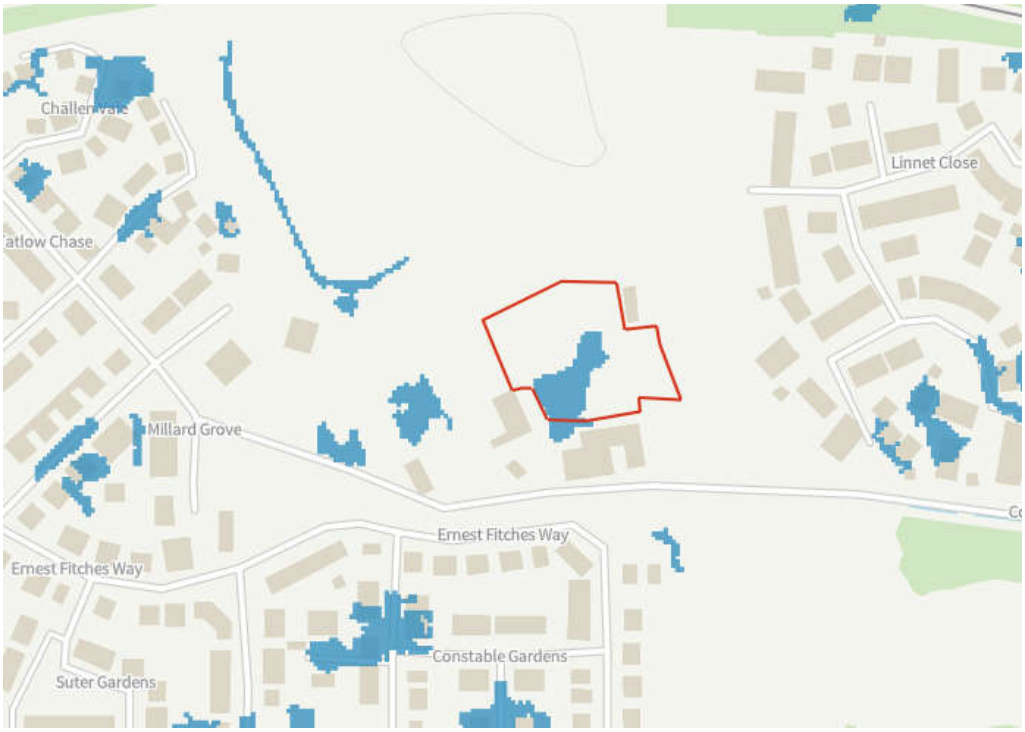

Figure 3.4 – Extent of 1 in 1000 year surface water flood risk

3.4 Groundwater Flood Risk

Groundwater monitoring was carried out on seven occasions between October 2024 and March 2025 at three locations. No groundwater was encountered with the exception of standing water at 3.27m depth in November at monitoring location B. The risk of flooding from groundwater is therefore considered to be low.

3.5 Sewer Flood Risk

Existing sewer records have been obtained from Southern Water. The sewer records show that there are no public surface water, foul water or combined water sewers within or surrounding the site.

The risk of sewer flooding can therefore be deemed as **low**.

3.6 Reservoir Flood Risk

Artificial sources of flood risk such as man-made ponds or reservoirs can cause a potential risk of flooding. The flood map below shows that the site is not considered to be at risk from potential reservoir flooding.

Figure 3.6 – Extent of reservoir flooding

The proposed development is considered appropriate within a Flood Zone 1 in line with the guidance contained within the NPPF for flooding.

4. Surface Water Disposal

The existing development is a 0.491 ha greenfield site, which comprises largely of grassland and mature trees.

Part H of the Building Regulations 2010 provides a recommended hierarchy for surface water disposal:

1. By infiltration
2. To watercourse
3. To sewer

4.1 Infiltration

Soakaway testing was undertaken in January 2025 by Albury S.I. Ltd at three locations. The lowest test result at each location was as follows:

- Test Location A1 3.1×10^{-5} (0.11160m/hr)
- Test Location B2 7.45×10^{-6} (0.02682m/hr)
- Test Location C 1.59×10^{-4} (0.57240m/hr)

4.2 Watercourse

There are no existing watercourses located within 400m of the site boundary.

4.3 Sewer

Existing sewer records have been obtained from Southern Water. The sewer records show that there are no public surface water or combined water sewers within or surrounding the site.

4.4 SUDS Techniques

In line with National Planning Policy, SUDS techniques are to be utilised as part of the design of the surface water network. The applicable techniques and the benefits that they bring to the development are outlined below.

- Attenuation: Geocellular attenuation will be used as a soakaway and storage structure to attenuate surface water prior to discharging to ground. Geocellular systems provide an effective space efficient solution for attenuating surface water below ground, allowing the land above to be used for other purposes.

- Source Control & Water Quality: Private driveways, shared driveways and roads will be of permeable block or permeable asphalt construction. **Permeable surfacing** can

provide benefits such as reduced peak flows to the watercourse, reduced effects of pollution in run-off to the environment and can assist with the reduction of surface ponding.

- Water Quality: All surface water flows will discharge through a **silt trap manhole** prior to discharging into the soakaway structure to prevent build-up of sediments ensuring that the soakaway will continue to function as designed.

4.5 Surface Water

Surface water from rooftops will discharge to ground via a geocellular infiltration soakaway. Soakaways have been designed to the 1 in 10 year storm event plus a 40% allowance for climate change and simulated using FEH22 rainfall data as requested by Arun District Council in their objection letter dated September 2023. A 10% uplift in plot areas has been applied for urban creep. Silt traps are proposed upstream of each soakaway to reduce the likelihood of silts entering and blocking up the base of each soakaway. As a factor of safety, the lowest infiltration rate of three tests has been used in the design and the rate is only applied to the sides of the structure.

Estate roads and driveways will be of permeable construction. No additional flows will be directed onto the surface, or into the subbase of the roads or driveways so only water falling directly on the surface will be allowed to permeate through the construction and to ground

For full details of the proposed drainage design, please refer to the drawings in Appendix E and supporting calculations in Appendix F. A copy of the sewer records can be found in Appendix C.

4.6 Ownership & Maintenance

It is our understanding that on site roads will not be put forward to the local highway authority for adoption. The permeable road construction will be maintained by a management company appointed by the developer.

It is unconfirmed at this stage is the foul drainage system will be adopted by Southern Water or be maintained by a management company appointed by the developer.

5. Foul Water Disposal

5.1 Discharge To Sewer

The closest foul water discharge point is at manhole 0701 located in the road named Kingfisher Drive in the residential estate to the east, approximately 75m from the proposed developments site boundary. An outfall route to this point does not appear to be feasible due to the belt of mature trees.

The preferred point of discharge is to manhole 2702 located approximately 205m east of the site boundary within the junction of Courtwick Lane and Kingfisher Drive. A connection to this manhole would require an outfall of approximately 275m and may need to be pumped although this should be confirmed by further topographic survey.

If further topographic and drainage survey proves that a gravity outfall is not feasible, a Type 2 foul water pumping station and rising main will be required. At this stage it is proposed that the pumping station will be put forward to Southern Water for adoption however this may not be possible if Southern Water require access from an adopted road as it is understood that the access roads will remain private, including the existing road, Courtwick Lane.

Should Southern Water be unwilling to adopt the pumping station, the foul drainage network could be a private system maintained by a management company appointed by the developer. Laying a private outfall along Courtwick Lane, a private road, would require approval from the land owner.

5.2 Treatment Plant & Discharge to Ground

An alternative solution would be to discharge treated foul flows to ground. The Environment Agency's '*General Binding Rules: Small Discharges to Ground (October 2023)*' states that all rules must be complied with otherwise, an environmental permit will be required.

British Water's '*Flows and Loads – 4*' has been used to calculate the sites daily foul discharge.

Plot 1 - 4 bed (6 persons)

Plot 2 - 4 bed (6 persons)

Plot 3 - 5 bed (7 persons)

Plot 4 - 4 bed (6 persons)

TOTAL 25P

An adjustment factor of 0.9 can be applied for developments between 13 and 25P with the figure rounded up.

25P x 0.9 = 22.5

Therefore, 23P

Allow 150 litres per person per day

150 x 23P = **3,450L (3.45m^3)**

General Binding Rules

(Note – whilst the site has been checked against all rules, not all rules have been covered below, only those which do not, or may not, comply.)

RULE 1

The discharge must be 2m^3 or less per day in volume.

Proposed discharge = 3.45m^3 therefore, **does not comply**.

RULE 5

You must use a septic tank or small treatment plan to treat the sewage then discharge the waste water to ground through a drainage field.

The majority of the open space in the layout is covered by tree root protection zones so there is not a suitable location for a drainage field to discharge treated flows to ground. Treated foul flows would need to discharge via a soakaway. Therefore, the site **does not comply**.

RULE 15

Check if you can connect to a nearby public sewer. You cannot meet the General Binding Rules if the sewer is within 30m x No. of properties (120m).

Manhole 0701 is approximately 75m direct distance from the site boundary. This is not considered a practical point of discharge due to the presence of the mature trees. Manhole 2702 is approximately 205m direct distance from the site boundary.

RULE 23

Make sure your discharge is not within 50m of any other exempt small sewer discharge.

It is understood that adjacent buildings drain to a septic tank identified on the topographic survey as being located within the site's red line boundary. At the time of writing, it is assumed that treated foul flows discharge to ground via infiltration although further investigation is required to confirm this. The foul drainage regime for all properties surrounding the development should be confirmed. The site **may not comply**.

In summary, the development does not comply with all General Binding Rules therefore an Environmental Permit would be required to discharge treated foul flows to ground via a soakaway.

6. References

The following reference documents have been used in the preparation of this report.

- National Planning Policy Framework - December 2024.
- Environment Agency online flood maps (Updated March 2024).
- Design and Construction Guidance for foul and surface water sewers offered for adoption under the Code.
- Building Regulations Document H 2010.
- Susdrain.org
- The SuDS Manual CIRIA C753.
- Surface Water Drainage Proposal Checklist – Arun Council
- West Sussex LFA Policy for the Management of Surface Water – November 2018
- Non-statutory technical standards for sustainable drainage – LASOO
- British Geological Survey online maps.
- Magic Map – DEFRA.
- British Water Flows and Loads 4
- General Binding Rules: Small sewerage discharge to the ground (October 2023) – Environment Agency

Appendix A –
Site Location Plan

A3

Issue	Date	Description	By	Chkd	Appd

COAST CONSULTING ENGINEERS
7 Silverton Court, Northumberland Business Park, NE23 7RY
0191 5977879

Client
Caring Homes

Job Title
Courtwick Park
Courtwick Lane
Littlehampton

Drawing Title
Site Location Plan

Scale at A3
1:2000

Drawing Status
PRELIMINARY

Job No	Drawing No	Issue
21090		

Do not scale

Appendix B –
Topographical Survey

Issue	Date	Description	By	Chkd	Appd

COAST CONSULTING ENGINEERS

7 Silverton Court, Northumberland Business Park, NE23 7RY
0191 5977879

Client
Caring Homes

Job Title
Courtwick Park
Courtwick Lane
Littlehampton

Drawing Title
Topographical Survey

Scale at A1
1:250

Drawing Status
INFORMATION

Job No
21090

Drawing No

Issue

Do not scale

Appendix C –
Southern Water Sewer Plans

(c) Crown copyright and database rights 2021 Ordnance Survey 100031673 | Date: 07/10/21 | Scale: 1:1250 | Map Centre: 502224,103794 | Data updated: 20/09/21 | Our Ref: 668624 - 1 | Wastewater Plan A2

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2021 Ordnance Survey 100031673 .This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

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
Foul Outfall
Surface Water 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

gill.paterson@centara-ltd.com

CEN21939

WATER for LIFE

from Southern Water

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0701	F	4.97	3.01	
0801	F	5.46	3.47	
0802	F	5.05	2.84	
0901	F	5.15	3.05	
1701	F	3.97	2.18	
1702	F	3.57	1.77	
1703	F	3.15	1.07	
1704	F	2.92	1.51	
1705	F	3.09	1.30	
1801	F	0.00	0.90	
1802	F	3.15	0.84	
1803	F	2.92	0.52	
1804	F	4.67	2.58	
1805	F	4.25	2.28	
1806	F	3.96	1.97	
1807	F	3.63	1.73	
1808	F	3.30	1.31	
2600	F	2.68	0.01	
2700	F	2.55	-0.48	
2701	F	2.56	-0.59	
2702	F	3.17	1.75	
2703	F	0.00	0.00	
2800	F	0.00	0.00	
2801	F	2.48	0.56	
2802	F	2.78	0.64	
2803	F	2.69	0.34	
2804	F	2.86	0.34	
2805	F	2.87	0.12	
2807	F	0.00	0.00	
2901	F	0.00	0.00	
3601	F	2.75	0.94	
3602	F	2.68	0.67	
3603	F	2.36	-0.16	
3701	F	2.53	-0.21	
3702	F	2.65	-0.71	
3703	F	2.48	0.45	
3704	F	2.47	-1.39	
3705	F	2.48	-0.98	
3706	F	2.60	-0.87	
3707	F	2.56	-1.52	
3708	F	2.65	-0.78	
3709	F	2.53	-0.65	
3710	F	1.88	-1.89	
3711	F	1.81	-1.29	
3712	F	0.00	0.00	
3801	F	1.86	-0.32	
4601	F	2.20	0.70	
4602	F	0.00	0.00	
4603	F	0.00	0.00	
4604	F	0.00	0.00	
4701	F	1.95	0.30	
4702	F	2.18	-0.12	
4703	F	2.15	0.00	
4704	F	2.17	-0.02	
4705	F	2.53	-0.87	
4706	F	0.00	0.00	
4707	F	0.00	0.00	
4708	F	0.00	0.00	
4709	F	0.00	0.00	
4801	F	1.93	0.52	
4802	F	2.00	0.38	
4803	F	2.00	-0.63	
4804	F	1.66	0.17	
4805	F	0.00	0.00	
4806	F	0.00	0.00	
4807	F	0.00	0.00	
5801	F	2.09	0.07	
1751	S	3.14	1.92	
1850	S	2.93	1.80	
2750	S	0.00	1.30	
2751	S	2.55	1.51	
2752	S	2.46	1.58	
2850	S	2.49	1.56	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
2851	S	2.67	1.53	
2852	S	2.83	1.73	
2853	S	2.85	1.64	
3650	S	2.77	1.56	
3651	S	2.57	1.45	
3750	S	2.52	1.35	
3751	S	2.65	1.20	
3752	S	2.58	1.07	
3753	S	2.46	1.03	
3754	S	2.61	0.98	
3755	S	2.46	0.94	
3756	S	2.71	1.02	
3757	S	2.46	0.98	
3758	S	2.58	1.39	
3759	S	2.73	0.00	
3760	S	2.47	0.91	
3761	S	2.73	0.97	
3762	S	2.41	0.94	
3763	S	2.47	0.72	
3850	S	2.57	0.94	
3851	S	2.43	0.91	
3852	S	2.58	0.96	
3853	S	2.48	0.92	
3854	S	2.71	1.74	
3855	S	2.79	1.62	
4650	S	2.90	1.21	
4651	S	0.00	0.00	
4652	S	1.94	1.25	
4750	S	1.94	1.13	
4751	S	2.18	0.86	
4752	S	2.19	0.79	
4753	S	2.38	1.49	
4850	S	2.03	1.10	
4851	S	1.92	0.88	
4852	S	1.68	1.06	
4853	S	1.64	0.99	
5650	S	3.18	1.21	
5651	S	3.06	1.21	
5750	S	2.14	0.89	
5751	S	2.19	0.00	
5752	S	2.09	1.26	
5753	S	1.85	1.27	
5754	S	1.81	1.28	
5850	S	1.91	1.23	
5851	S	2.08	0.96	
5852	S	2.96	1.51	
5853	S	0.00	1.36	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Appendix D –
Proposed Layout

Rev	Date	Revision Description	Drawn By	Approved By
I	10/08/23	Relocaterd Plot 3 - To reduce impact on existing trees	LW	JB
H	26/07/23	Roofs added to site plan	LW	JB
G	13/12/22	A0 Layout	JB	JB
F	13/12/22	Layout has been revised to retain the existing TPO trees	JB	JB
E	13/10/22	Layout has been revised to retain the existing TPO trees	JB	JB
D	02/03/22	Layout has been revised to suit the existing trees	JB	JB
C	22/11/21	Redline has been updated to suit the title plan	JB	JB
B	14/09/21	House Types Amended	JB	JB
A	12/08/21	House Types Amended	JB	JB
-	15/06/21	Updated Entrance	JB	JB

ADG ARCHITECTS
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w: www.adgarchitects.co.uk

Client
Paul Jeffery

Project Information
Proposed Residential Development, Land Adj to Courtwick Park, Littlehampton

Drawing Title
Proposed Site Plan

A1 Scale: 1:200

A3 Scale:

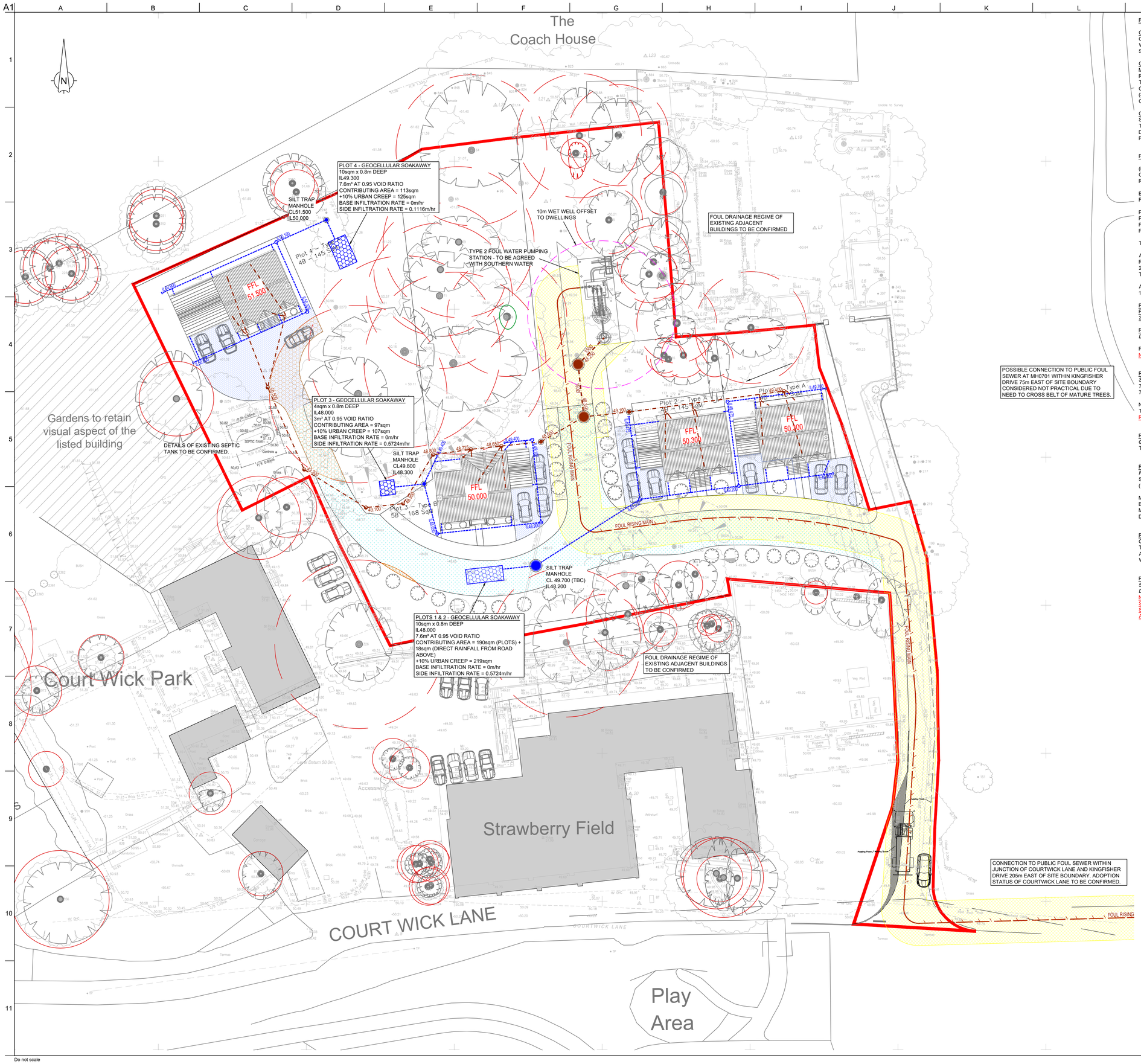
Job Number: H.20.70

Drawing Number: (9-) 2

Revision: I

Drawing Issue: PLANNING

Appendix E –
Drainage Strategy



FOUL DRAINAGE OPTIONS

OPTION 1 - ADOPTED PUMPING STATION
ON-SITE ROADS TO REMAIN PRIVATE. SOUTHERN WATER MAY NOT PERMIT AN ADOPTED PUMPING STATION OFF A PRIVATE ROAD.

OPTION 2 - PRIVATE PUMPING STATION
MAINTAINED BY MANAGEMENT COMPANY INCLUDING RISING MAIN. A SECTION 50 LICENCE MAY BE REQUIRED TO LAY THE PRIVATE FOUL WATER OUTFALL WITHIN COURTWICK LANE WHICH IS ASSUMED TO BE ADOPTED. (STATUS OF COURTWICK LANE ADOPTION TO BE CONFIRMED).

OPTION 3 - TREATMENT PLANT & SOAKAWAY
SITE DOES NOT MEET THE GENERAL BINDING RULES THEREFORE AN ENVIRONMENT AGENCY PERMIT TO DISCHARGE TREATED DOMENSTIC SEWAGE EFFLUENT FLOWS TO GROUND.

FOUL GENERAL BINDING RULES

(NOTE - YOU MUST COMPLY WITH ALL RULES OTHERWISE, AN ENVIRONMENTAL PERMIT WILL BE REQUIRED)

ESTIMATED FOUL FLOWS USING BRITISH WATER'S FLOWS & LOADS - 4

PLOT 1 - 4 BED (6 PERSONS)
PLOT 2 - 4 BED (6 PERSONS)
PLOT 3 - 5 BED (7 PERSONS)
PLOT 4 - 4 BED (6 PERSONS)

TOTAL = 25P

APPLY ADJUSTMENT FACTOR OF 0.9 FOR 13-25P AND ROUND UP
25 x 0.9 = 22.5
THEREFORE, 23P

ALLOW 150 LITRES PER PERSON PER DAY
150 x 23P = 3,450L (3.45m³)

REFER TO ENVIRONMENT AGENCY'S 'GENERAL BINDING RULES: SMALL DISCHARGE TO THE GROUND' (OCTOBER 2023)

RULE 1 - *'THE DISCHARGE MUST BE 2m³ OR LESS PER DAY IN VOLUME'*

PROPOSED DISCHARGE = 3.45m³ THEREFORE, DOES NOT COMPLY - A PERMIT WILL BE REQUIRED

RULE 5 - *'YOU MUST USE A SEPTIC TANK OR SMALL SEWAGE TREATMENT PLANT TO TREAT THE SEWAGE THEN DISCHARGE THE WASTE WATER TO GROUND THROUGH A DRAINAGE FIELD'*

NOTE - NO SPACE IN LAYOUT FOR A DRAINAGE FIELD THEREFORE, DOES NOT COMPLY - A PERMIT WILL BE REQUIRED

RULE 7 - *'MAKE SURE THE DISCHARGE IS NOT IN A GROUNDWATER SOURCE PROTECTION ZONE 1'*
THE SITE IS NOT IN A SOURCE PROTECTION ZONE

RULE 15 - *'CHECK IF YOU CAN CONNECT TO A NEARBY PUBLIC SEWER.'* YOU CANNOT MEET THE RULES IF THE SEWER IS WITHIN 30m x NUMBER OF PROPERTIES (120m)

MH0701 APPROX 75m DIRECT DISTANCE FROM SITE BOUNDARY NOT CONSIDERED PRACTICAL DUE TO MATURE TREE BELT. MH2702 APPROX 205m DIRECT DISTANCE FROM SITE BOUNDARY.

RULE 18 - *'MAKE SURE THE DISCHARGE POINT IS NOT IN OR NEAR PROTECTED SITES'*
THE SITE IS NOT WITHIN A SSSI, SPECIAL PROTECTION AREA, SPECIAL AREA, RAMSAR SITE OR ANCIENT WOODLAND.

RULE 23 - *'MAKE SURE YOUR DISCHARGE IS NOT WITHIN 50m OF ANY OTHER EXEMPT SMALL SEWER DISCHARGE'*
NOTE - CHECK DISTANCE AND DETAILS OF EXISTING SEPTIC TANK IDENTIFIED ON THE TOPOGRAPHIC SURVEY TO THE WEST AND ALL OTHER PROPERTIES ADJACENT TO THE SITE

Key

- Permeable Block Paving - Drives
- Porous Asphalt - Non-adopted roads
- Cellweb TRP - Tree Root Protection zones

Drainage Strategy Notes

- Soakaway design based on infiltration rates provided by Albury SI Ltd. Report dated February 2025.
- Enquiry to be submitted to Southern Water for disposal of foul water to existing public sewer.
- Further topographic survey including cover levels and invert levels of existing public foul sewer required to determine if gravity foul drainage outfall is feasible. Foul water pumping station may be required.
- If required, foul water pumping station to be "Type 2", with the wet well located a minimum of 10m from habitable buildings.
- Final road levels and plot finished floor levels subject to detailed design.

Issue	Date	Description	By	Chkd	Appd
P7	28.05.25	Layout updated. Drainage design revised following infiltration testing.	PB	PB	PB
P6	16.01.25	Revised architectural layout added. Drawing revised to suit.	PB	PB	RH
P5	20.06.23	Drawing revised following receipt of updated tree root zone information.	PB	PB	RH
P4	12.06.23	Revised architectural layout added. Drawing revised to suit.	PB	PB	RH
P3	15.05.23	Revised architectural layout added. Drawing revised to suit.	PB	PB	RH
P2	09.01.23	Drainage revised to suit new architectural site layout	PB	PB	RH
P1	08.10.21	Preliminary Issue	PB	PB	RH

COAST CONSULTING ENGINEERS
7 Silverton Court, Northumberland Business Park, NE23 7RY
0191 5977879

Client
Caring Homes

Job Title
Courtwick Park
Courtwick Lane
Littlehampton

Drawing Title
Drainage Strategy
Sheet 1

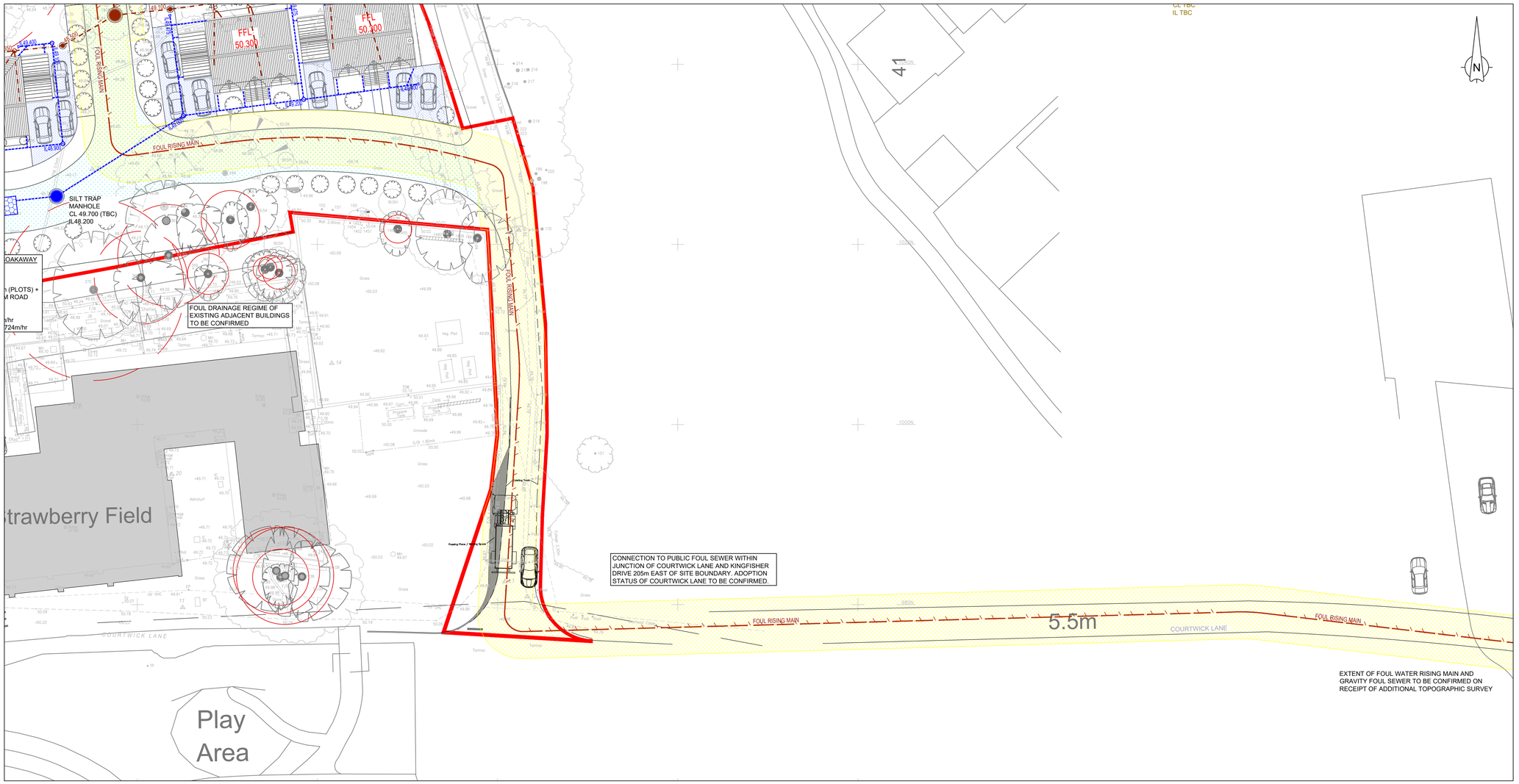
Scale at A1
1:250

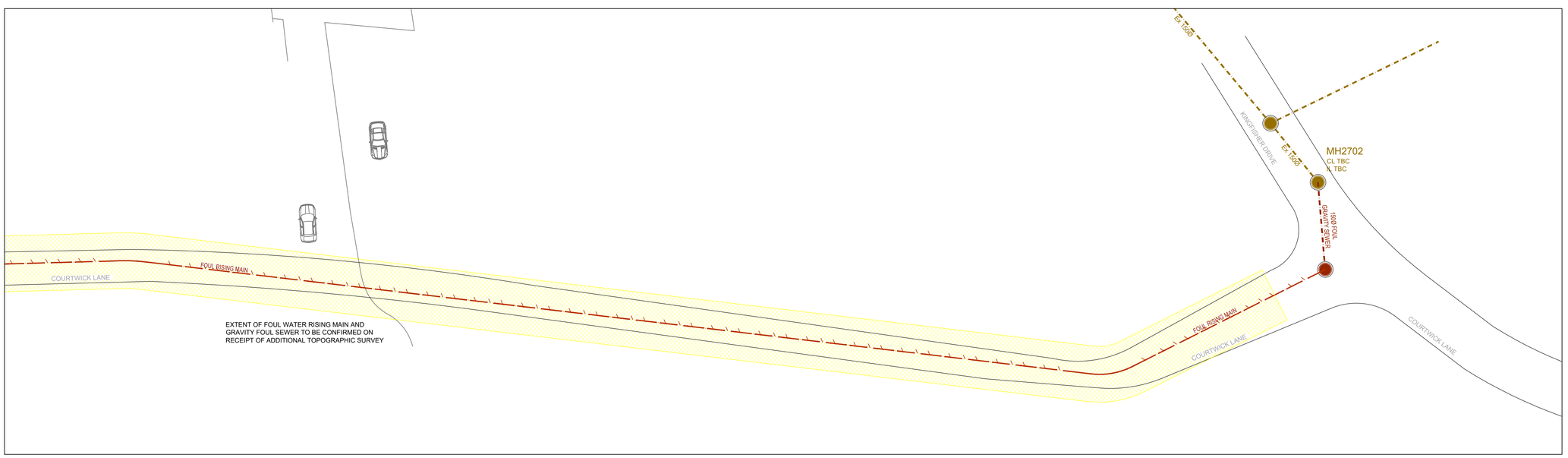
Drawing Status
PRELIMINARY

Job No	Drawing No	Issue
21090	200	P7

Do not scale

A1





Key

- Permeable Block Paving - Drives
- Porous Asphalt - Non-adopted roads
- Cellweb TRP - Tree Root Protection zones

Drainage Strategy Notes

- Soakaway design based on infiltration rates provided by Albury SI Ltd. Report dated February 2025.
- Enquiry to be submitted to Southern Water for disposal of foul water to existing public sewer.
- Further topographic survey including cover levels and invert levels of existing public foul sewer required to determine if gravity foul drainage outfall is feasible. Foul water pumping station may be required.
- If required, foul water pumping station to be "Type 2", with the wet well located a minimum of 10m from habitable buildings.
- Final road levels and plot finished floor levels subject to detailed design.

Issue	Date	Description	By	Chkd	Appd
P6	28.05.25	Layout updated. Easement added to foul outfall along non-adopted Courtwick Lane.	PB	PB	RH
P5	20.06.23	Drawing revised following receipt of updated tree root zone information.	PB	PB	RH
P4	12.06.23	Revised architectural layout added. Drawing revised to suit.	PB	PB	RH
P3	15.05.23	Drainage revised to suit new architectural site layout	PB	PB	RH
P2	09.01.23	Drainage revised to suit new architectural site layout	PB	PB	RH
P1	08.10.21	Preliminary Issue	PB	PB	RH

COAST CONSULTING ENGINEERS

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0191 5977879

Client

Caring Homes

Job Title

Courtwick Park
Courtwick Lane
Littlehampton

Drawing Title

Drainage Strategy
Sheet 2

Scale at A1

1:250

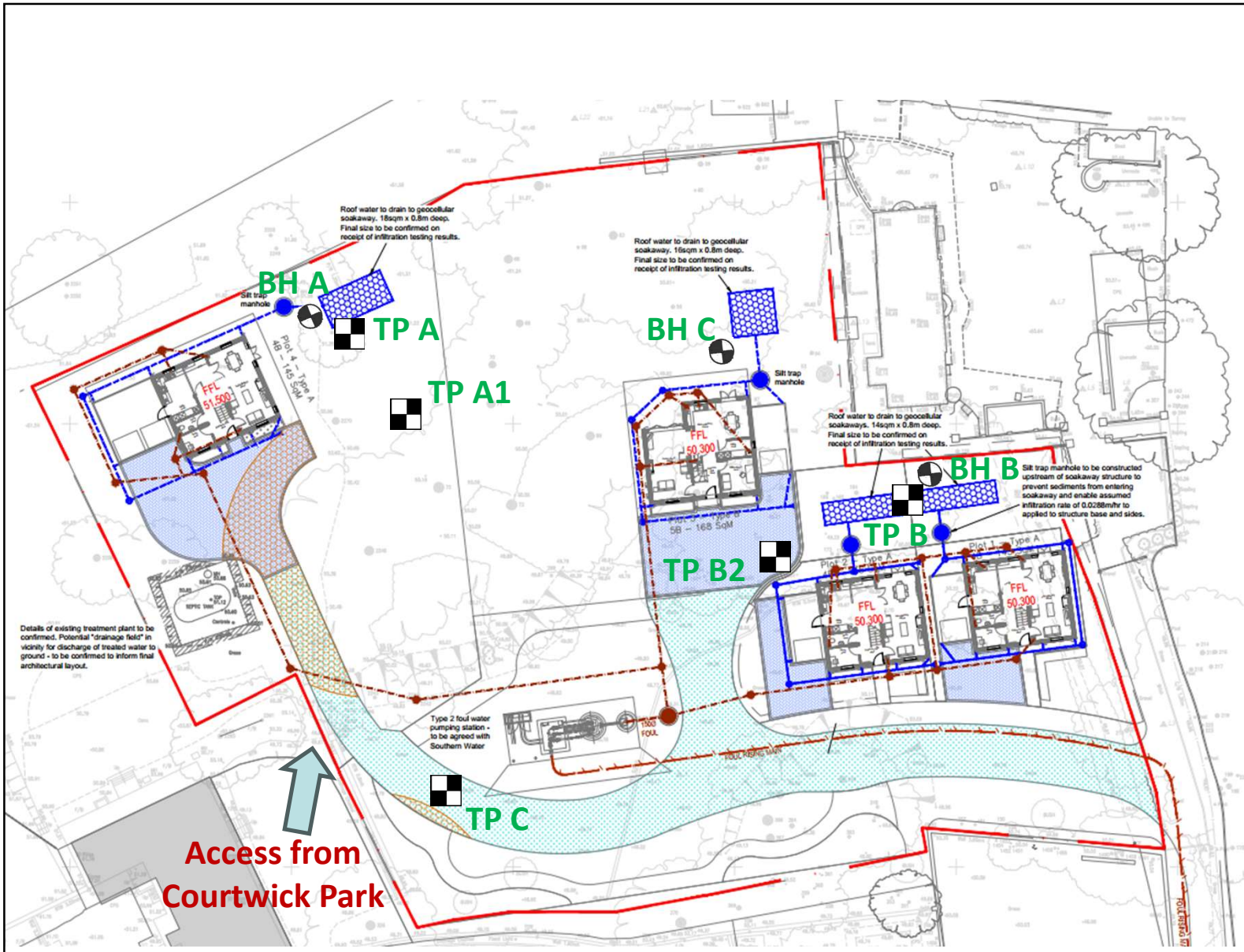
Drawing Status

PRELIMINARY

Job No	Drawing No	Issue
21090	201	P6

Do not scale

Appendix F –
Soakaway Calculations



Legend:

- Borehole Location
- Trial Pit Location
- Site Boundary

Title:	Site Layout Plan
Dwg No:	25/12992/A/1
Drawn by:	GO
Client:	Parkcourt (Wick) Ltd
Contract:	Courtwick Park, Wick
Job Ref:	25/12992/A/GO
Scale:	NTS
Revision:	1
Issue Date:	20/02/2025

ALBURY S.I. LTD

Miltons Yard, Petworth Road,
Witley, Surrey GU8 5LH
www.alburysi.co.uk

SOAKAWAY INFILTRATION TEST RESULTS

ALBURY S.I. LTD
Geotechnical & Environmental

Contract	Courtwick Park, Wick
Report Ref	25/12992/A/GO
Test Location	A1 - Cycle 1

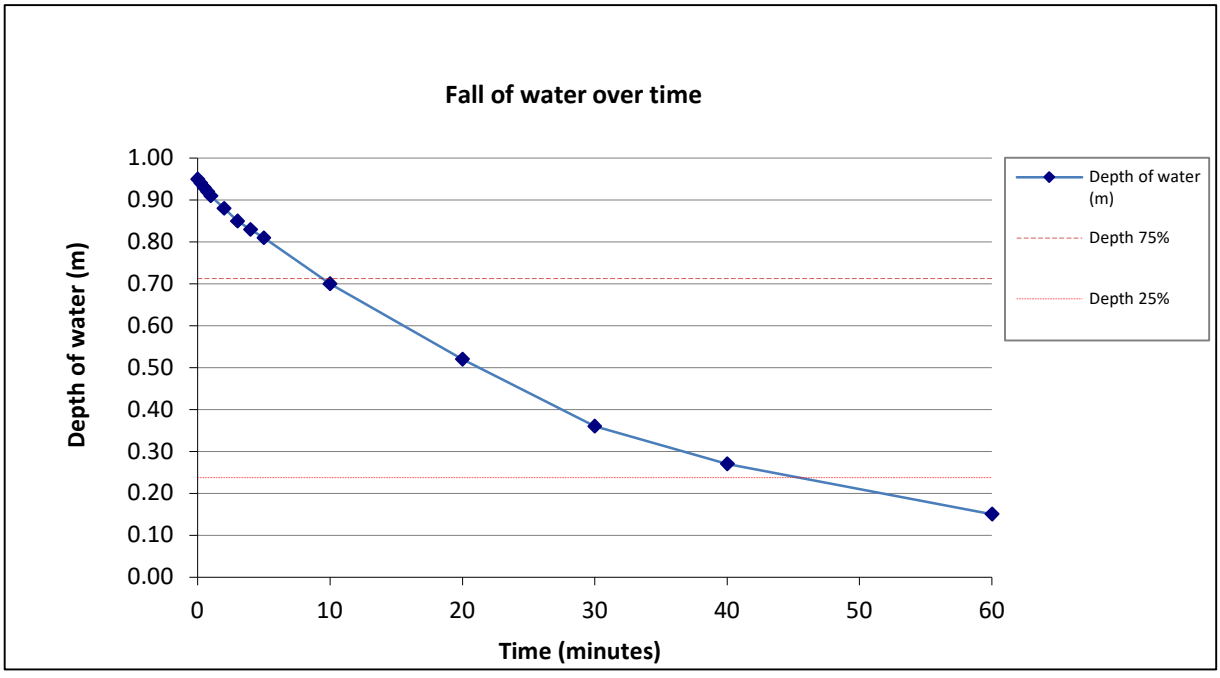
Time (mins)	Depth of Water (m)
0	0.95
0.25	0.94
0.5	0.93
0.75	0.92
1	0.91
2	0.88
3	0.85
4	0.83
5	0.81
10	0.70
20	0.52
30	0.36
40	0.27
60	0.15

Pit Dimensions (m)

Length	1.50
Width	0.40
Depth	2.00

Remarks:

1. Test undertaken in general accordance with BRE Digest 365
2. Trial pit was filled with 20mm aggregate for test
3. Test undertaken 27/01/25



V_{p75-25}	Effective depth storage volume of water in trial pit between 75% and 25% effective depth	0.285
α_{p50}	Internal surface area of trial pit up to 50% effective depth and including base	2.405
t_{p75-25}	Time for water level to fall from 75% to 25% effective depth	36

Soil Infiltration Rate (m/sec) *f*	5.49E-05

SOAKAWAY INFILTRATION TEST RESULTS

ALBURY S.I. LTD
Geotechnical & Environmental

Contract	Courtwick Park, Wick
Report Ref	25/12992/A/GO
Test Location	A1 - Cycle 2

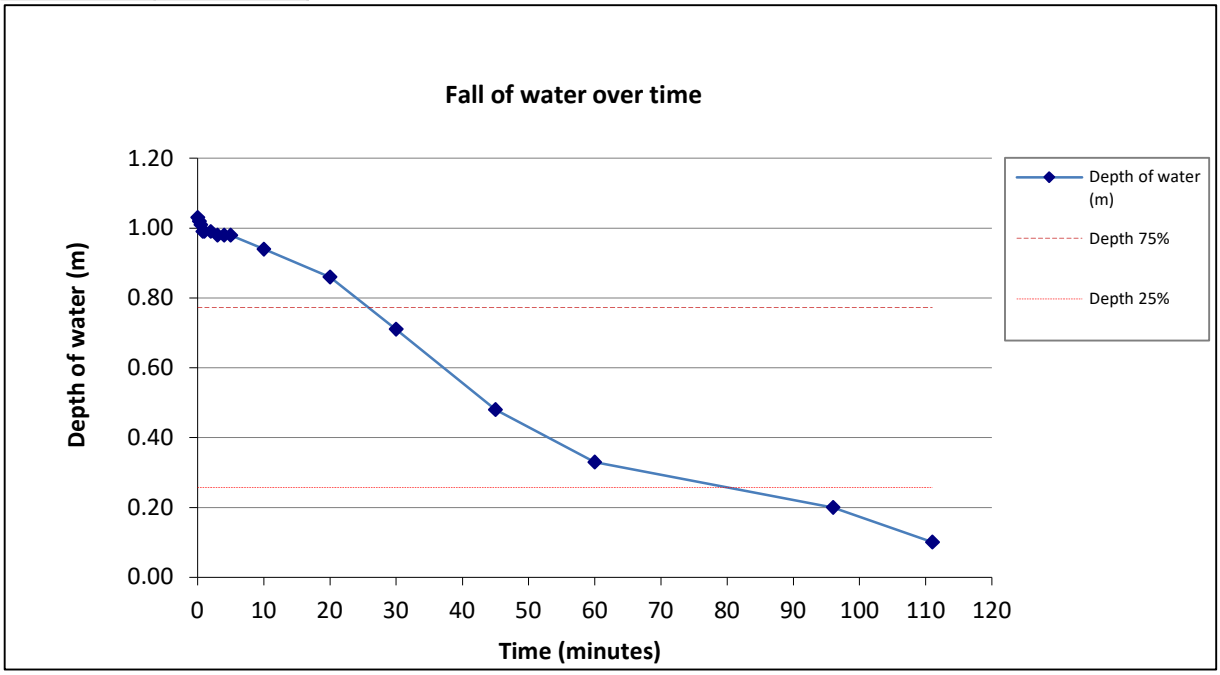
Time (mins)	Depth of Water (m)
0	1.03
0.25	1.02
0.5	1.01
0.75	0.99
1	0.99
2	0.99
3	0.98
4	0.98
5	0.98
10	0.94
20	0.86
30	0.71
45	0.48
60	0.33
96	0.20
111	0.10

Pit Dimensions (m)

Length	1.50
Width	0.40
Depth	2.00

Remarks:

1. Test undertaken in general accordance with BRE Digest 365
2. Trial pit was filled with 20mm aggregate for test
3. Test undertaken 27/01/25



V_{p75-25}	Effective depth storage volume of water in trial pit between 75% and 25% effective depth	0.309
α_{p50}	Internal surface area of trial pit up to 50% effective depth and including base	2.557
t_{p75-25}	Time for water level to fall from 75% to 25% effective depth	65

Soil Infiltration Rate (m/sec) *f*	3.10E-05

SOAKAWAY INFILTRATION TEST RESULTS

ALBURY S.I. LTD
Geotechnical & Environmental

Contract	Courtwick Park, Wick
Report Ref	25/12992/A/GO
Test Location	A1 - Cycle 3

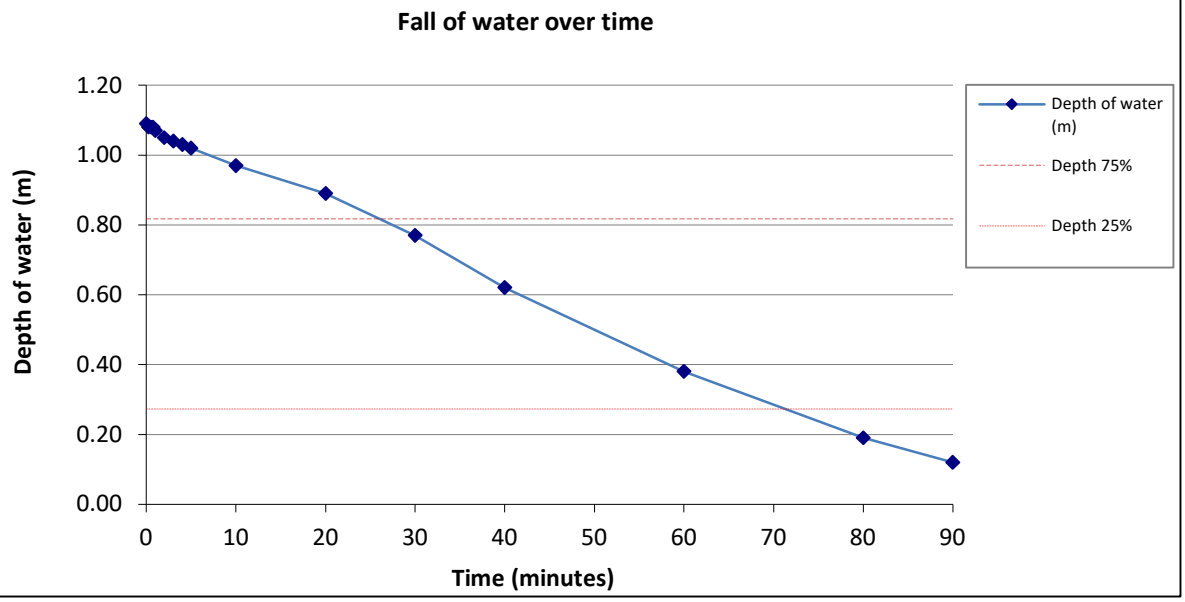
Time (mins)	Depth of Water (m)
0	1.09
0.25	1.08
0.5	1.08
0.75	1.08
1	1.07
2	1.05
3	1.04
4	1.03
5	1.02
10	0.97
20	0.89
30	0.77
40	0.62
60	0.38
80	0.19
90	0.12

Pit Dimensions (m)

Length	1.50
Width	0.40
Depth	2.00

Remarks:

1. Test undertaken in general accordance with BRE Digest 365
2. Trial pit was filled with 20mm aggregate for test
3. Test performed 28/01/2025



V_{p75-25}	Effective depth storage volume of water in trial pit between 75% and 25% effective depth	0.327
α_{p50}	Internal surface area of trial pit up to 50% effective depth and including base	2.671
t_{p75-25}	Time for water level to fall from 75% to 25% effective depth	44

Soil Infiltration Rate (m/sec) *f*	4.64E-05

SOAKAWAY INFILTRATION TEST RESULTS

ALBURY S.I. LTD
Geotechnical & Environmental

Contract	Courtwick Park, Wick
Report Ref	25/12992/A/GO
Test Location	B2 - Cycle 1

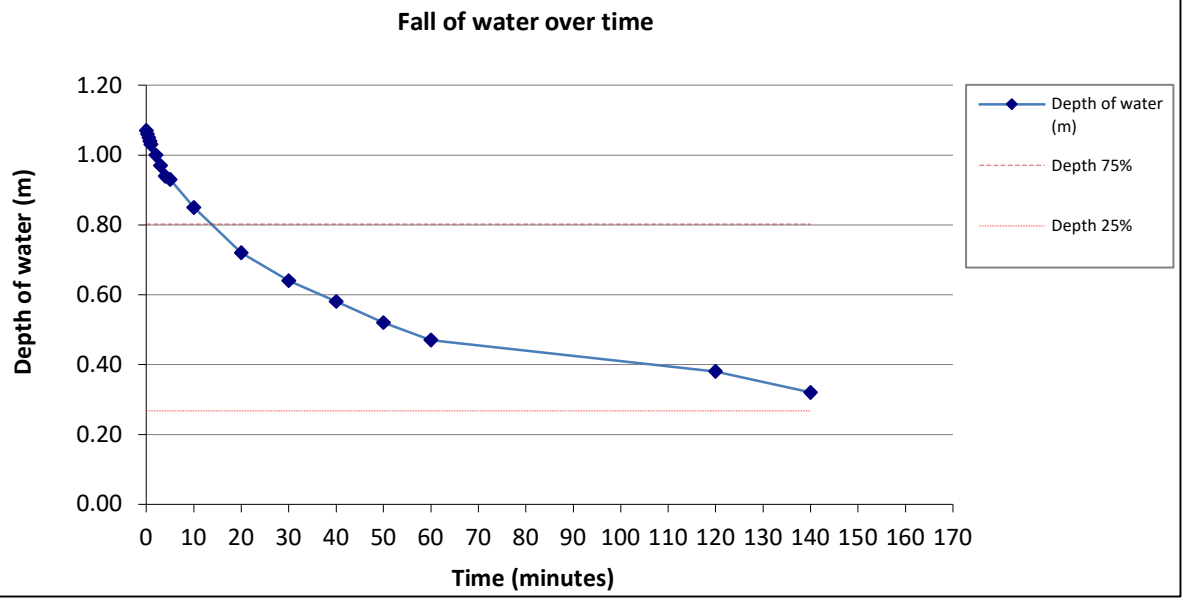
Time (mins)	Depth of Water (m)
0	1.07
1	1.03
2	1.00
3	0.97
4	0.94
5	0.93
10	0.85
20	0.72
30	0.64
40	0.58
50	0.52
60	0.47
120	0.38
140	0.32

Pit Dimensions (m)

Length	1.40
Width	0.40
Depth	2.00

Remarks:

1. Test undertaken in general accordance with BRE Digest 365
2. Trial pit was filled with 20mm aggregate for test
3. Test performed 27/01/2025
4. Extrapolated infiltration rate



V_{p75-25}	Effective depth storage volume of water in trial pit between 75% and 25% effective depth	0.2996
α_{p50}	Internal surface area of trial pit up to 50% effective depth and including base	2.486
t_{p75-25}	Time for water level to fall from 75% to 25% effective depth	155

Soil Infiltration Rate (m/sec) *f*	1.30E-05

SOAKAWAY INFILTRATION TEST RESULTS

ALBURY S.I. LTD
Geotechnical & Environmental

Contract	Courtwick Park, Wick
Report Ref	25/12992/A/GO
Test Location	B2 - Cycle 2

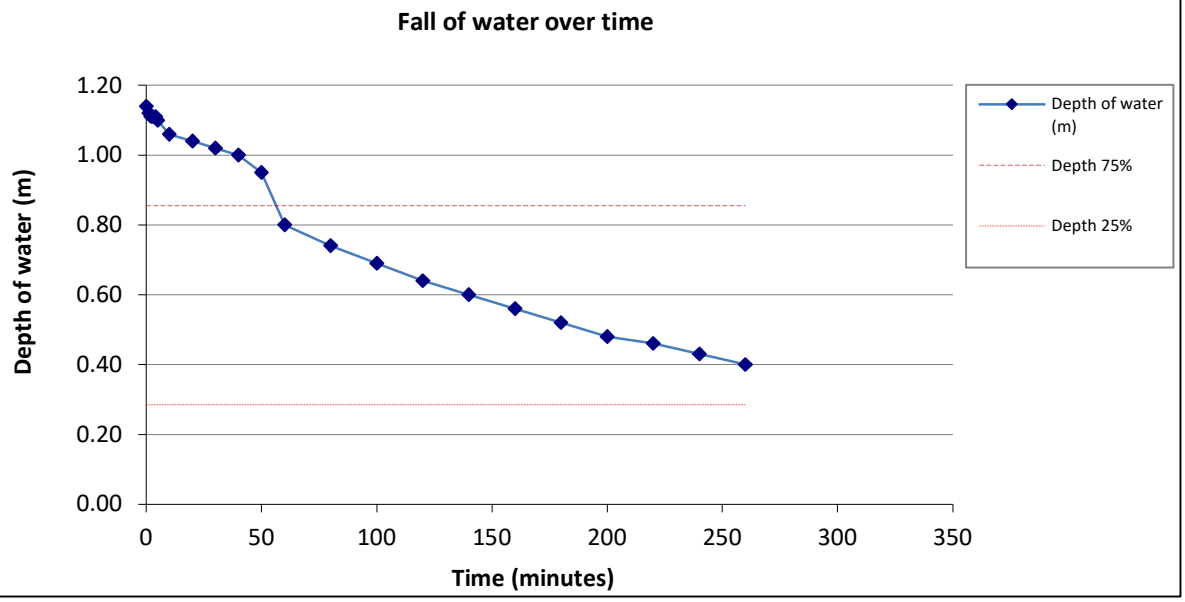
Time (mins)	Depth of Water (m)
0	1.14
10	1.06
20	1.04
30	1.02
40	1.00
50	0.95
60	0.80
80	0.74
100	0.69
140	0.60
160	0.56
180	0.52
200	0.48
220	0.46
240	0.43
260	0.40

Pit Dimensions (m)

Length	1.40
Width	0.40
Depth	2.00

Remarks:

1. Test undertaken in general accordance with BRE Digest 365
2. Trial pit was filled with 20mm aggregate for test
3. Test performed 28/01/2025
4. Extrapolated infiltration rate



V_{p75-25}	Effective depth storage volume of water in trial pit between 75% and 25% effective depth	0.3192
α_{p50}	Internal surface area of trial pit up to 50% effective depth and including base	2.612
t_{p75-25}	Time for water level to fall from 75% to 25% effective depth	270

Soil Infiltration Rate (m/sec) *f*	7.54E-06

SOAKAWAY INFILTRATION TEST RESULTS

ALBURY S.I. LTD
Geotechnical & Environmental

Contract	Courtwick Park, Wick
Report Ref	25/12992/A/GO
Test Location	B2 - Cycle 3

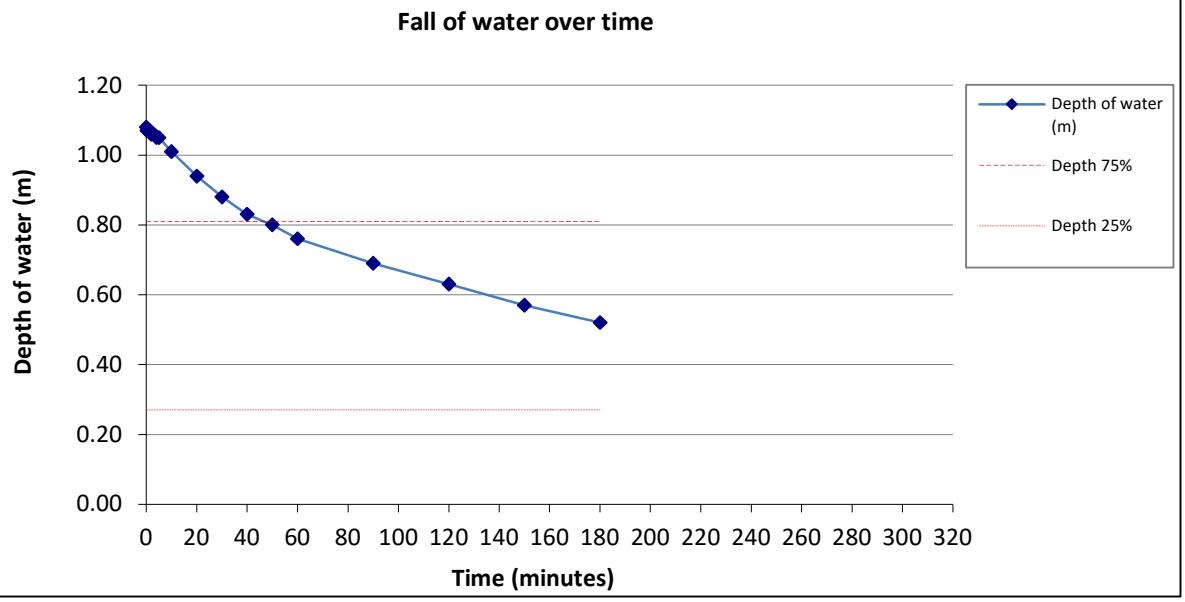
Time (mins)	Depth of Water (m)
0	1.08
1	1.07
2	1.06
3	1.06
4	1.05
5	1.05
10	1.01
20	0.94
30	0.88
40	0.83
50	0.80
60	0.76
90	0.69
120	0.63
150	0.57
180	0.52

Pit Dimensions (m)

Length	1.40
Width	0.40
Depth	2.00

Remarks:

1. Test undertaken in general accordance with BRE Digest 365
2. Trial pit was filled with 20mm aggregate for test
3. Test performed 29/01/2025
4. Extrapolated infiltration rate



V_{p75-25}	Effective depth storage volume of water in trial pit between 75% and 25% effective depth	0.3024
α_{p50}	Internal surface area of trial pit up to 50% effective depth and including base	2.504
t_{p75-25}	Time for water level to fall from 75% to 25% effective depth	270

Soil Infiltration Rate (m/sec) *f*	7.45E-06

SOAKAWAY INFILTRATION TEST RESULTS

ALBURY S.I. LTD
Geotechnical & Environmental

Contract	Courtwick Park, Wick
Report Ref	25/12992/A/GO
Test Location	C - Cycle 1

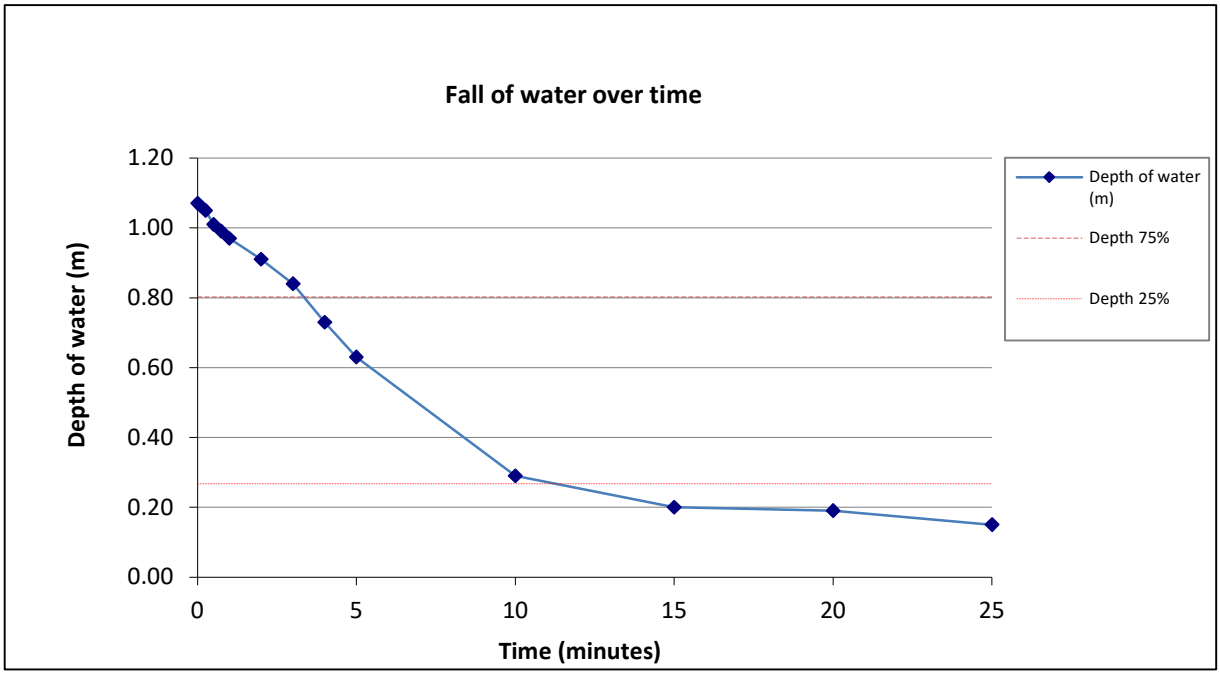
Time (mins)	Depth of Water (m)
0	1.07
0.25	1.05
0.5	1.01
0.75	0.99
1	0.97
2	0.91
3	0.84
4	0.73
5	0.63
10	0.29
15	0.20
20	0.19
25	0.15

Pit Dimensions (m)

Length	1.70
Width	0.40
Depth	2.00

Remarks:

1. Test undertaken in general accordance with BRE Digest 365
2. Trial pit was filled with 20mm aggregate for test
3. Test performed 27/01/25



V_{p75-25}	Effective depth storage volume of water in trial pit between 75% and 25% effective depth	0.3638
α_{p50}	Internal surface area of trial pit up to 50% effective depth and including base	2.927
t_{p75-25}	Time for water level to fall from 75% to 25% effective depth	7

Soil Infiltration Rate (m/sec) *f*	2.96E-04

SOAKAWAY INFILTRATION TEST RESULTS

ALBURY S.I. LTD
Geotechnical & Environmental

Contract	Courtwick Park, Wick
Report Ref	25/12992/A/GO
Test Location	C - Cycle 2

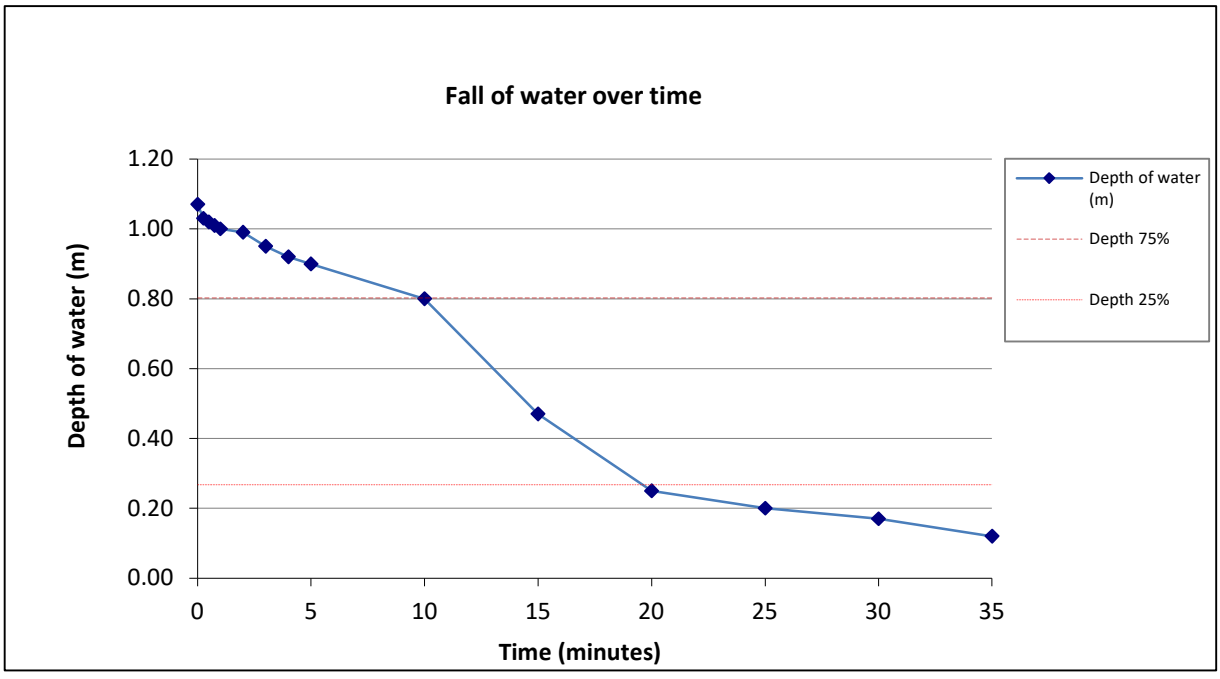
Time (mins)	Depth of Water (m)
0	1.07
0.25	1.03
0.5	1.02
0.75	1.01
1	1.00
2	0.99
3	0.95
4	0.92
5	0.90
10	0.80
15	0.47
20	0.25
25	0.2
30	0.17
35	0.12

Pit Dimensions (m)

Length	1.70
Width	0.40
Depth	2.00

Remarks:

1. Test undertaken in general accordance with BRE Digest 365
2. Trial pit was filled with 20mm aggregate for test
3. Test performed 27/01/25



V_{p75-25}	Effective depth storage volume of water in trial pit between 75% and 25% effective depth	0.3638
α_{p50}	Internal surface area of trial pit up to 50% effective depth and including base	2.927
t_{p75-25}	Time for water level to fall from 75% to 25% effective depth	10

Soil Infiltration Rate (m/sec) *f*	2.07E-04

SOAKAWAY INFILTRATION TEST RESULTS

ALBURY S.I. LTD
Geotechnical & Environmental

Contract	Courtwick Park, Wick
Report Ref	25/12992/A/GO
Test Location	C - Cycle 3

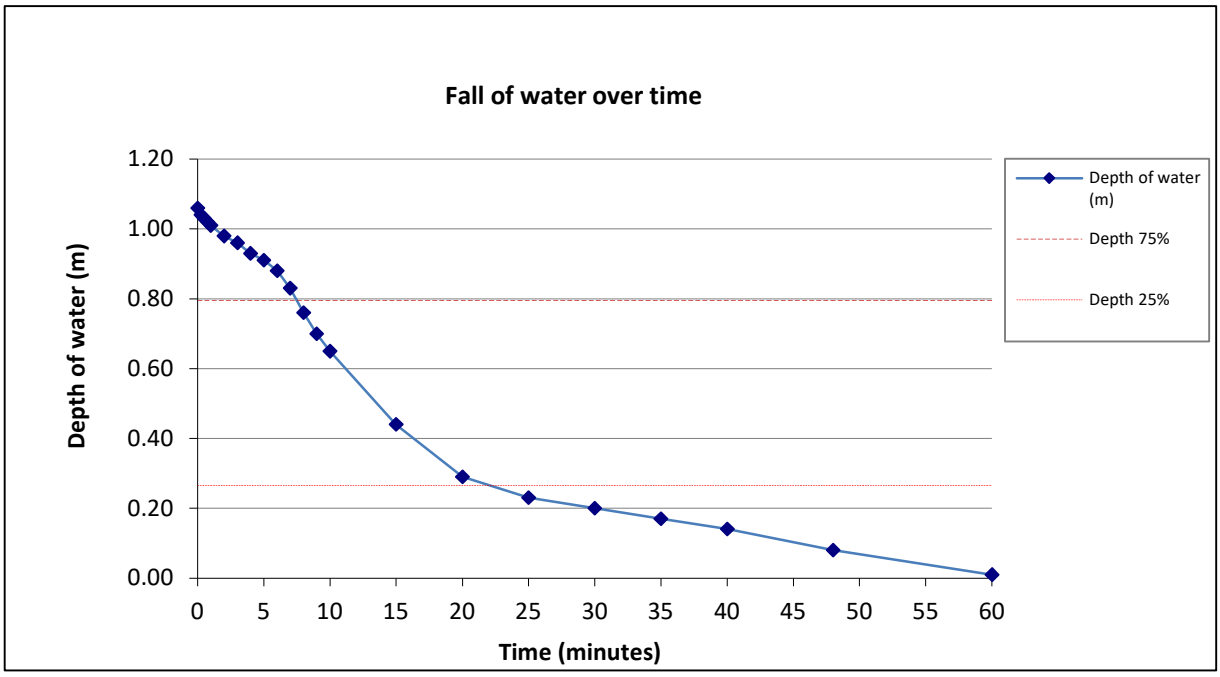
Time (mins)	Depth of Water (m)
0	1.06
1	1.01
2	0.98
3	0.96
4	0.93
5	0.91
10	0.65
15	0.44
20	0.29
25	0.23
30	0.20
35	0.17
40	0.14
48	0.08
60	0.01

Pit Dimensions (m)

Length	1.70
Width	0.40
Depth	2.00

Remarks:

1. Test undertaken in general accordance with BRE Digest 365
2. Trial pit was filled with 20mm aggregate for test
3. Test performed 28/01/25



V_{p75-25}	Effective depth storage volume of water in trial pit between 75% and 25% effective depth	0.3604
α_{p50}	Internal surface area of trial pit up to 50% effective depth and including base	2.906
t_{p75-25}	Time for water level to fall from 75% to 25% effective depth	13

Soil Infiltration Rate (m/sec) *f*	1.59E-04

Soakaway Ref: A1

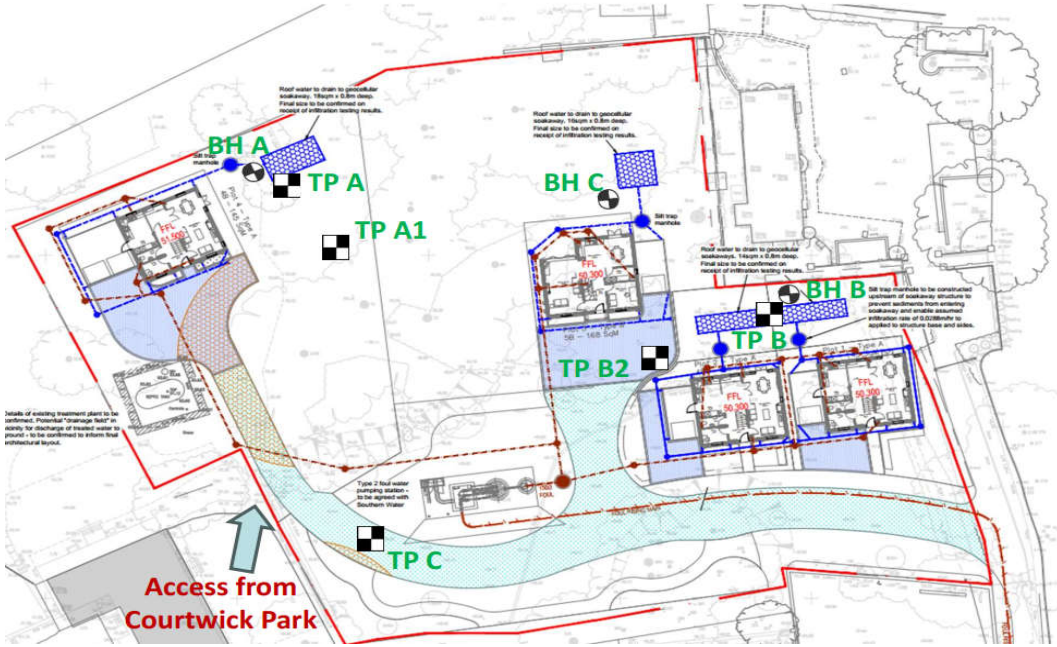
Existing Ground Level			50.500		
Trial Pit Depth (m)			2		
Test invert level			48.500		
Test No.				**Rate (m/s)**	**Rate (m/hr)**
1	5.49	x	0.00001	0.0000549	0.19764
2	3.1	x	0.00001	0.000031	0.11160
3	4.64	x	0.00001	0.00005	0.16704

Soakaway Ref: B2

Existing Ground Level			49.000		
Trial Pit Depth (m)			2		
Test invert level			47.000		
Test No.				**Rate (m/s)**	**Rate (m/hr)**
1	1.3	x	0.00001	0.000013	0.04680
2	7.54	x	0.000001	7.54E-06	0.02714
3	7.45	x	0.000001	0.00001	0.02682

Soakaway Ref: C

Existing Ground Level			48.750		
Trial Pit Depth (m)			2		
Test invert level			46.750		
Test No.				**Rate (m/s)**	**Rate (m/hr)**
1	2.96	x	0.0001	0.000296	1.06560
2	2.07	x	0.0001	0.000207	0.74520
3	1.59	x	0.0001	0.00016	0.57240



Legend:

- Borehole Location
- Trial Pit Location
- Site Boundary

Title:	Site Layout Plan
Dwg No:	25/12992/A/1
Drawn by:	GO
Client:	Parkcourt (Wick) Ltd
Contract:	Courtwick Park, Wick
Job Ref:	25/12992/A/GO
Scale:	NTS
Revision:	1
Issue Date:	20/02/2025

ALBURY S.I. LTD

Geotechnical and Environmental Consultants
Miltons Yard, Petworth Road,
Witley, Surrey GU8 5LH
[redacted]
www.alburysi.co.uk

Our Ref 25/12992/A/GO

19th March 2025

Parkcourt (Wick) Ltd
886 The Crescent
Colchester
Essex
CO4 9YQ

FAO Jennifer Cannons

Dear Jennifer

Land at Courtwick Park, Wick, Littlehampton BN17 7PD

Further to the factual data issued in February 2025 for the above site, we write to confirm the results of the groundwater monitoring visits.

Return visits were made to site on 14th October, 27th November and 10th December 2024 to monitor groundwater levels within the standpipes. On each occasion the standpipes were noted to be dry, with the exception of a standing water level of 3.27m at location B on 27th November 2024.

The soakaway testing to BRE Digest 365 was undertaken on 27th and 28th January 2025 and the standpipes were also noted to be dry on this occasion. Further return monitoring was undertaken on 17th February and 12th March 2025 where the monitoring positions were observed to be dry on both occasions. The monitoring position C was not able to be located on the two final visits.

This concludes the winter groundwater monitoring and we trust that this provides you with the information that you require. Should you have any queries, please do not hesitate to contact the undersigned.

Yours faithfully

[redacted]

George Owens
Director
[redacted]

Network Details

Manhole Schedule

Manhole	Catchment Area (ha)	Diameter (m)	Type	CL (m)	IL (m)	Depth To Soffit (m)	Easting (m)	Northing (m)
S1-1	0.022	0.450	Type E	50.000	49.000	0.900	1043.950	1035.721
S1-2 (ST)	0.000	1.350	Type E	49.700	48.200	1.400	1029.876	1026.761
S1 - OUTFALL	0.000	0.180	Type E	49.700	48.000	1.600	1022.493	1025.968

Pipe Schedule

Pipe Number	US Manhole	US IL (m)	DS Manhole	DS IL (m)	Shape	Dimension (m)	Length (m)	Gradient (1:x)	Roughness (mm)	US Depth To Soffit (m)	DS Depth To Soffit (m)
1.000	S1-1	49.000	S1-2 (ST)	48.200	Circ	0.1mØ	16.684	20.9	0.600	0.900	1.400
1.001	S1-2 (ST)	48.200	S1 -	48.000	Circ	0.1mØ	7.426	37.1	0.600	1.400	1.600

Outfall Details

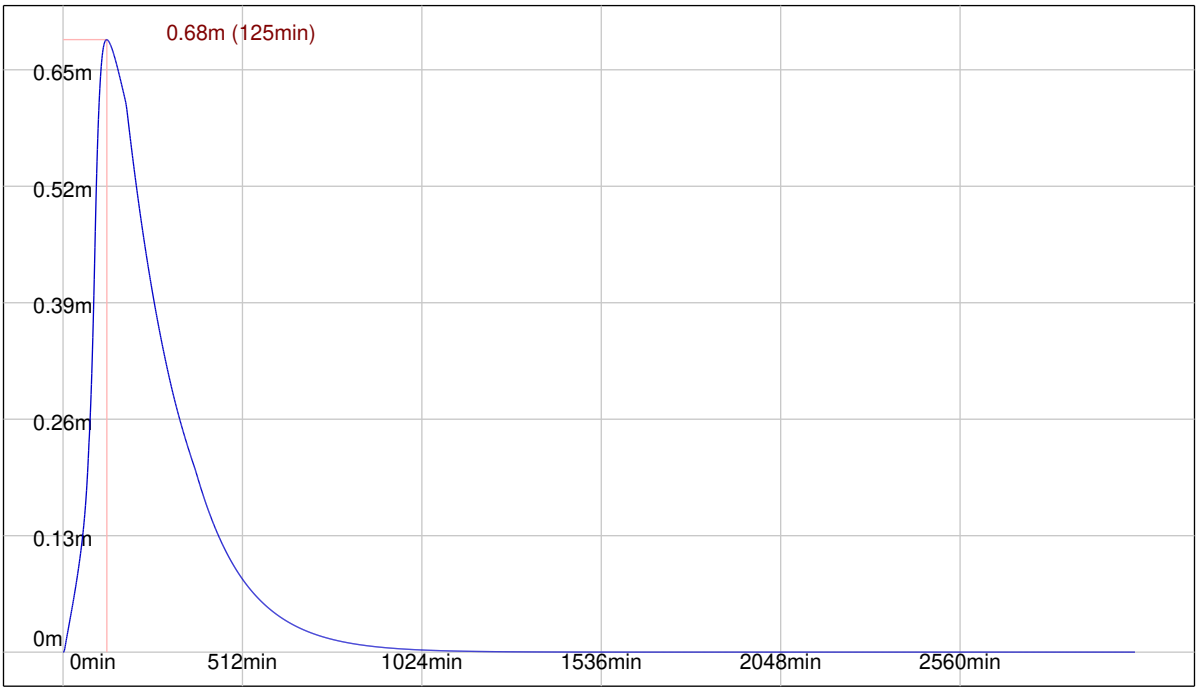
Outfall Manhole S1 - OUTFALL : Infiltration Tank

Flow Control Details

Tank Structure at Manhole S1 - OUTFALL

Tank Invert (m)	Tank Height (m)	Porosity Ratio (%)	Area (m2)	Effective Area (m2) Area x Porosity Ratio	Max Storage (m3) Effective Area x Height	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
48.000	0.800	95.00	10.000	9.500	7.600	0.00000000	0.57240000	2.00

Tank at S1 - OUTFALL (10Yr+40% 180Min Summer)



Simulation Settings

FEH2022 (point): Filename=FEH_Point_Descriptors_501950_103778_v5_0_1.xml

Summer (Cv: 1.00), Winter (Cv: 1.00)

Global Time of Entry: 5.0 mins

Durations (mins): 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440

Return Periods (yrs) + Climate Change: (10, +40%)

Simulated Rainfall Events

Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %	Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %
10Yr+40% 15Min Winter	89.600	0.00	0.00	10Yr+40% 360Min Summer	10.227	0.00	0.00
10Yr+40% 15Min Summer	89.600	0.00	-0.66	10Yr+40% 360Min Winter	10.227	0.00	0.00
10Yr+40% 30Min Winter	58.722	0.00	0.00	10Yr+40% 480Min Summer	8.141	0.00	0.00
10Yr+40% 30Min Summer	58.722	0.00	0.00	10Yr+40% 480Min Winter	8.141	0.00	0.00
10Yr+40% 60Min Winter	37.061	0.00	0.00	10Yr+40% 600Min Summer	6.787	0.00	0.00
10Yr+40% 60Min Summer	37.061	0.00	0.00	10Yr+40% 600Min Winter	6.787	0.00	0.00
10Yr+40% 120Min Winter	23.271	0.00	0.00	10Yr+40% 720Min Summer	5.832	0.00	0.00
10Yr+40% 120Min Summer	23.271	0.00	0.00	10Yr+40% 720Min Winter	5.832	0.00	0.00
10Yr+40% 180Min Summer	17.452	0.00	0.00	10Yr+40% 960Min Summer	4.596	0.00	0.00
10Yr+40% 180Min Winter	17.452	0.00	0.00	10Yr+40% 960Min Winter	4.596	0.00	0.00
10Yr+40% 240Min Summer	14.015	0.00	0.00	10Yr+40% 1440Min Winter	3.304	0.00	0.00
10Yr+40% 240Min Winter	14.015	0.00	0.00	10Yr+40% 1440Min Summer	3.304	0.00	0.00

Simulation Results

Return Period Yrs: 10.0
Climate Change %: 40

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S1-1	15 min Summer	8	49.072	0.072	11.631		OK
S1-2 (ST)	180 min Summer	124	48.685	0.485	0.777		Surcharged
S1 - OUTFALL	180 min Summer	125	48.684	0.684	0.753		OK

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	15 min Summer	8	S1-1	S1-2 (ST)	0.086	1.676	11.588	0.869	OK
1.001	15 min Summer	9	S1-2 (ST)	S1 -	0.100	1.384	9.352	0.939	Surcharged

Network Details

Manhole Schedule

Manhole	Catchment Area (ha)	Diameter (m)	Type	CL (m)	IL (m)	Depth To Soffit (m)	Easting (m)	Northing (m)
S3-1	0.011	0.450	Type E	49.850	48.650	1.100	1016.540	1031.086
S3-2 (ST)	0.000	0.450	Type E	49.850	48.300	1.450	1014.770	1037.805
S3 - OUTFALL	0.000	0.180	Type E	49.597	48.000	1.497	1009.247	1037.210

Pipe Schedule

Pipe Number	US Manhole	US IL (m)	DS Manhole	DS IL (m)	Shape	Dimension (m)	Length (m)	Gradient (1:x)	Roughness (mm)	US Depth To Soffit (m)	DS Depth To Soffit (m)
1.000	S3-1	48.650	S3-2 (ST)	48.300	Circ	0.1mØ	6.948	19.9	0.600	1.100	1.450
1.001	S3-2 (ST)	48.300	S3 -	48.000	Circ	0.1mØ	5.555	18.5	0.600	1.450	1.497

Outfall Details

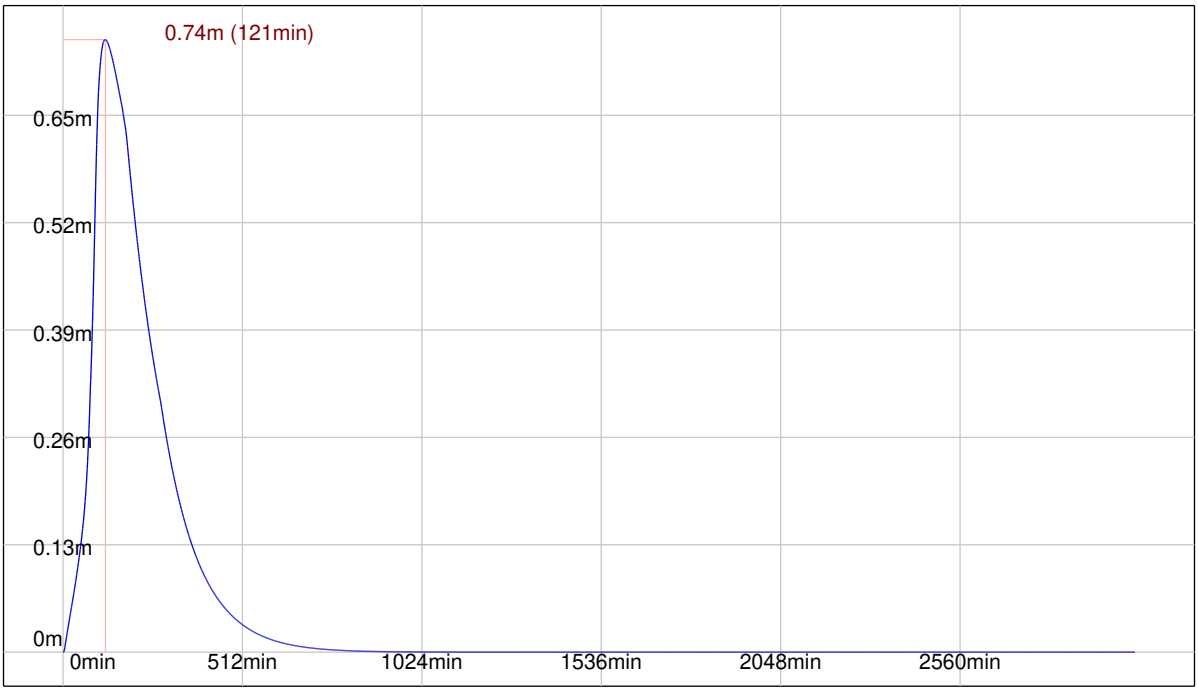
Outfall Manhole S3 - OUTFALL : Infiltration Tank

Flow Control Details

Tank Structure at Manhole S3 - OUTFALL

Tank Invert (m)	Tank Height (m)	Porosity Ratio (%)	Area (m2)	Effective Area (m2) Area x Porosity Ratio	Max Storage (m3) Effective Area x Height	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
48.000	0.800	95.00	4.000	3.800	3.040	0.00000000	0.57240000	2.00

Tank at S3 - OUTFALL (10Yr+40% 180Min Summer)



Simulation Settings

FEH2022 (point): Filename=FEH_Point_Descriptors_501950_103778_v5_0_1.xml

Summer (Cv: 1.00), Winter (Cv: 1.00)

Global Time of Entry: 5.0 mins

Durations (mins): 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440

Return Periods (yrs) + Climate Change: (10, +40%)

Simulated Rainfall Events

Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %	Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %
10Yr+40% 15Min Winter	89.600	0.00	0.00	10Yr+40% 360Min Summer	10.227	0.00	0.00
10Yr+40% 15Min Summer	89.600	0.00	0.00	10Yr+40% 360Min Winter	10.227	0.00	0.00
10Yr+40% 30Min Winter	58.722	0.00	0.00	10Yr+40% 480Min Summer	8.141	0.00	0.00
10Yr+40% 30Min Summer	58.722	0.00	0.00	10Yr+40% 480Min Winter	8.141	0.00	0.00
10Yr+40% 60Min Winter	37.061	0.00	0.00	10Yr+40% 600Min Summer	6.787	0.00	0.00
10Yr+40% 60Min Summer	37.061	0.00	0.00	10Yr+40% 600Min Winter	6.787	0.00	0.00
10Yr+40% 120Min Winter	23.271	0.00	0.00	10Yr+40% 720Min Summer	5.832	0.00	0.00
10Yr+40% 120Min Summer	23.271	0.00	0.00	10Yr+40% 720Min Winter	5.832	0.00	0.00
10Yr+40% 180Min Summer	17.452	0.00	0.00	10Yr+40% 960Min Summer	4.596	0.00	0.00
10Yr+40% 180Min Winter	17.452	0.00	0.00	10Yr+40% 960Min Winter	4.596	0.00	0.00
10Yr+40% 240Min Summer	14.015	0.00	0.00	10Yr+40% 1440Min Winter	3.304	0.00	0.00
10Yr+40% 240Min Winter	14.015	0.00	0.00	10Yr+40% 1440Min Summer	3.304	0.00	0.00

Simulation Results

Return Period Yrs: 10.0
Climate Change %: 40

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S3-1	180 min Summer	120	48.742	0.092	0.455		OK
S3-2 (ST)	180 min Summer	120	48.742	0.442	0.454		Surcharged
S3 - OUTFALL	180 min Summer	120	48.742	0.742	0.453		OK

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	180 min Summer	120	S3-1	S3-2 (ST)	0.096	1.072	2.034	0.149	OK
1.001	15 min Summer	10	S3-2 (ST)	S3 -	0.100	1.335	5.561	0.393	Surcharged

Network Details

Manhole Schedule

Manhole	Catchment Area (ha)	Diameter (m)	Type	CL (m)	IL (m)	Depth To Soffit (m)	Easting (m)	Northing (m)
S4-1	0.013	0.450	Type E	51.350	50.100	1.150	994.790	1070.477
S4-2 (ST)	0.000	0.450	Type E	51.500	50.000	1.400	1001.551	1073.483
S4 - OUTFALL	0.000	0.180	Type E	51.379	49.300	1.979	1003.579	1068.920

Pipe Schedule

Pipe Number	US Manhole	US IL (m)	DS Manhole	DS IL (m)	Shape	Dimension (m)	Length (m)	Gradient (1:x)	Roughness (mm)	US Depth To Soffit (m)	DS Depth To Soffit (m)
1.000	S4-1	50.100	S4-2 (ST)	50.000	Circ	0.1mØ	7.400	74.0	0.600	1.150	1.400
1.001	S4-2 (ST)	50.000	S4 -	49.300	Circ	0.1mØ	4.994	7.1	0.600	1.400	1.979

Outfall Details

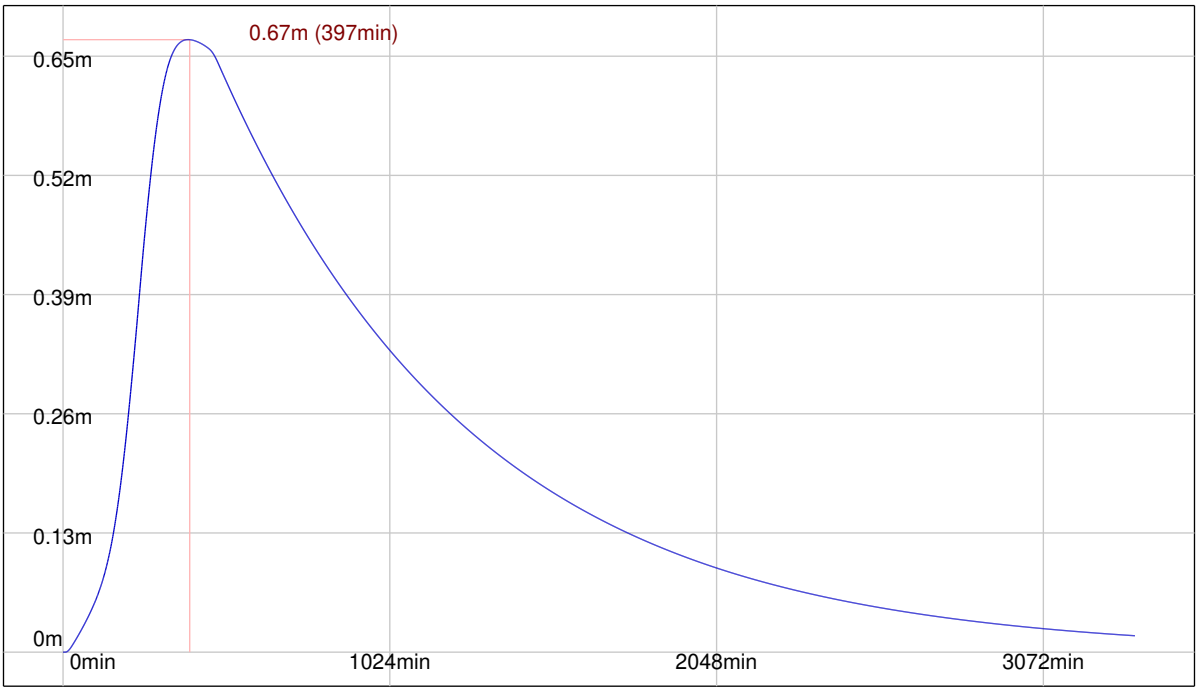
Outfall Manhole S4 - OUTFALL : Infiltration Tank

Flow Control Details

Tank Structure at Manhole S4 - OUTFALL

Tank Invert (m)	Tank Height (m)	Porosity Ratio (%)	Area (m2)	Effective Area (m2) Area x Porosity Ratio	Max Storage (m3) Effective Area x Height	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
49.300	0.800	95.00	10.000	9.500	7.600	0.00000000	0.11160000	2.00

Tank at S4 - OUTFALL (10Yr+40% 480Min Winter)



Simulation Settings

FEH2022 (point): Filename=FEH_Point_Descriptors_501950_103778_v5_0_1.xml

Summer (Cv: 1.00), Winter (Cv: 1.00)

Global Time of Entry: 5.0 mins

Durations (mins): 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440

Return Periods (yrs) + Climate Change: (10, +40%)

Simulated Rainfall Events

Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %	Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %
10Yr+40% 15Min Winter	89.600	0.00	0.00	10Yr+40% 360Min Summer	10.227	0.00	0.00
10Yr+40% 15Min Summer	89.600	0.00	0.00	10Yr+40% 360Min Winter	10.227	0.00	0.00
10Yr+40% 30Min Winter	58.722	0.00	0.00	10Yr+40% 480Min Summer	8.141	0.00	0.00
10Yr+40% 30Min Summer	58.722	0.00	0.00	10Yr+40% 480Min Winter	8.141	0.00	0.00
10Yr+40% 60Min Winter	37.061	0.00	0.00	10Yr+40% 600Min Summer	6.787	0.00	0.00
10Yr+40% 60Min Summer	37.061	0.00	0.00	10Yr+40% 600Min Winter	6.787	0.00	0.00
10Yr+40% 120Min Winter	23.271	0.00	0.00	10Yr+40% 720Min Summer	5.832	0.00	0.00
10Yr+40% 120Min Summer	23.271	0.00	0.00	10Yr+40% 720Min Winter	5.832	0.00	0.00
10Yr+40% 180Min Summer	17.452	0.00	0.00	10Yr+40% 960Min Summer	4.596	0.00	0.00
10Yr+40% 180Min Winter	17.452	0.00	0.00	10Yr+40% 960Min Winter	4.596	0.00	0.00
10Yr+40% 240Min Summer	14.015	0.00	0.00	10Yr+40% 1440Min Winter	3.304	0.00	0.00
10Yr+40% 240Min Winter	14.015	0.00	0.00	10Yr+40% 1440Min Summer	3.304	0.00	0.00

Simulation Results

Return Period Yrs: 10.0
Climate Change %: 40

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S4-1	15 min Summer	8	50.179	0.079	6.887		OK
S4-2 (ST)	15 min Summer	8	50.037	0.037	6.826		OK
S4 - OUTFALL	480 min Winter	392	49.968	0.668	0.135		OK

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	15 min Summer	8	S4-1	S4-2 (ST)	0.058	1.440	6.826	0.972	OK
1.001	15 min Summer	8	S4-2 (ST)	S4 -	0.069	2.101	6.810	0.298	OK

Coast Consulting Engineers Ltd

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[redacted]