ARDENT
CONSULTING ENGINEERS
AN EMPLOYEE OWNED COMPANY

BELLWAY HOMES LTD (STRATEGIC LAND)

FORMER THAKEHAM MUSHROOM SITE, THAKEHAM

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

REPORT REF.
2505500-ACE-XX-XX-RP-C-0301_B

August 2026

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Contents

Page

1. Introduction 4
2. Policy Context 7
3. Baseline 10
4. Sources of Flooding 14
5. Surface Water Disposal and Rates of Discharge 20
6. Surface Water Drainage Strategy 23
7. Foul Water Drainage Strategy 29
8. Conclusions 31

Appendices

Appendix A: Development Masterplan Layout
Appendix B: Topographical Survey
Appendix C: Ground Investigation Logs
Appendix D: Groundwater Monitoring Records
Appendix E: Southern Water Sewer Asset Plan
Appendix F: Greenfield Run-off Calculation
Appendix G: Drainage Strategy Drawings
Appendix H: Flow Model
Appendix I: Pollution Mitigation Indices
Appendix J: SuDS Maintenance Schedules

Figures

Figure 1-1: Site Location Plan
Figure 1-2: Extract of Development Masterplan Layout
Figure 2-1: Extract of Flood Risk and Costal Change Guidance Table 2, Flood Risk Vulnerability
Figure 3-1: Main River Map Extract
Figure 3-2: Soil Classification
Figure 3-3: Bedrock Geology
Figure 3-4: Exploratory Hole Location Plan
Figure 3-5: Sewer Asset Plan Extract
Figure 4-1: Fluvial Flooding Extents
Figure 4-2 to 4-4: Pluvial Flooding Extents
Figure 4-5: Artificial Flooding Extents

Tables

Table 4-1: Summary of Flood Risk Pre and Post Development
Table 5-1: Greenfield Run-off Rates
Table 5-2: Existing Run-off Rates
Table 6-1: SuDS Features Appraisal
Table 6-2: Network Flooding for 100-year Event at Cv of 1.0

Document Control Sheet

REV	ISSUE PURPOSE	AUTHOR	CHECKED	APPROVED	DATE
-	DRAFT	NC	JH	DRAFT	22/01/26
-	FINAL FOR PLANNING	NC	JH	DM	12/02/26
A	UPDATED FURTHER TO LLFA COMMENT	NC	JH	DM	21/04/26
B	APPLICATION EXTENTS UPDATED	NC	JH	DM	05/08/26

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1. Introduction

1.1. Ardent Consulting Engineers (hereafter referred to as Ardent) has been appointed by Bellway Homes Ltd (Strategic Land) to undertake a Flood Risk Assessment (FRA) & Drainage Strategy for the proposed residential development on land west of Storrington Road, Monaghan Mushroom, Thakeham, RH20 3QT (hereafter referred to as 'the site'). The Lead Local Flood Authority is West Sussex County Council (hereafter referred to as 'the LLFA') and the Local Planning Authority is Horsham District Council (hereafter referred to as 'the LPA').

1.2. This updated version of the FRA is provided with changes in application area and scope, along with an update to the means of connection to the watercourse downstream of the development. It also addresses recent points raised by the LLFA, with provision of further detail on the containment of drainage exceedance flows and topography along the existing watercourse.

1.3. The application area is 25.72ha, with the primary development within an area of approximately 6.57ha. The Environment Agency (EA) flood map shows that the site is located within Flood Zone 1, however as the site area exceeds 1ha an FRA is required to support the development planning application.

1.4. This FRA has been prepared with specific reference to the requirements of the National Planning Policy Framework (NPPF) updated in December 2024, and the Planning Practice Guidance (PPG) updated in September 2025. This report also takes into consideration the requirements of non-statutory technical standards by DEFRA, National Standards for Sustainable Drainage Systems (SuDS) of June 2025.

Site Location

1.5. The site is located to the west of the B2139 Storrington Road, within Thakeham Village and north of Storrington, West Sussex (**Figure 1-1**).

1.6. The site is centred on National Grid reference 510287mE, 117160mN (TQ 10287 17160) and is bound by Storrington Road to the east; residential dwellings and High Bar Lane to the south; South Hill Farm and Barn to the North; and open land to the West.

1.7. The proposed development site consists of outbuildings, offices, welfare facilities and land associated with a former mushroom site.

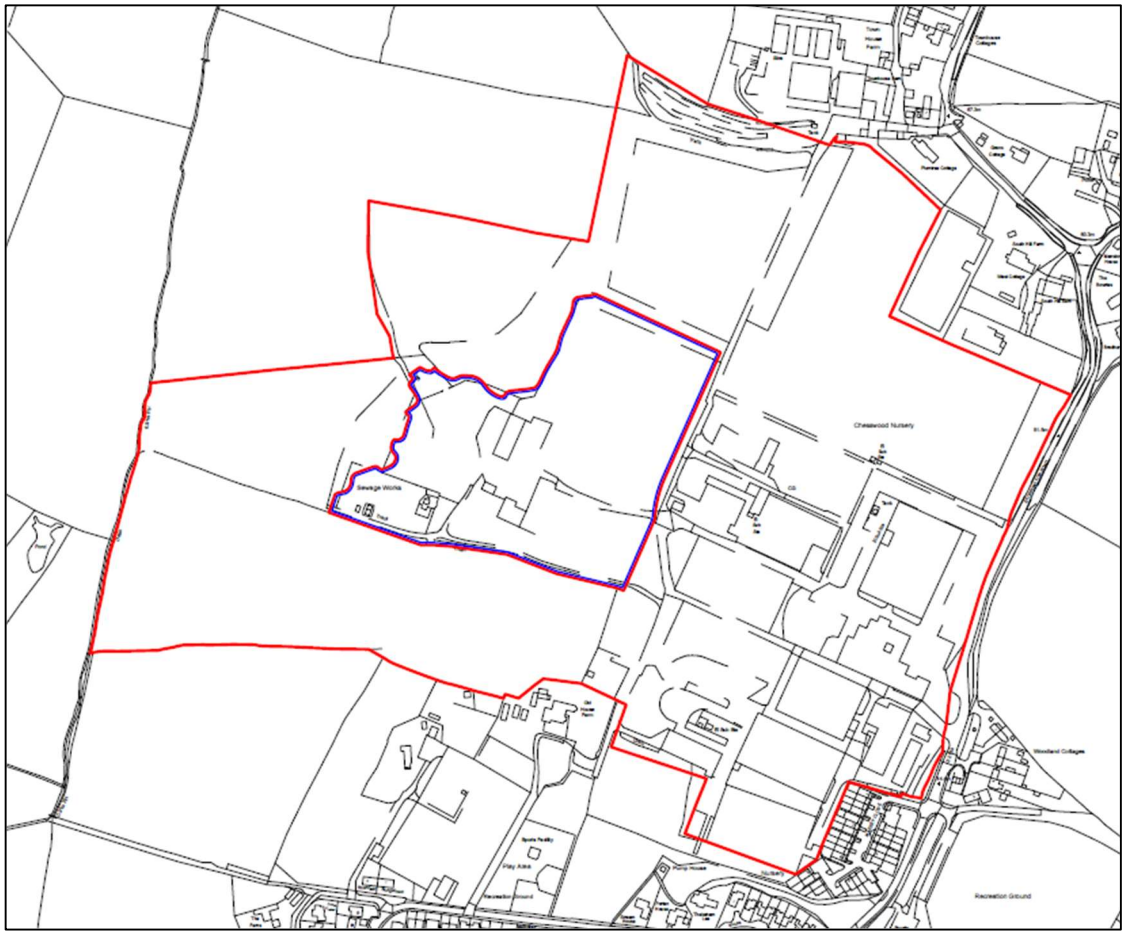

Figure 1-1: Site Location Plan (Source: Pegasus)

Development Proposals

1.8. The proposals comprise: *Demolition of existing buildings and the redevelopment of the site to provide 150 dwellings, including affordable housing, land for the community land trust, works to public right of way and associated landscaping,* ***biodiversity net gain bank****,* ***public*** *open space,* ***ancillary parking*** *and infrastructure* (hereafter referred to as 'the development').

1.9. For the purposes of the drainage strategy, a primary developable area of 6.6ha will be assumed, which is within the south-east corner of the wider application area encompassed by the red boundary.

1.10. The development layout is included in **Appendix A** and an extract shown in **Figure 1-2** below.

Figure 1-2: Extract of Development Masterplan Layout (Source: Pegasus)

2. Policy Context

National Planning Policy Framework (December 2024)

2.1. The National Planning Policy Framework (NPPF) paragraphs 170 to 182 inclusive, establish the Planning policy relating to flood risk management. The Technical Guide to the NPPF was superseded by the Planning Practice Guidance (PPG), with the flood risk management element of the publication updated in September 2025.

2.2. The focus of the policy is to direct development towards areas of the lowest practicable flood risk and to ensure that all development is safe, without increasing flood risk elsewhere. The main considerations are:

- Applying the Sequential Test, and if necessary, apply the Exception Test to appropriately locate development.
- Safeguarding land from development that is required for current and future flood management.
- Using opportunities offered by new development to reduce the causes and impacts of flooding.
- Where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to facilitate the relocation of development, including housing, to more sustainable locations.

2.3. The *NPPF* states that a Flood Risk Assessment is required for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving:

- Sites of 1 hectare or more.
- Land which has been identified by the Environment Agency as having critical drainage problems.
- Land identified in a strategic flood risk assessment as being at increased flood risk in future.
- Land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

Planning Practice Guidance

2.4. The accompanying planning practice guidance to the NPPF provides additional guidance to local planning authorities to ensure the effective implementation of the planning policy set out in the National Planning Policy Framework on development in areas at risk of flooding.

2.5. The PPG provides supporting information on:

- The application of the sequential approach, Sequential and Exception Tests.
- Measures to reduce flood risk to acceptable levels.
- How to manage residual risks.
- Guidance on how to take climate change into account.
- Guidance relating to SuDS drainage principles.

Best Practise guidance for the design of drainage

2.6. Various non-statutory publications offer guidance on the design, implementation, maintenance and operation of drainage, with these including for:

- National Standards for Sustainable Drainage Systems (SuDS) – the current version published in June 2025, which sets-out a prescriptive approach to the delivery of surface water drainage and SuDS.
- Practise guidance to the previous (2015) version of the National standards for drainage systems (SuDS) – whilst relating to the replaced version of guidance, this publication of 2016 by LASOO retains relevant advice.
- CIRIA 753 SuDS Manual – the current version published in 2015, provides detailed guidance on the appropriate provision of SuDS features.
- SSG Appendix C - the current version published in 2023, provides detailed guidance for compliant delivery of adoptable foul and surface water drainage, including for limited SuDS components.

Sequential and Exception Test

2.7. According to Annex 3 of the NPPF, the proposed residential development for the Site is classified as 'More Vulnerable.' As the site is located within Flood Zone 1, the development is considered appropriate without application of the Sequential or Exception Test with respect of fluvial/tidal flooding (**Figure 2-1**).

2.8. As detailed within the following, whilst there are instances of pluvial flooding within areas of proposed development, the Sequential Test need not be applied as these risk areas would be reasonably removed through the works.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✔	✔	✔	✔	✔
Zone 2	✔	Exception Test required	✔	✔	✔
Zone 3a †	Exception Test required †	X	Exception Test required	✔	✔
Zone 3b *	Exception Test required *	X	X	X	✔ *

Key:

✔ Exception test is not required

X Development should not be permitted

Figure 2-1: Extract of Flood Risk and Coastal Change Guidance Table 2, Flood Risk Vulnerability

3. Baseline

Hydrology

3.1. The EA online main river mapping shows there are no main rivers within the site, with the River Chilt the closest around 1km to the west and flowing east to west into the River Stour (**Figure 3-1**).

3.2. Mapping shows no surface water features (e.g. ordinary watercourses, open channels, canals, ponds, lakes or reservoirs) to be located within the site, with the nearest features an unnamed open channel around 10m to the south, along with areas of open water around 330m to the south and another around 800m to the west (**Figure 3-1**).

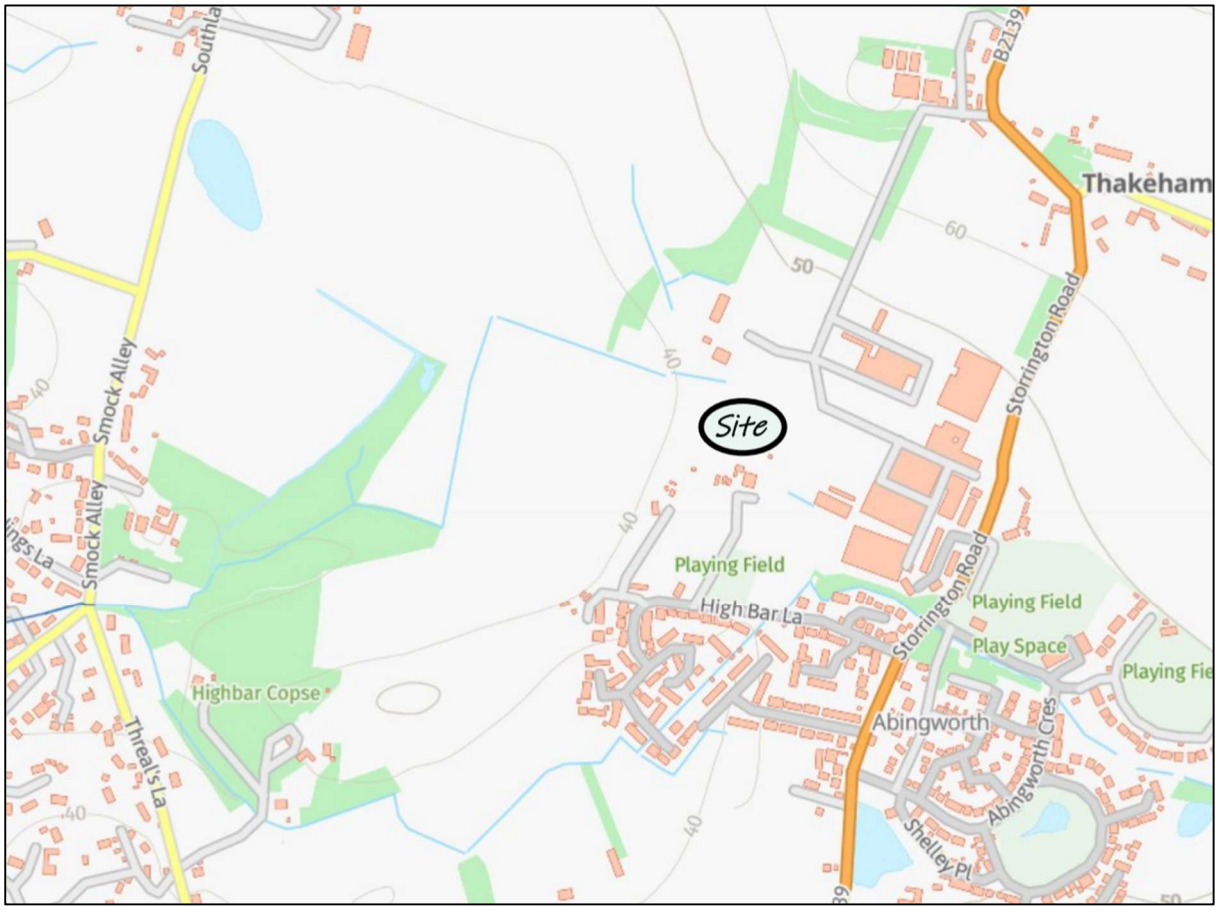

Figure 3-1: Main River Map Extract (Source: EA Statutory Main River Map)

Topography

3.3. The topographical survey drawing (**Appendix B**), prepared by MK Surveys in May 2023, indicates the site falls in a southerly direction. The ground level for most of the site ranges between circa 41.50 and 69.00mAOD with approximate gradient of 1:20 fall to the south.

Ground Conditions

3.4. The British Geological Survey (BGS) online mapping indicates that, where present, the superficial deposits (**Figure 3-2**) of the Site consists primarily of clay soils.

Figure 3-2: Soil Classification (Source: British Geological Society)

3.5. The British Geological Survey (BGS) online mapping indicates that the bedrock geology (**Figure 3-3**) of the Site consists of Sandstone and Mudstone, of the Fittleworth and Selham Ironshot Sands Member.

Figure 3-3: Bedrock Geology (Source: British Geological Society)

3.6. Initial ground investigations have been completed on the site (**Figure 3-4**).

Figure 3-4: Exploratory Hole Location Plan (Source: RSK Geosciences)

3.7. Trial pits and bores were taken by RSL Geosciences during November 2022 **(Appendix C**). Reviewing the 10 locations of ground investigation results located within the primary development area (WS3-9 & WS11-13), it has been noted that there were encounters of strata sequence comprising topsoil and/or made ground over yellow and brown sandy silty clay (Fittleworth Member). These validate the bedrock geology (where encountered) on the site to be generally consistent with the BGS mapping.

3.8. Included within the investigation works, groundwater levels were monitored and recorded (**Appendix D**). The results of these findings showed groundwater levels to range between 3.17m and 4.45m below ground level.

3.9. The site is partially located within Groundwater Source Protection Zone 2, with the remainder within Zone 3.

Existing Sewer Infrastructure

3.10. An extract from Southern Water sewer asset plans shows there is a 150mm dia. foul water sewer passing the site in a southerly direction within Storrington Road (**Figure 3-5** with full plans in **Appendix E**). The site is also served by a network of existing private foul and surface water assets, which respectively connect with the sewer and outfall to perimeter open channels.

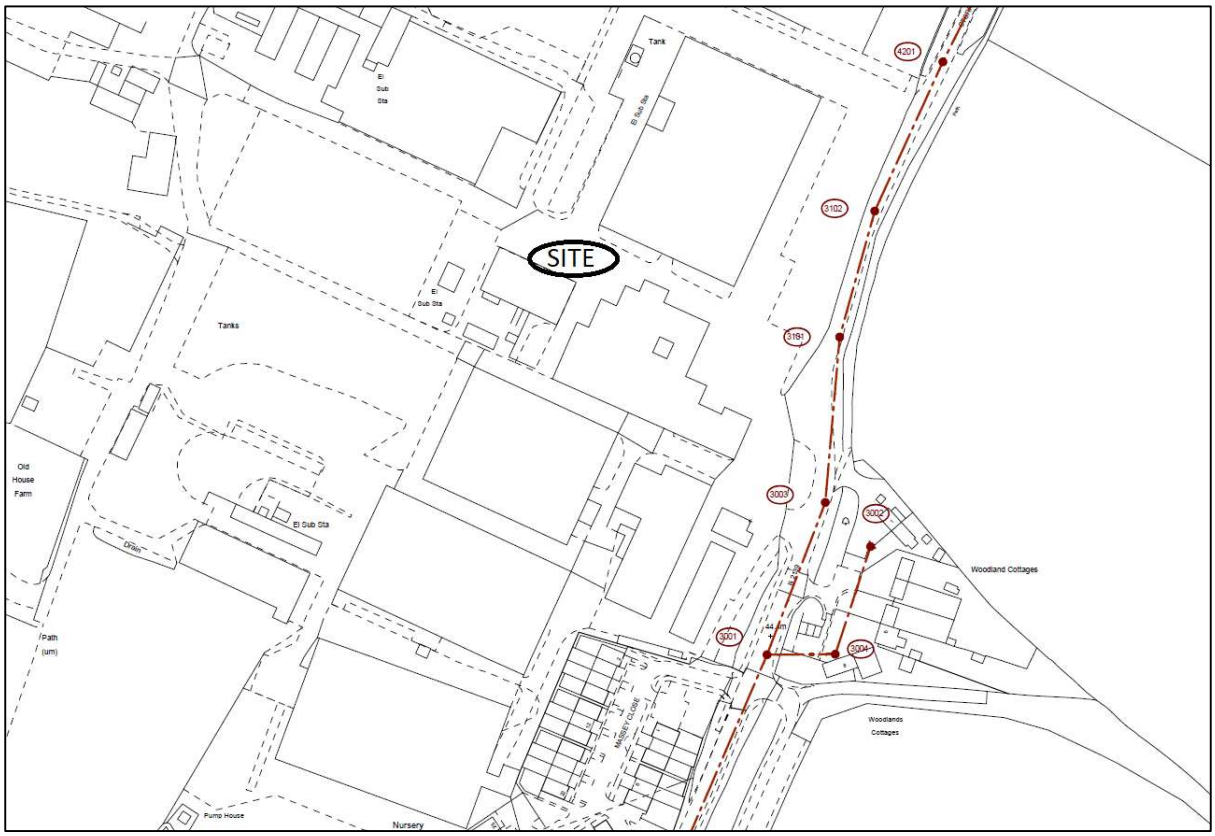

Figure 3-5: Sewer Asset Plan Extract (Source: Southern Water asset records)

4. Sources of Flooding

4.1. The NPPF requires flood risk from the following sources to be assessed, each of which are assessed separately below:

- Tidal sources (flooding from the sea);
- Fluvial sources (river flooding);
- Pluvial sources (flooding resulting from overland flows);
- Groundwater sources;
- Sewer surcharge; and
- Artificial sources, canals, reservoirs etc;
- It also requires the risk from increases in surface water discharge to be assessed (surface water management).

Tidal/Fluvial Flooding

4.2. The EA distinguish between three different flood zones as described below:

- **Flood Zone 1** is land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%);
- **Flood Zone 2** is land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year;
- **Flood Zone 3** is 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.

4.3. The EA flood map for planning shows the site is located within Flood Zone 1 (**Figure 4-1**). The site is therefore considered to have a very low annual probability of tidal/fluvial flooding, at less than 0.1%.

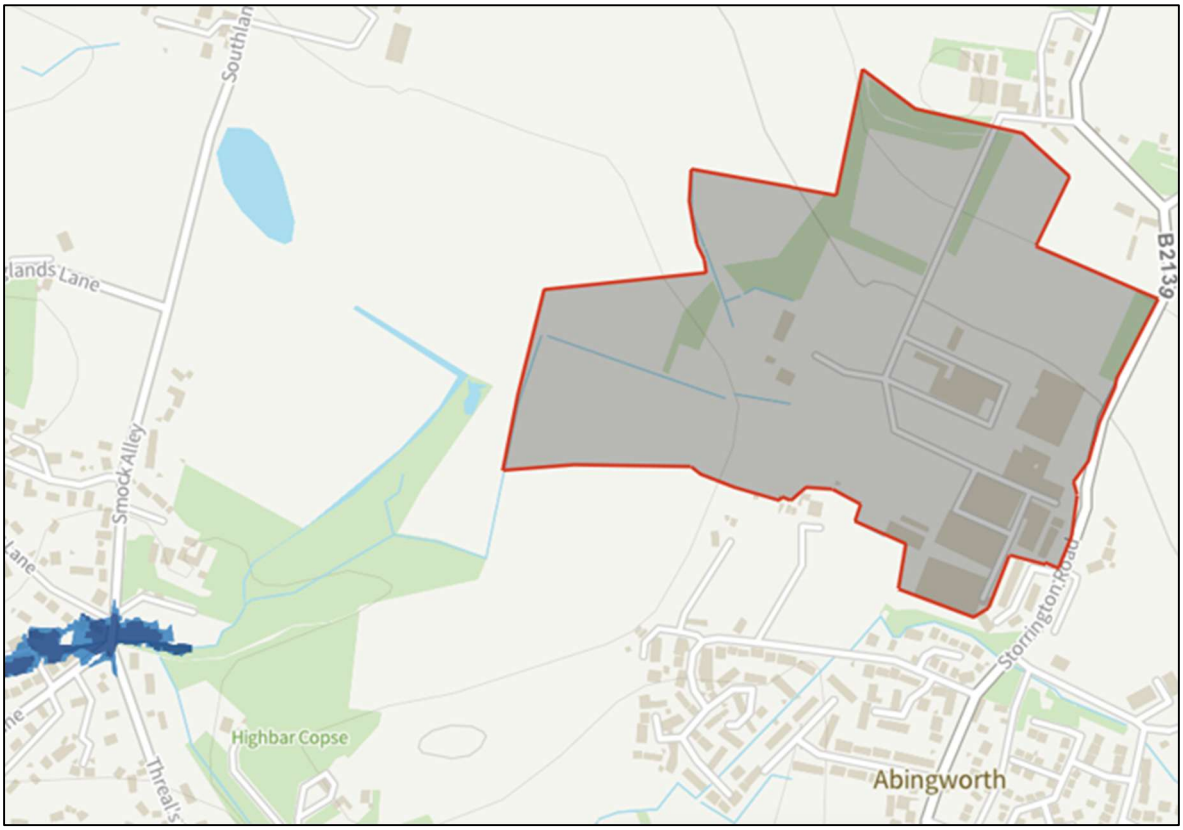

Figure 4-1: Fluvial Flooding Extents (Source: EA mapping)

Surface Water Flooding

4.4. The EA distinguishes between three levels surface water (pluvial) flood risk as defined below:

- **Low risk** is defined as an area of land which has an AEP between 0.1% and 1%;
- **Medium risk** is defined as an area of land which has an AEP between 1% and 3.3%; and
- **High risk** is defined as an area of land which has an AEP greater than 3.3%.

4.5. EA flood risk from surface water mapping **(Figure 4-2 to 4-4)** shows accumulations of pluvial flooding originating from within and around the site, which appear to align with localised low points within prevailing topography.

4.6. With consideration of the proposals, it would be noted that the flooding extents for all risk profiles encroach into areas of the site, however it would be considered that the flooding is generated by current site run-off with no flooding shown as entering from offsite areas.

4.7. Based upon site run-off generating the pluvial flooding, this would be reasonably mitigated through the positive draining of the site that would be provided as part of the development and as is proposed within the drainage strategy.

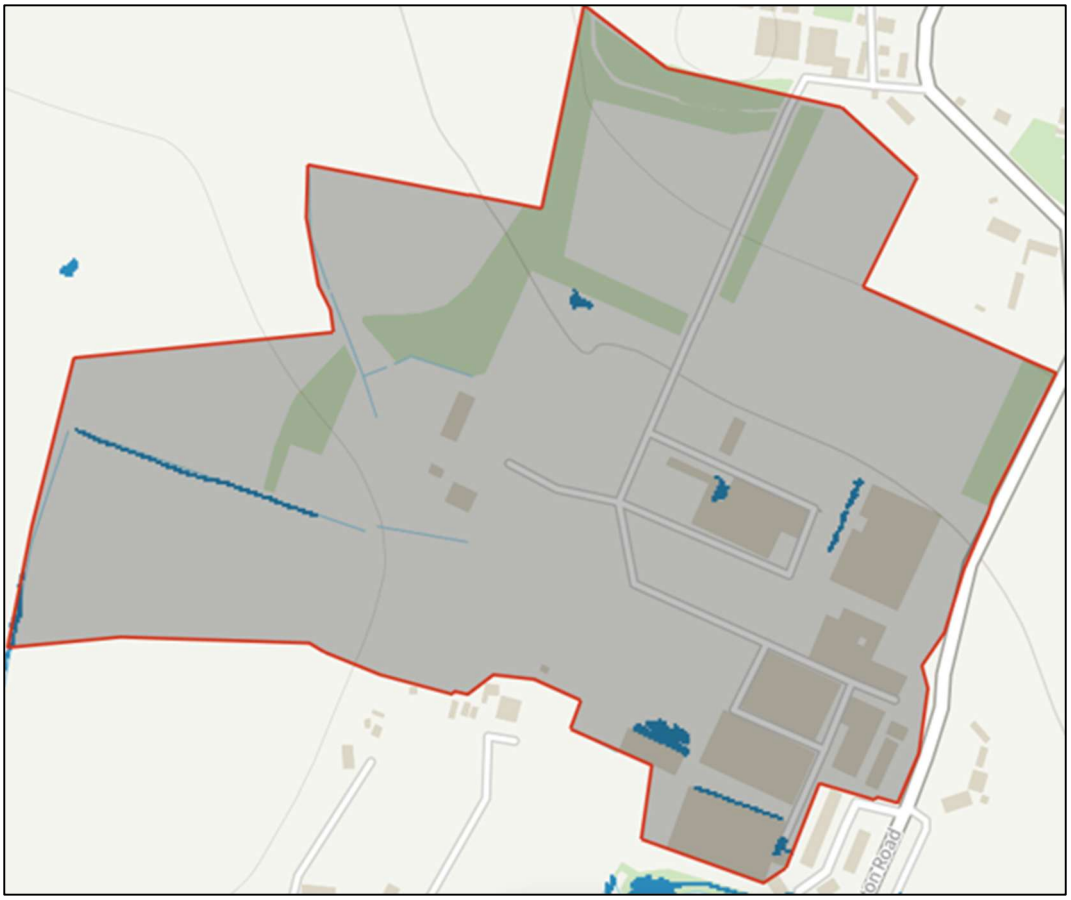

Figure 4-2: High Risk Pluvial Flooding Extents (Source: EA mapping)

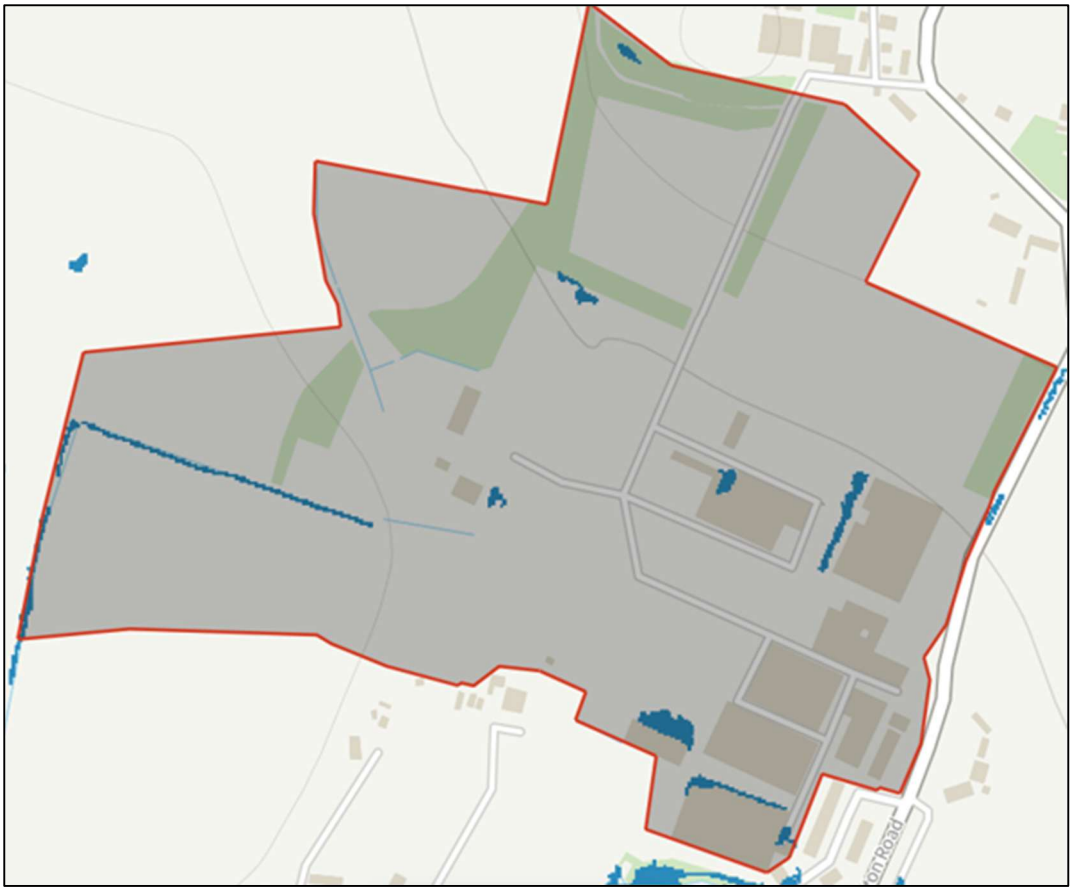

Figure 4-3: Medium Risk Pluvial Flooding Extents (Source: EA mapping)

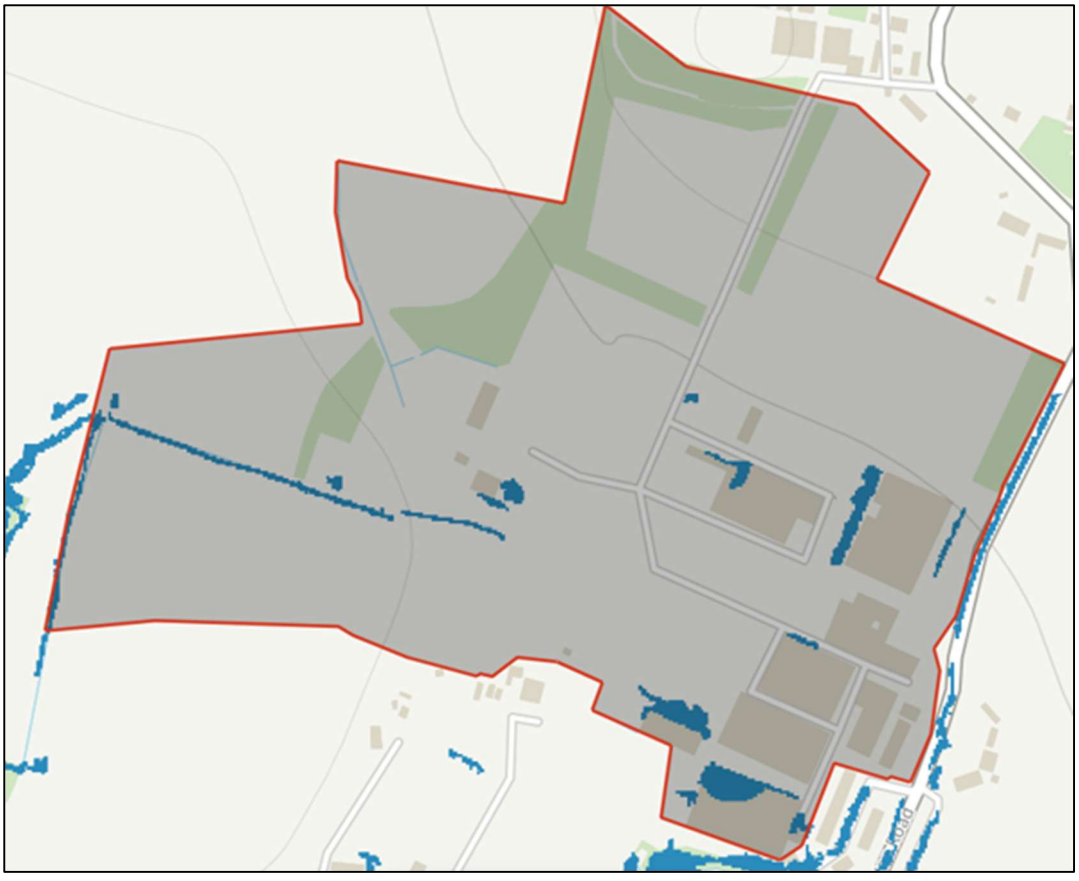

Figure 4-4: Low Risk Pluvial Flooding Extents (Source: EA mapping)

Groundwater Flooding

4.8. The West Sussex County Council (WSCC) Strategic Flood Risk Assessment (SFRA) ***Map G*** ranks the potential of groundwater flooding across the county from high to low. With reference to this, the site would be judged to be in an area of low risk of groundwater flooding.

4.9. As shown through site investigation works, groundwater was not recorded at shallow depths and surface soils would generally be considered to have relatively low permeability, further supporting the low risk of groundwater flooding across the site.

Sewer Flooding

4.10. The WSCC SFRA ***Map S*** would indicate that the site is not in an area prone to sewer flooding.

Artificial Sources

4.11. Risk of flooding from artificial sources has been checked with reference to long term flood risk mapping (**Figure 4-5**), which indicates that the site and wider surroundings are not located in a risk area.

Figure 4-5: Artificial Flooding Extents (Source: EA flood mapping)

Flood Risk Summary

4.12. The risk of flooding pre and post development by varying sources is summarised below (**Table 4-1**). Based upon current mapping and future drainage provision, the site in the end condition would be concluded to be at low risk of flooding.

FLOODING TYPE	PRE-DEVELOPMENT	POST-DEVELOPMENT	COMMENTS
Tidal/Fluvial	Very Low Risk	Very Low Risk	No risk to the site.
Surface Water (Pluvial) Flooding	Low to High Risk	Low Risk	Risk considered as brought by on-site sources only, and therefore managed through appropriate drainage provision.
Groundwater Flooding	Low Risk	Low Risk	Existing risk level maintained or reduced with a standard freeboard to proposed units.
Sewer Flooding	Low Risk	Low Risk	Existing risk level maintained or reduced with a standard freeboard to proposed units.
Artificial Sources	Low Risk	Low Risk	No risk anticipated to either the site or general surrounding area.
Overall assessment of site risk = Low and suitable for residential development			

Table 4-1: Summary of Flood Risk Pre and Post Development

Flood Resistance

4.13. Notwithstanding the Site being at a reasonably low risk of flooding, resilience would be provided by setting of unit floor levels as noted below, to provide a freeboard from fluvial risk and offer protection from overland flows.

- Finished floor levels should be set with a freeboard of 150mm to external ground, with levels falling locally away from units where practicable.

5. Surface Water Disposal and Rates of Discharge

Surface Water Disposal

5.1. The means of discharging surface water will require to be reviewed against the drainage hierarchy as contained within *Standard 1* of the current national SuDS standards, as replicated below.

- Priority 1 – collected for non-potable use
- Priority 2 - infiltration to ground
- Priority 3 - discharged to an above ground surface water body
- Priority 4 - discharged to a surface water sewer, or another piped surface
- water drainage system
- Priority 5 - discharged to a combined sewer

5.2. Notwithstanding that the non-potable water demands of the development as a residential use could not provide a primary means for disposing of all the potential run-off generated by the catchment, rainwater harvesting could be locally provided to deliver water savings.

5.3. As rainwater harvesting would not fully dispose of surface water run-off generated by the catchment, disposal through infiltration to ground shall next be considered as a primary means for disposal of run-off.

5.4. As discussed in **Section 3**, shallow soil deposits are expected to be of low infiltration potential, with primary discharge of development run-off to the permeable bedrock ruled out based upon the groundwater protection status of the area.

5.5. With sole infiltration to ground considered unfeasible, it would be proposed to drain development run-off at a restricted rate to adjacent open channels via established outfall(s) from the site, which is considered the highest relevant standard for the site in accordance with the National Standards for SuDS

5.6. There may also be nominal deep bore infiltration to ground to assist groundwater recharge, however the benefits with respect to rate of surface water disposal achievable will not be allowed for at this time.

Existing and Proposed Discharge Rates

5.7. The application boundary for the site equates to an area of 25.72ha, comprising of brownfield land. Approximately 6.6ha of the application area would be considered as proposed for development, with the remainder retained as common open space.

5.8. As the site comprises an impermeable area expected to exceed that which is proposed, a reduction in volume of run-off from the proposed development would be expected.

5.9. With the volume of run-off from the site to decrease following development, and in accordance with *Standard 3* of the current national SuDS standards, the discharge from the development will be flow matched by return period, up to the 100-year return period storm with climate change allowance.

5.10. With consideration of the current national SuDS standards, the allowable rate of run-off will be calculated based upon the development area (application area less public open space), which is considered to equate to 6.6ha.

5.11. Pro-rata greenfield run-off rates utilising FEH22 rainfall data for key return periods are presented within **Table 5-1** (calculation and FEH data within **Appendix F)**.

Return Period	Per Hectare (l/s)	Application Area of 25.7ha (l/s)	Developable Area of 6.6ha (l/s)
Qbar	3.0	77.1	19.8
Q1	2.6	66.8	17.2
Q30	6.9	177.3	45.5
Q100	9.6	126.8	63.4

Table 5-1: Greenfield Run-off Rates

5.12. From **Table 5-1**, the development discharge will be restricted to maximum rates as follows: to 19.8l/s under the 2-year event and 63.4l/s under the 100-year event with 45% allowance for climate change.

5.13. As the site is currently formally drained and for a further means of comparison, run-off rates from impermeable catchments within the development area are presented within **Table 5-2**, based upon FEH rainfall intensity for a 60-minute duration storm for respective return period events.

Return Period	Rainfall Intensity (mm/hr)	Impermeable Area (ha)	Run-off Rate (l/s)
Q1	11.5	5.04	161.12
Q2	16.6	5.04	232.59
Q30	38.2	5.04	535.23
Q100	48.8	5.04	683.75

Table 5-2: Existing Run-off Rates

5.14. Based upon the comparison of proposed restriction and anticipated rates of run-off from the site in the current form, it is evident that the proposed development will pass forward flows at a much-reduced rate.

6. Surface Water Drainage Strategy

Sustainable Drainage Systems (SuDS)

6.1. The current national standards for SuDS and CIRIA SuDS manual have been used to determine an appropriate SuDS strategy, which considers the spatial and environmental constraints of the site.

6.2. Based upon the above guidance, constraints, and opportunities for the use of SuDS techniques are outlined in **Table 6-1**, appraised using the Management Train approach outlined in CIRIA C753.

Green Roofs (Source Control)	
Constraints:	Subject to Architect's design.
Opportunities:	Deemed incompatible with type of development, with low density housing and likely preference for pitched roofs.
Lined Permeable Paving (Source Control)	
Constraints:	It is considered unfeasible to provide widespread infiltrating permeable paving due to site characteristics (see infiltration devices below).
Opportunities:	Permeable paving with a drained outfall to provide a stage of at-source treatment would be considered reasonable (see infiltration devices below).
Rainwater Harvesting (Source Control)	
Constraints:	The benefits of rainwater harvesting on a specific design storm event cannot be quantified, due to the seasonal availability of storage within the structure.
Opportunities:	Opportunities to provide local/nominal harvesting features exist, for re-use in irrigation and for grey water uses to reduce development water demand.
Infiltration Devices (Source Control)	
Constraints:	Based upon anticipated clay soils and the sensitive groundwater, widespread discharge to ground would be considered unsuitable.
Opportunities:	As a minimum subject to BRE 365 testing.
Tree Pits/Bio-retention (Source Control)	
Constraints:	Subject to Landscape Architect's design.
Opportunities:	Opportunities to use landscaped space to incorporate tree pits and bio-retention areas.
Swales (Conveyance and Storage)	
Constraints:	To provide practicable attenuation benefits, 1:3 side-slope swales tend to require a significant land requirement.
Opportunities:	Opportunities to provide as at source conveyance features, which will provide treatment to run-off and allow drainage to be kept at a shallower depth.

Filter trenches (Conveyance and Storage)	
Constraints:	At c30% void, filter trenches do not provide a significant volume of storage and are therefore not feasible as primary attenuation.
Opportunities:	Opportunities to provide as conveyance features which will provide treatment to run-off and potentially nominal volumes of attenuation.
Detention/Retention Basins (Storage)	
Constraints:	Subject to Architect's site layout.
Opportunities:	It would be anticipated that current areas of open space would offer ample area for provision of basins.
Attenuation Tanks (Storage)	
Constraints:	None
Opportunities:	Potential to locate below ground within private parking courts and areas of public open space, providing efficient attenuation with void ratios typically of 95% or greater.

Table 6-1: SuDS Features Appraisal

6.3. With consideration of the above and need for SuDS to offer interception of run-off, removal of pollutants and balancing of flows; a combination of the following forms is proposed:

- Water butts to offer partial interception and re-use of clean roof water run-off for garden irrigation.
- Drained permeable paving to parking courts, private and shared driveways to offer interception and at-source treatment to the given pavement area, and nominal adjacent impermeable finishes.
- Drained swales and bioretention features to offer interception and at-source treatment to adjacent roads.
- Detention basins for balancing of run-off, along with residual interception and treatment of run-off where at-source features cannot be reasonably allowed for.

Climate Change Allowance

6.4. The National Planning Policy Framework (NPPF) of December 2024, paragraphs 162 to 164(a) inclusive, establish the Planning policy relating to climate change in the context of flood risk and drainage.

6.5. The focus of the policy is to direct development towards areas of the lowest practicable flood risk and to ensure that all development is safe, without increasing flood risk elsewhere. As part of this, it is noted that proposals should take a proactive approach to mitigating and adapting to climate change, considering the long-term implications for flood risk.

6.6. Guidance on how climate change is predicted to alter peak rainfall intensity has been considered, and for this site the upper requirements are noted as below.

- **30-year** return period storms – **40%** allowance for climate change
- **100-year** return period storms – **45%** allowance for climate change

Surface Water Drainage Network

6.7. Refer to **Appendix G** for drawing no. 2505500-ACE-XX-XX-DR-C-0101, showing the preliminary surface water drainage layout and provision of SuDS.

6.8. Based upon the prevailing levels of the site against anticipated levels of the downstream open channel and surface water drainage within the site, connection of the development surface water by gravity would be considered achievable.

6.9. Point of connection for the surface water drainage will be toward the south-west corner of the site, with new outfall pipework taken between the site and open channel to the south.

6.10. The topographical survey drawing (**Appendix B**), prepared by K.A. Rylance Limited in September 2022, confirms the invert level of the existing channel at the point of proposed connection to be 39.530 and top of bank of 40.250mAOD. These compare with a basin invert of 40.400mAOD, which would indicate the outflow from the basin would not be unduly restricted by the downstream channel running full.

6.11. To achieve the restrictions in discharge rate without undue flood risk to the development or surrounding area, a total storage volume of approximately 3,200m^3 is to be provided. This is based upon balancing of the 100-year return period event with 45% climate change allowance, and the following parameters:

- Catchment area (north and to intermediate basin) - impermeable area of 7,231m^2 from roads/driveways and 3,476m^2 from roofs. Applying a 10% urban creep allowance to the current roof area, a connecting impermeable area of 11,055m^2 is generated.

- Catchment area (south and unrestricted to end-of-line basin) - impermeable area of 18,682m^2 from roads/driveways and 9,989m^2 from roofs. Applying a 10% urban creep allowance to the current roof area, a connecting impermeable area of 29,670m^2 is generated.

- Cv values – based upon 'default' values and when considering interception by at-source SuDS, it would be considered appropriate to design based upon values of 0.75 for summer and 0.84 for winter storm events. Notwithstanding this, a sensitivity check has been completed to understand the extent of flooding and to ensure balancing of flows within the freeboard of basins with use of a Cv value of 1.0.

6.12. The calculated balancing volume will be allowed for within detention basins provided toward the west of the site within the village green, and toward the end-of-line within a further area of proposed public open space.

6.13. The wider surface water drainage network will be designed to ensure conveyance of the 1 in 2-year event without exceedance of pipe capacity, with appropriate conveyance and containment of run-off for storm events up to the 1 in 30-year with 40% allowance for climate change.

6.14. Any flooding from the drainage network beyond the 30-year event and up to the 100-year event with 45% allowance for climate change will be reasonably contained within the site, with routing of any exceedance flows via roads and open space, to ensure overland run-off is directed in a manner that reasonably minimises the risk to person and property, on and off the site.

6.15. Full network modelling results from Causeway Flow are provided within **Appendix H1** and **H2** for the varying Cv values. Anticipated means of containing any

exceedance flows is as presented within **Table 6-2** for the Cv of 1.0, with flood routing shown upon drawing 2505500-ACE-XX-XX-DR-C-0105 within **Appendix G**.

Reference	Volume of Flooding (m^3)	Means of Containment	Area at 100mm Depth (m^2)
S9 Pipe 1.007	11.0	Within road corridor	110
S10 Pipe 1.008	0.3	Within road corridor	3
S17 Pipe 3.004	0.2	Within road corridor	2
S18 Pipe 3.005	9.5	Within road corridor	95
S25 Pipe 1.013	1.7	Within area of public open space	17
S30 Pipe 6.000	3.8	Within road corridor and area of public open space	38
S57 Pipe 10.003	1.8	Within road corridor	18

Table 6-2: Network Flooding for 100-year Event at Cv of 1.0

Surface Water Quality

6.16. A combination of SuDS are proposed to treat surface water run-off, with features by area drained as below and respective pollution mitigation indices provided within **Appendix I:**

- **Higher traffic roads** (including adjacent footways and parking bays) – drained at or near source by swales or bio-retention features; further site wide treatment provided through the retention and/or detention basin.
- **Low traffic roads** (including adjacent footways and parking bays) – with potentially reduced opportunity to provide at source SuDS for these areas with lesser or no verge areas, treatment will be provided through the retention and/or detention basin only.
- **Shared driveways and plot run-off** – drained at or near source by permeable paving; further site wide treatment provided through the retention and/or detention basin only.

Future Maintenance

6.17. A management company will be appointed to maintain communal areas, landscaping and shared SuDS throughout the development.

6.18. All maintenance will be in accordance with the best practices and the CIRIA Manual C753. Refer to **Appendix J** for an overview of the maintenance tasks required.

6.19. To ensure reasonable access for future maintenance activities, in-particular for SuDS, the following measures by form are proposed and as appropriate detailed upon drawing no. 2505500-ACE-XX-XX-DR-C-0101 (**Appendix G**)

- SuDS basins – 3.5m wide route to inlet and outlet points kept clear of planting or structures. Reinforced grass area to be provided adjacent to basins for authorised maintenance vehicles.
- Linear roadside features – access to be reasonably achievable from road or footway side, with no long lengths of planting or significant street furniture/structures placed along the sides.
- Permeable paving – no additional or particular access requirements considered necessary.

7. Foul Water Drainage Strategy

7.1. Refer to **Appendix G** for the drawing no. 2505500-ACE-XX-XX-DR-C-0101, showing the preliminary foul water drainage layout.

7.2. As the site has an existing connection to the sewer within Storrington Road, it would be considered to have a historic demand on the downstream wastewater network.

7.3. The flow generated by the historic site use would be estimated as 2.0l/s, based upon Southern Water rates for commercial use at 3l/sqm/day over a buildings footprint of 5.15ha, with 10% allowance for infiltration but no peaking factor applied.

7.4. The preferred point of connection to the Southern Water sewer would be adjacent to Massey Close, with as appropriate any length of drain within the root protection zone of boundary trees to be installed through trenchless techniques to a new chamber formed on the existing sewer.

7.5. Based upon invert levels denoted upon Southern Water record plans around the point of the proposed connection, a gravity discharge would be anticipated as achieved from 116 of the 150 No. residential units. The remaining 34 No. would broadly follow the prevailing topography of the site to the south-east corner by gravity, with a rising main then provided back up to the gravity connection within the development.

7.6. In accordance with Part H of Building Regulations, emergency storage should be provided at the pump station to offer reasonable protection from flooding in the event of pump failure. As more than 30 No. properties would be connecting to the pump, storage requirements of SSG Appendix C would be considered more appropriate at 160 litres per unit, opposed to the 150 litres per person of Part H.

7.7. With 34 No. units connected via the pump, the volume of emergency storage to be provided within the wet well and supplemented by an appropriate below ground tank or similar would be 5.4m^3.

7.8. With 150 No. dwellings proposed, a peak foul flow from the development of 1.4l/s would be estimated. This is based upon Southern Water advised demand of 300l/dwelling/day (residential), with 10% allowance for infiltration into the network and 2.5 peak factor.

7.9. As the development will be split between a direct gravity connection and pumped discharge, the final peak discharge will be adjusted, assuming an outgoing flow from the pump at 50% of incoming, giving a total peak of 1.2l/s for the development.

7.10. Currently, no discharge from the community land trust allocation is allowed for, but by inspection the development foul water drainage could be expected to accept a connection from the residential use and this land via a 150mm-dia. connection at minimum grade.

7.11. Based upon a consultation response received with relation to the original application form, for which this update brings no change with relation to foul water demand, Southern Water advised there may be a need for reinforcement works to the existing drainage network to allow for the connection of 150 No. units. As stated within the response, reinforcement works would be provided for by Southern Water, typically within 24-months of planning consent being granted.

7.12. Based upon the noted consultation response, it would be considered reasonable for the development to discharge to the existing foul sewer. In-particular as the proposed development discharge rate would be less than that anticipated from the historic site use.

8. Conclusions

8.1. According to the EA flood maps, the site is in Flood Zone 1 and is therefore at very low risk of fluvial or tidal flooding.

8.2. The potential risk of flooding from other sources at the site including surface water, groundwater, sewers and artificial sources are considered low under the end condition. This risk level would be achieved through the development by implementing the proposed surface water drainage and finished levels to dwellings.

8.3. As the end draining of the development would be considered to reasonably mitigate current high and medium risk pluvial flooding, application of the Sequential Test would not be considered necessary.

8.4. The surface water drainage strategy will manage flood risk by restricting surface water to equivalent greenfield rates for all return period events, up to and including the 1 in 100-year critical event (with 45% allowance for climate change). The surface water from the development will connect to an existing open channel to the south of the site, via a new outfall.

8.5. The surface water from the development will primarily be attenuated within basins, with a total volume of approx. 3,100m^3 required to balance run-off. In addition, at-source SuDS will be provided throughout the development to treat, partially intercept, and locally balance run-off.

8.6. A management company will be appointed to maintain the SuDS within the development, in accordance with best practice of the CIRIA Manual C753.

8.7. It is proposed that foul flows from the development will discharge into a Southern Water sewer adjacent to the site.

8.8. In conclusion, the proposals are consistent with the aims of NPPF, PPG, the latest National Standards for SuDS, Local Plan and other relevant local guidance. The proposed drainage strategy will not increase flood risk for the development site or the surrounding area.

Appendix A

KEY

- SITE BOUNDARY
- OPEN MARKET DWELLINGS
- AFFORDABLE RENT DWELLINGS
- SHARED OWNERSHIP DWELLINGS
- INDICATIVE COMMUNITY LAND TRUST AREA
- INDICATIVE LOCATION OF MOBILITY HUB
- INDICATIVE DRAINAGE
- INDICATIVE PLANTING
- RETAINED EXISTING VEGETATION
- PUBLIC RIGHT OF WAY
- LEAP LOCAL EQUIPPED AREA FOR PLAY

0 20 50 100m

FORMER THAKEHAM MUSHROOM SITE – SITE LAYOUT

PEGASUS GROUP

| PEGASUSGROUP.CO.UK | TEAM/DRAWN BY: AV | APPROVED BY: MCC | DATE: 03/08/2026 | SCALE: 1:1250@A0 | DRWG: P24-2268_DE_010_i_029 | CLIENT: BELLWAY HOMES |

Appendix B

509600 E | 509650 E | 509700 E | 509750 E | 509800 E | 509850 E | 509900 E | 509950 E | 510000 E | 510050 E

117650 N | 117600 N | 117550 N | 117500 N | 117450 N | 117400 N | 117350 N | 117300 N

Notes:

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2. TREE AND HEDGE SPECIES HAVE BEEN IDENTIFIED AS ACCURATELY AS POSSIBLE BUT SHOULD BE CROSS CHECKED IN CRITICAL AREAS.

Coordinate Table

Station	Description	Easting	Northing	Level
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S2	ROAD NAIL	510347.853	117127.607	47.859
S3	HILTI NAIL	510259.855	117173.133	48.366
S4	ROAD NAIL	510286.671	117270.487	52.008
S5	ROAD NAIL	510225.458	117305.058	51.527
S6	ROAD NAIL	510152.608	117341.321	50.978
S7	PEG	510168.042	117442.314	58.714
S8	PEG	510066.520	117435.937	54.992
S9	PEG	510010.224	117439.664	50.714
S10	PEG	509933.956	117417.214	44.774
S11	PEG	509866.359	117343.559	39.909
S16	ROAD NAIL	510117.084	117163.132	45.829
S17	HILTI NAIL	510220.093	117124.848	46.913

TOPOGRAPHICAL KEY

SURVEY STATION — 5
BANKING — TOP / BOTTOM
HEDGE SPREADS
WOODLAND CANOPY
ARROW ON STEPS / RAMPS INDICATES DIRECTION UPWARDS
TREES — SPREAD & GIRTH SHOWN TO SCALE
GATE
KERB CHANNEL
ROAD UNKERBED
FOOTPATH
CHANGE IN SURFACE
FENCE
WALL
OVERHEAD ELECTRIC
OVERHEAD TELECOM
FOUL SEWER
SURFACE SEWER
P-TRAP
BACK DROP (EXTERNAL)
BACK DROP (INTERNAL)
BUILDING
OPEN SIDED BUILDING
OVERHANG / CANOPY
GLASSHOUSE
CONTOUR — 25.50
SPOT LEVEL — + 127.13
SONAR LEVEL — ○ 127.13
BORE HOLE — BH
TRIAL HOLE — TH

GENERAL ABBREVIATIONS

AIR CONDITIONING UNIT	ACU
AIR VALVE	AV
AVERAGE	Av
BACK DROP	BD
BENCH MARK	BM
BELISHA BEACON	BB
BOLLARD	BO
BOLLARD LIGHT	BOL
BRICK	BK
BUS STOP	BS
CABLE MKER	CA
CABLE TV COVER	CATV
CABLES TO GROUND	CTG
CATCH PIT	CP
CONTROL BOX	CB
COVER LEVEL	CL
CROSSING CONTROL BUTTON	CCB
DAMP PROOF COURSE	DPC
DRAINAGE CHANNEL	DCH
DROP KERB	DK
ELECTRICITY POLE	EP
ELECTRICITY WIRE	EW
EARTH ROD	ER
FLOOD LEVEL	FL
FLOOR LEVEL	FL
FOOTPATH	FP
FOUL WATER	FW
GAS RISER	GR
GAS VALVE	GV
GRATE	GR
HARD BED	HB
INSPECTION COVER	IC
INVERT LEVEL	IL
KERB OUTLET	KO
LAMP POST	LP
MANHOLE	MH
MARKER POST	MK
METER	MT
NO PIPES VISIBLE	NPV
ORDNANCE SURVEY BENCH MARK	OSBM
PIT	PT
POST	PO
POST BOX	PBOX
ROSSING EYE	RE
ROAD SIGN	RS
RAIN WATER PIPE	RWP
RETAINING WALL	RW
SOFT BED	SB
STOP COCK	SC
STREET NAME PLATE	SNP
STOP VALVE	SV
SOIL PIPE	SP
SOIL VENT PIPE	SVP
SURFACE WATER	SW
TACTILE PAVING	TPC
TELECOM POLE	TP
TELECOM INSPECTION COVER	TEL
TELEPHONE CALL BOX	TCB
TICKET MACHINE	TM
TOP OF WALL	TOW
TRAFFIC LIGHT	TL
TRAFFIC LIGHT COVER	TLC
THRESHOLD LEVEL	THL
UNABLE TO LOCATE	UTL
UNABLE TO RAISE	UTR
UNABLE TO SURVEY	UTS
VENT PIPE	VP
WATER LEVEL	WL
WATER METER	WM
WASH OUT	WO
WATER RISER	WR
WATER TAP	WT

FENCE ABBREVIATIONS

BARBED WIRE FENCE	B/W	IRON RAILINGS	I/R
CLOSE BOARDED FENCE	C/B	LARCH LAP FENCE	L/L
CONCRETE PANEL FENCE	CPL	POST AND RAIL FENCE	P/R
CORRUGATED IRON FENCE	C/I	POST AND WIRE FENCE	P/W
CHESTNUT PALING	CP	WIRE MESH FENCE	W/M
CHESTNUT FENCE	CNF		

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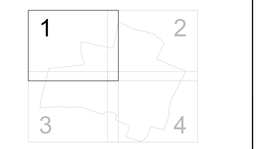

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Revision	Description	Surv by	Check by	Appr by	Date

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Topographical Survey

Client: Bellway

Storrington Road
Abingworth
West Sussex

Scale:	Sheet Size:	Sheet Number:	Date:
1:500	A0	1	May 2023

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117650 N 117600 N 117550 N 117500 N 117450 N 117400 N 117350 N 117300 N

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TOPOGRAPHICAL KEY

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HEDGE SPREADS
WOODLAND CANOPY
ARROW ON STEPS / RAMPS INDICATES DIRECTION UPWARDS
TREES (SPREAD & GIRTH SHOWN TO SCALE)
GATE
KERB CHANNEL
ROAD UNKERBED
FOOTPATH
CHANGE IN SURFACE
FENCE
WALL
OVERHEAD ELECTRIC
OVERHEAD TELECOM
FOUL SEWER
SURFACE SEWER
P-TRAP
BACK DROP (EXTERNAL)
BACK DROP (INTERNAL)
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OPEN SIDED BUILDING
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BUS STOP	BS
CABLE MKER	CA
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CATCH PIT	CP
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DROP KERB	DK
ELECTRICITY POLE	EP
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EARTH ROD	ER
FLOOD ALLEVIANT	FA
FLOOR LEVEL	FL
FOOTPATH	FP
FOUL WATER	FW
GAS RISER	GR
GAS VALVE	GV
GRATE	GT
HAND BED	HB
INSPECTION COVER	IC
INVERT LEVEL	IL
KERB OUTLET	KO
LAMP POST	LP
MANHOLE	MH
MARKER POST	MK
METER	MT
NO PIPES VISIBLE	NPV
ORDNANCE SURVEY BENCH MARK	OSBM
POST	PT
POST	PO
POST BOX	PBOX
ROSSING EYE	RE
ROAD SIGN	RS
RAIN WATER PIPE	RWP
RETAINING WALL	RW
SOFT BED	SB
STEPS/ZOOM	SG
STOP TAP/ME PLATE	SWP
STOP VALVE	SV
SOIL PIPE	SP
SOIL VENT PIPE	SVP
SURFACE WATER	SW
TANK/CHAMBER	TC
TELECOM POLE	TP
TELECOM INSPECTION COVER	TEL
TELEPHONE CALL BOX	TCB
TICKET MACHINE	TM
TOP OF WALL	TOW
TRAFFIC LIGHT	TL
TRAFFIC LIGHT COVER	TLC
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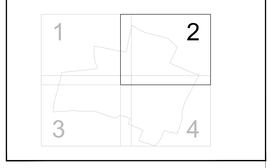

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117300 N | 117250 N | 117200 N | 117150 N | 117100 N | 117050 N | 117000 N | 116950 N

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DOOR BELL CONTROL BUTTON	DCB
DAMP PROOF COURSE	DPC
DRAINAGE CHANNEL	DCH
DROP KERB	DK
ELECTRICITY POLE	EP
ELECTRICITY WIRE	EW
EARTH ROD	ER
FLOOD LIGHT	FL
FLOOR LEVEL	FL
FOOTPATH	FP
FOUL WATER	FW
GAS RISER	GR
GAS VALVE	GV
GULLY	GY
HARD BED	HB
INSPECTION COVER	IC
INVERT LEVEL	IL
KERB OUTLET	KO
LAMP POST	LP
MANHOLE	MH
MARKER POST	MP
METER	MT
NO PIPES VISIBLE	NPV
ORDNANCE SURVEY BENCH MARK	OSBM
PIT	PIT
POST	PO
POST BOX	PBOX
ROSSING EYE	RE
ROAD SIGN	RS
RAIN WATER PIPE	RWP
RETAINING WALL	RW
SOFT BED	SB
STOP COCK	SC
STOP COCK NAME PLATE	SCP
STOP VALVE	SV
SOIL PIPE	SP
SOIL VENT PIPE	SVP
SURFACE WATER	SW
TACTILE PAVING	TAC
TELECOM POLE	TP
TELECOM INSPECTION COVER	TEL
TELEPHONE CALL BOX	TCB
TICKET MACHINE	TM
TOP OF WALL	TOW
TRAFFIC LIGHT	TL
TRAFFIC LIGHT COVER	TLC
THRESHOLD LEVEL	THL
UNABLE TO LOCATE	UTL
UNABLE TO RAISE	UTR
UNABLE TO SURVEY	UTS
VENT PIPE	VP
WATER LEVEL	WL
WATER METER	WM
WASH OUT	WO
WATER RISER	WR
WATER TAP	WT

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CHESTNUT RAILING	CNP		

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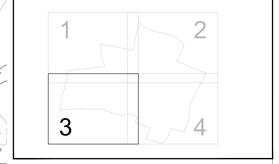

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Abingworth
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1:500	A0	3	May 2023

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32595	-	RG/TC/TH/JM	AS	CP

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Notes:

1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GNSS NETWORK. LOCAL SCALE FACTOR 0.99975 APPLIED.
2. TREE AND HEDGE SPECIES HAVE BEEN IDENTIFIED AS ACCURATELY AS POSSIBLE BUT SHOULD BE CROSS CHECKED IN CRITICAL AREAS.

Coordinate Table

Station	Description	Easting	Northing	Level
S1	ROAD NAIL	510322.934	117069.440	45.688
S2	ROAD NAIL	510347.853	117127.607	47.859
S3	HILTI NAIL	510259.855	117173.133	48.366
S4	ROAD NAIL	510286.671	117270.487	52.008
S5	ROAD NAIL	510225.458	117305.058	51.527
S6	ROAD NAIL	510152.608	117341.321	50.978
S7	PEG	510168.042	117442.314	58.714
S8	PEG	510066.520	117435.937	54.992
S9	PEG	510010.224	117439.664	50.714
S10	PEG	509933.956	117417.214	44.774
S11	PEG	509866.359	117343.559	39.909
S16	ROAD NAIL	510117.084	117163.132	45.829
S17	HILTI NAIL	510220.093	117124.848	46.913

TOPOGRAPHICAL KEY

GENERAL ABBREVIATIONS

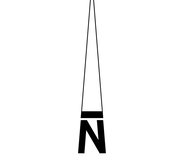
SURVEY STATION 5
BANKING TOP / BOTTOM
HEDGE SPREADS
WOODLAND CANOPY
ARROW ON STEPS / RAMPS INDICATES DIRECTION UPWARDS
TREES SPREAD & GIRTH SHOWN TO SCALE
GATE
KERB CHANNEL
ROAD UNKERBED
FOOTPATH
CHANGE IN SURFACE
FENCE
WALL
OVERHEAD ELECTRIC
OVERHEAD TELECOM
FOUL SEWER
SURFACE SEWER
P-TRAP
BACK DROP (EXTERNAL)
BACK DROP (INTERNAL)
BUILDING
OPEN SIDED BUILDING
OVERHANG / CANOPY
GLASSHOUSE
CONTOUR 25.00
SPOT LEVEL + 127.13
SONAR LEVEL ○ 127.13
BORE HOLE BH
TRIAL HOLE TH

AIR CONDITIONING UNIT	ACU		
AIR VALVE	AV		
AVERAGE	Av		
BACK DROP	BD		
BENCH MARK	BM		
BELISHA BEACON	BB		
BOLLARD	BO		
BOLLARD LIGHT	BOL		
BRICK	BK		
BUS STOP	BS		
CABLE UNDER	CA		
CABLE TV COVER	CATV		
CABLES TO GROUND	CTG		
CATCH PIT	CP		
CONTROL BOX	CB		
COVER LEVEL	CL		
CROSSING CONTROL BUTTON	CCB		
DAMP PROOF COURSE	DPC		
DRAINAGE CHANNEL	DCH		
DROP KERB	DK		
ELECTRICITY POLE	EP		
ELECTRICITY WIRE	EW		
EARTH ROD	ER		
FLOOD LIGHT	FL		
FLOOR LEVEL	FL		
FOOTPATH	FP		
FOUL WATER	FW		
GAS RISER	GR		
GAS VALVE	GV		
GRATE	GR		
HAND BED	HB		
INSPECTION COVER	IC		
INVERT LEVEL	IL		
KERB OUTLET	KO		
LAMP POST	LP		
MANHOLE	MH		
MARKER POST	MK		
METER	MT		
NO PIPES VISIBLE	NPV		
ORDNANCE SURVEY BENCH MARK	OSBM		
P-TRAP	PT		
POST	PO		
POST BOX	PBOX		
ROSSING EYE	RE		
ROAD SIGN	RS		
RAIN WATER PIPE	RWP		
RETAINING WALL	RW		
SOFT BED	SB		
STOP COCK	SC		
STOP COCK FRAME PLATE	SCP		
STOP VALVE	SV		
SOIL PIPE	SP		
SOIL VENT PIPE	SVP		
SURFACE WATER	SW		
TELECOM BOX	TBC		
TELECOM POLE	TP		
TELECOM INSPECTION COVER	TEL		
TELEPHONE CALL BOX	TCB		
TICKET MACHINE	TM		
TOP OF WALL	TOW		
TRAFFIC LIGHT	TL		
TRAFFIC LIGHT COVER	TLC		
THRESHOLD LEVEL	THL		
UNABLE TO LOCATE	UTL		
UNABLE TO RAISE	UTR		
UNABLE TO SURVEY	UTS		
VENT PIPE	VP		
WATER LEVEL	WL		
WATER METER	WM		
WASH OUT	WO		
WATER RISER	WR		
WATER TAP	WT		

FENCE ABBREVIATIONS

BARBED WIRE FENCE	B/W	IRON RAILINGS	I/R
CLOSE BOARDED FENCE	C/B	LARCH LAP FENCE	L/L
CONCRETE PANEL FENCE	CPL	POST AND RAIL FENCE	P/R
CORRUGATED IRON FENCE	C/I	POST AND WIRE FENCE	P/W
CHESTNUT FENCE	CF	WIRE MESH FENCE	W/M
CHESTNUT PALING	CNP		

Sheet Layout: (Not to Scale)



N

Revision	Description	Surv. by	Check by	Appr. by	Date

0m 5 10 15 20 25 30 35 40 45 50 55

Topographical Survey

Client: Bellway

Storrington Road
Abingworth
West Sussex

Scale:	Sheet Size:	Sheet Number:	Date:
1:500	A0	4	May 2023

Project Number:	Rev:	Surveyed by:	Checked by:	Approved by:
32595	-	RG/TC/TH/JM	AS	CP

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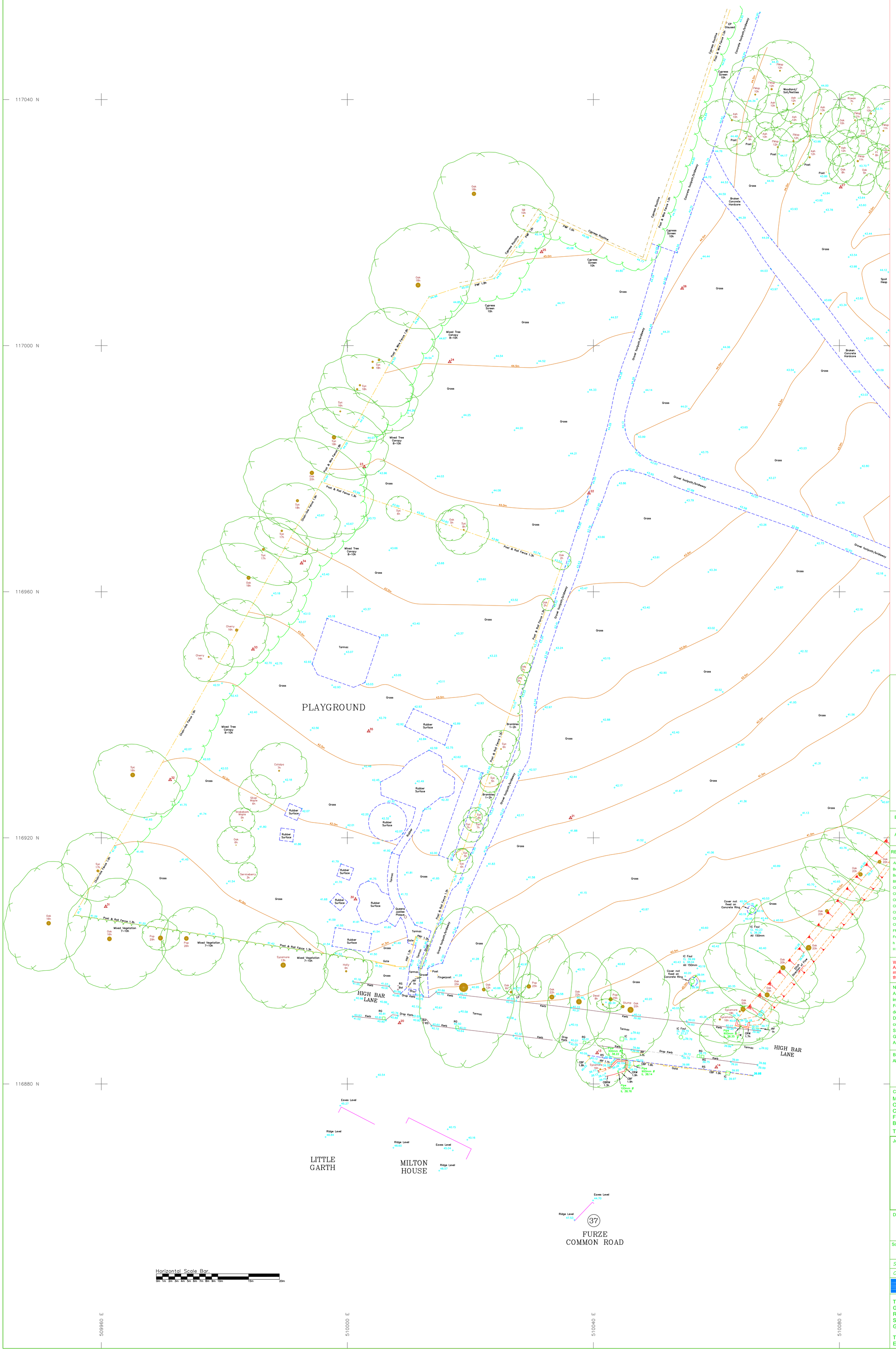

N

North

REV.	DATE	DETAILS
B	Jan 2024	Detail of culverts and adjacent ditches added.
A	Sept 2022	Addition of Scale Bars Job No. 22:5588

Abbreviations:

BoC	Bottom of Chamber	Hb	Hornbeam
Bol	Bollard	IC	Inspection Cover
BRW	Brick Retaining Wall	IL	Invert Level
CB	Control Box	IRF	Iron Railing Fence
CBF	Close Board Fence	LP	Lamp Post
Ch	Cherry	Pop	Poplar
CL	Cover Level	PRF	Post & Rail Fence
CLF	Chain Link Fence	PWF	Post & Wire Fence
CRW	Concrete Retaining Wall	RG	Road Gully
CBRW	Concrete Block Retaining Wall	RS	Road Sign
FMap	Field Maple	Syc	Sycamore
Fr	Fruit	TPav	Tactile Paving
h	Height (metres)	UTL	Unable To Lift
H	Holly	W	Water

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All dimensions on this plan have only been measured to an accuracy commensurate with the original 1/200 plotting scale.

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All values expressed in metres unless otherwise stated.

Benchmark Details:
All levels related to GPS value.

Client:
Mr Timothy Bryant, FRICS
Old Vicarage Cottage
Crowlink Lane
Friston, East Sussex
BN20 0AU
Tel: 01323 423400

Job Title:

LAND OFF HIGH BAR LANE THAKEHAM WEST SUSSEX

Drawing Title:
TOPOGRAPHICAL SURVEY
Sheet 1 of 3
Revision B

Scale:	Size:	Date:
1/200	A0	SEPT 2022

Surveyed:	JD/PSD	*Dwg File:*	High Bar Lane RevB
Checked:	PSD	*Job No:*	22:5659

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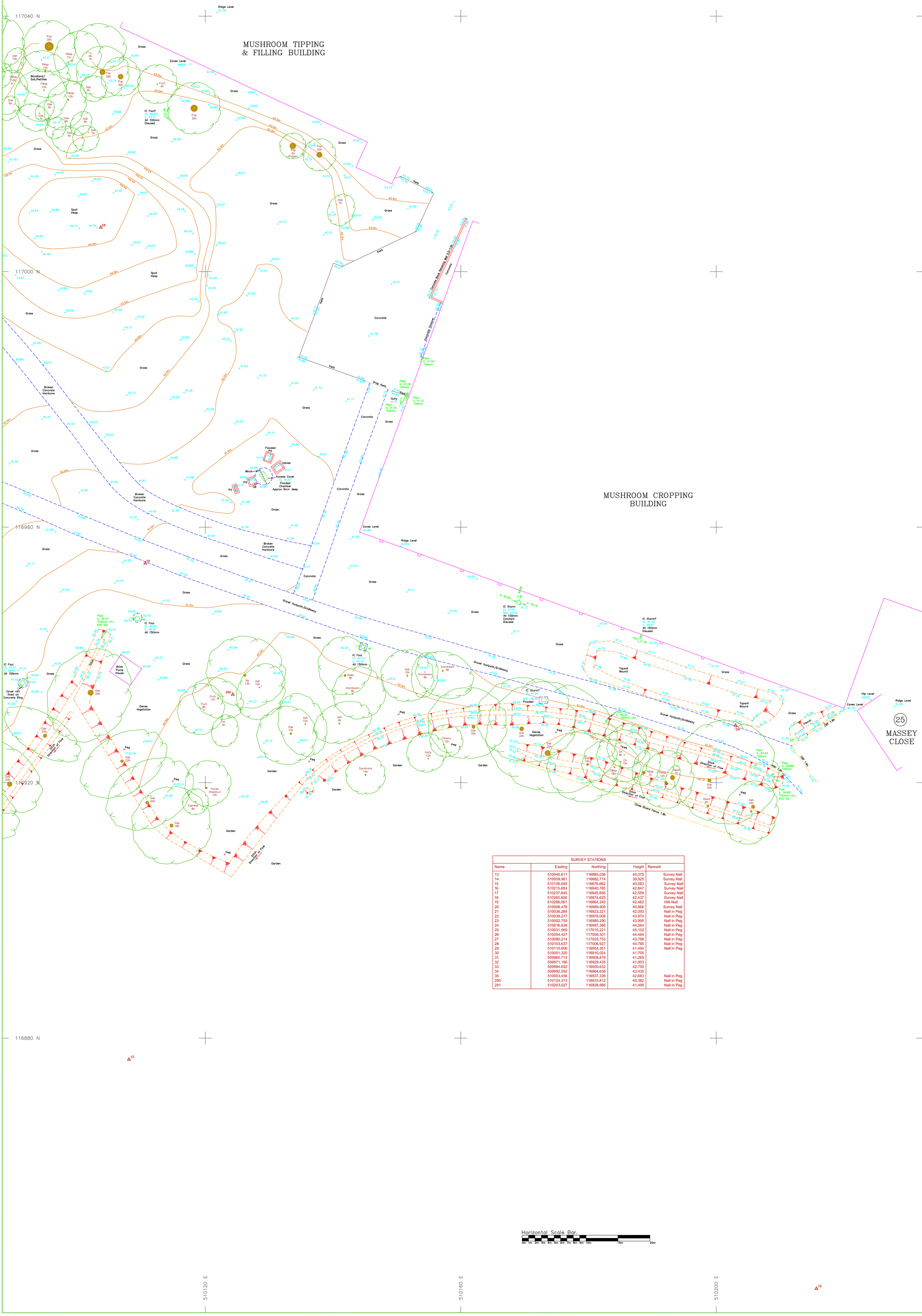

SURVEY STATIONS				
Name	Easting	Northing	Height	Remark
13	510040.611	116885.036	40.070	Survey Nail
14	510059.981	116882.714	39.925	Survey Nail
15	510108.049	116876.662	40.583	Survey Nail
16	510215.693	116840.785	42.847	Survey Nail
17	510237.645	116845.695	42.559	Survey Nail
18	510265.826	116874.625	42.437	Survey Nail
19	510288.061	116864.240	42.462	Hilti Nail
20	510008.478	116889.905	40.866	Survey Nail
21	510036.284	116923.221	42.093	Nail in Peg
22	510039.277	116976.008	43.974	Nail in Peg
23	510002.759	116980.290	43.995	Nail in Peg
24	510016.638	116997.366	44.564	Nail in Peg
25	510031.569	117015.221	45.102	Nail in Peg
26	510054.427	117009.301	44.464	Nail in Peg
27	510080.214	117025.753	43.788	Nail in Peg
28	510103.637	117006.927	44.785	Nail in Peg
29	510110.606	116954.351	41.494	Nail in Peg
30	510001.320	116910.024	41.705	
31	509960.715	116908.819	41.269	
32	509971.186	116929.435	41.903	
33	509984.652	116950.632	42.750	
34	509992.552	116964.638	43.435	
35	510003.456	116937.326	42.683	Nail in Peg
290	510124.313	116933.812	40.382	Nail in Peg
291	510203.027	116928.966	41.499	Nail in Peg

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Tel: 01323 423400

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Drawing Title:
TOPOGRAPHICAL SURVEY
Sheet 2 of 3
Revision B

Scale:	Size:	Date:
1/200	A0	JAN 2024

Surveyed:	JD/PSD	*Dwg File:*	High Bar Lane RevB
Checked:	PSD	*Job No:*	22:5659

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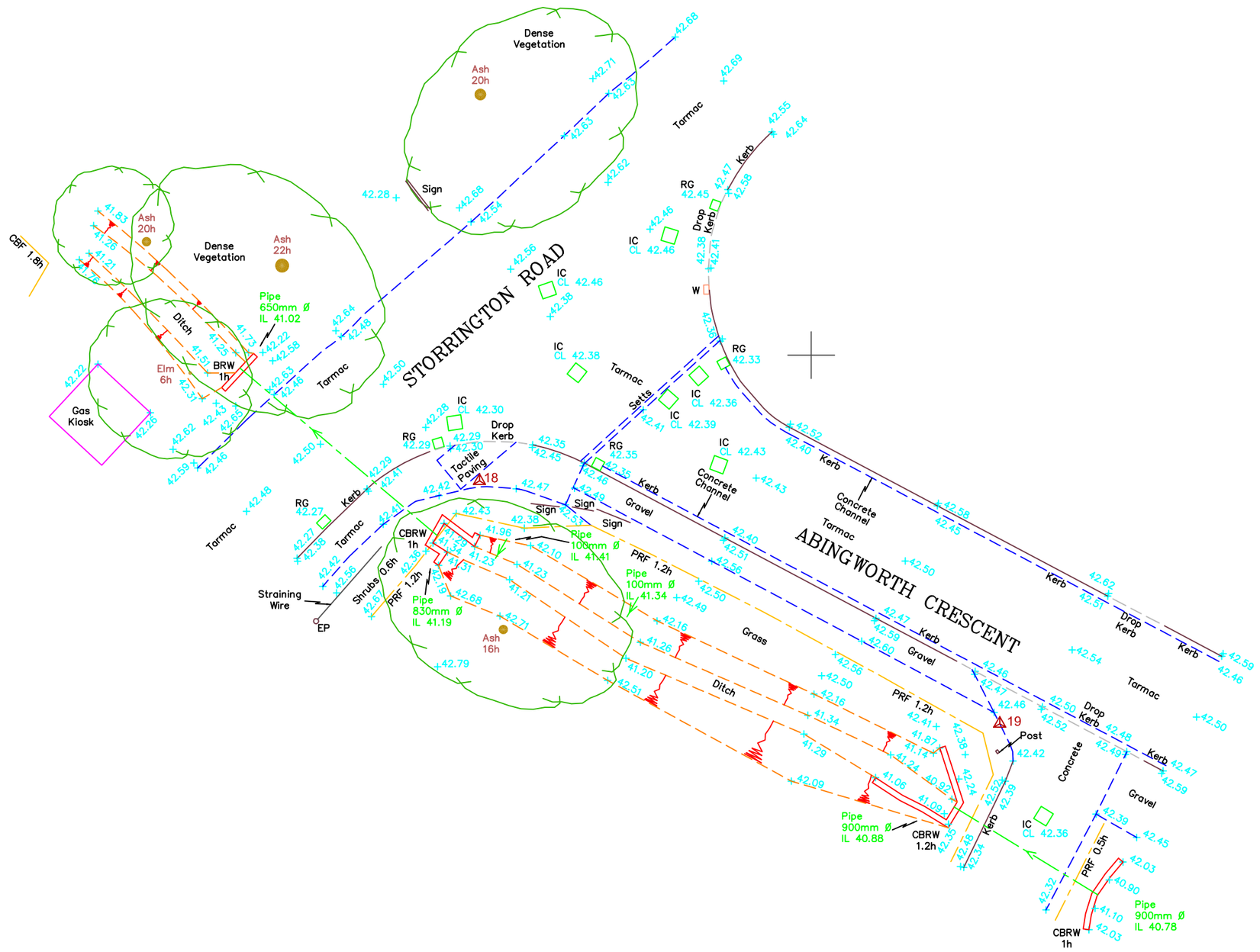

Horizontal Scale Bar.

0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m 15m 20m

116880 N

510240 E

510280 E

510320 E

N

North

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Sheet 3 of 3
Revision B

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1/200	A0	JAN 2024

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Appendix C

Monaghan Mushrooms Limited

Storrington Road, Thakeham

Geo-environmental and Geotechnical Investigation

305276-R03 (00)

RSK GEOSCIENCES

JANUARY 2023

RSK GENERAL NOTES

Project No.: 305276

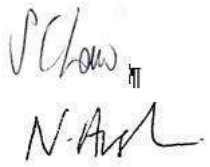
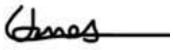
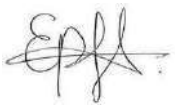
Title: Geo-environmental and Geotechnical Investigation: Storrington Road, Thakeham, RH20 3DY

Client: Monaghan Mushrooms Limited

Date: January 2023

Office: RSK Environment Limited, Chancery House, Premier Way, Abbey Park Industrial Estate, Romsey, SO51 9DQ

Status: R03 (00)

Author	James Lilley / Emily Chissell	**Technical reviewer**	Suneel Law / Nigel Austin
Signature		Signature	
Project manager	James Lilley	**Quality reviewer**	Ellie Sanders
Signature		Signature	

Revision control sheet				
Revision ref.	**Date**	**Reason for revision**	**Amended by:**	**Approved by:**
Rev 00	Jan 2023	Final	n/a	see above

RSK Environment Limited (RSK) has prepared this report for the sole use of the client, showing reasonable skill and care, for the intended purposes as stated in the agreement under which this work was completed. The report may not be relied upon by any other party without the express agreement of the client and RSK. No other warranty, expressed or implied, is made as to the professional advice included in this report.

Where any data supplied by the client or from other sources have been used, it has been assumed that the information is correct. No responsibility can be accepted by RSK for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

This work has been undertaken in accordance with the quality management system of RSK Environment Ltd. No part of this report may be copied or duplicated without the express permission of RSK and the party for whom it was prepared.

Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

CONTENTS

EXECUTIVE SUMMARY **1**
1 INTRODUCTION **4**
1.1 Commissioning 4
1.2 Objectives 4
1.3 Scope of works 4
1.4 Existing reports and information 5
1.5 Limitations 6
2 SITE DETAILS **7**
2.1 Site location 7
2.2 Site description 7
2.3 Surrounding land uses 7
2.4 Development plans 7
3 DESK-BASED ASSESSMENT **8**
3.1 Site history 8
3.1.1 Historical development record 8
3.1.2 Unexploded ordnance 9
3.2 Information from environmental database report 9
3.3 Information from regulatory authorities 12
3.3.1 Planning records 12
3.3.2 Local Authority environmental health department information 13
3.3.3 Water Resources Licence to Abstract Water 13
3.4 Site geology 14
3.4.1 Anticipated geological sequence 14
3.4.2 Radon 14
3.5 Mining and quarrying 15
3.6 Hydrogeology 15
3.7 Hydrology 16
3.8 Sensitive land uses 16
4 SITE RECONNAISSANCE FINDINGS **18**
5 PRELIMINARY GEOTECHNICAL CONSTRAINTS **21**
5.1 Design class 21
5.2 Preliminary geotechnical hazards assessment 21
6 INITIAL CONCEPTUAL SITE MODEL **24**
6.1 Potential soil, soil vapour and groundwater linkages 24
6.1.1 Potential sources of contamination 24
6.1.2 Sensitive receptors and linking exposure/ migration pathways 25
6.2 Potential ground gas linkages 26
6.2.1 Ground gas generation potential 26
6.2.2 Preferential pathways for ground gas migration 27
6.2.3 Sensitive receptors and linking pathways 27
6.3 Preliminary risk assessment 27
6.4 Data gaps and uncertainties 33
7 SITE INVESTIGATION STRATEGY & METHODOLOGY **34**
7.1 Introduction 34

7.2 Objectives 34
7.3 Selection of investigation methods 34
7.4 Investigation strategy 34
7.4.1 Implementation of investigation works 36
7.5 Monitoring programme 37
7.5.1 Ground gas monitoring 37
7.5.2 Groundwater monitoring and sampling 37
7.6 Laboratory testing 37
7.6.1 Chemical analysis of soil samples 38
7.6.2 Geotechnical analysis of soils 39
7.6.3 Chemical analysis of groundwater 39
8 SITE INVESTIGATION FACTUAL FINDINGS 41
8.1 Ground conditions encountered 41
8.1.1 Topsoil 42
8.1.2 Made ground 42
8.1.3 Fittleworth Member 42
8.1.4 Visual/olfactory evidence of soil contamination 43
8.2 Groundwater and surface water 44
8.2.1 Groundwater encountered during intrusive works 44
8.2.2 Groundwater encountered during monitoring 44
8.2.3 Visual/olfactory evidence of groundwater contamination 46
8.3 Chemical laboratory results 46
8.4 Geotechnical laboratory results 46
8.5 Ground gas monitoring 46
9 GEO-ENVIRONMENTAL ASSESSMENT 47
9.1 Refinement of initial CSM 47
9.2 Linkages for assessment 47
9.3 Methodology and assessment of human health and phytotoxic-related linkages 49
9.3.1 H1. Oral, dermal and inhalation exposure with impacted soil by future occupants/site users 49
9.3.2 H2. Inhalation exposure of future occupants/site users to asbestos fibres 50
9.3.3 H3. Organic contaminants permeating potable water supply pipes 50
9.3.4 H5. Inhalation exposure of future residents to vapours from groundwater 50
9.4 Methodology and assessment of controlled waters-related linkages 51
9.4.1 W1. Leaching of soil contaminants and dissolved phase migration to wider secondary aquifer (heavy metals) 51
9.4.2 W2. Migration of dissolved phase contaminants 51
9.5 G1: Methodology and assessment of ground gas-related linkages 52
9.5.1 Appropriate guidance 52
9.5.2 Summary of the refined CSM for ground gas 52
9.5.3 Empirical semi-quantitative approach using borehole monitoring data (Wilson and Card approach, BS8485) 53
9.5.4 BS8485 recommended ground gas protection measures 57
9.5.5 Implications of ground improvement on foundation design 57
9.6 Uncertainties and implications in refined CSM and GQRA 57
10 GEOTECHNICAL ASSESSMENT 59
10.1 Proposed development 59

10.2 Key geotechnical hazards / development constraints 59
10.3 Foundations 59
10.3.1 Foundation options 59
10.3.2 Strip/Spread foundations 60
10.3.3 Piled foundations 60
10.3.4 Foundation works risk assessment 61
10.3.5 Floor slabs 62
10.4 Excavations for foundations and services 62
10.5 Chemical attack on buried concrete 62
11 CONCLUSIONS AND RECOMMENDATIONS 64
11.1 Geo-environmental assessment 64
11.2 Geotechnical 65
11.3 Recommendations 66
REFERENCES 67

FIGURES

Figure 1 Site location plan
Figure 2 Exploratory hole location plan
Figure 3 Foundation Zoning Plan
Figure 4 SPT v Depth Plot

APPENDICES

Appendix A Service constraints
Appendix B Summary of legislation and policy relating to land contamination
Appendix C Environmental database report
Appendix D Supporting desk study information
Appendix E Utility service plans
Appendix F Site photographs
Appendix G Technical background
Appendix H Exploratory hole records
Appendix I Gas / Groundwater data sheet
Appendix J Laboratory certificates for soil analysis
Appendix K Laboratory certificates for groundwater analysis
Appendix L Laboratory certificates for geotechnical analysis
Appendix M Generic assessment criteria for human health
Appendix N Generic assessment criteria potable water supply pipes
Appendix O Generic assessment criteria for controlled waters
Appendix P GQRA data screening tables - soils
Appendix Q GQRA data screening tables - groundwater
Appendix R GQRA data screening tables - gas

EXECUTIVE SUMMARY

Commissioning and purpose of assessment	RSK Environment Limited (RSK) was commissioned by Alder King on behalf of Monaghan Mushrooms Limited to carry out a geo-environmental and geotechnical investigation of the land at Storrington Road, Thakeham, RH20 3DY, grid reference TQ 10291 17117. The works are being undertaken to provide an assessment of the environmental risks and liabilities associated with site ownership or redevelopment. Currently we understand that a residential development is being considered for the site..
DESK-BASED ASSESSMENT	
Site description and proposed development	The site occupies an area of 30.1 hectares and currently comprises a series of buildings and access roads associated with mushroom production. The remaining area appears to comprise a series of fields, demarcated by hedgerows and wooded borders. RSK understands that the site in question is being considered for development for residential use. At the time of preparing this report, no proposed development plans were available.
History of site and surrounding area	The site was formerly occupied by a collection of nurseries central to the site dating from 1938 to 2006, with several phases of construction and demolition. From 1961 demolition of several nursery buildings and construction of new agricultural buildings occurred in the southeast corner of site with several tanks and an electricity substation shown. The west of the site comprised a collection of structures, including a former sewage works dating from 1978 to 2021. Potential sources of contamination identified on site include the former sewage works, an array of demolition rubble, refuse abandoned vehicles and old fuel storage tanks. The site is currently disused but until relatively recently was used for mushroom production and office buildings to the east. The remainder of the site is derelict, comprising empty fields, abandoned farmhouse structure and waste mounds.
Geology and environmental setting	Historical BGS borehole data suggests the Site is underlain by bedrock deposits of the Fittleworth Member, comprising sandstone and mudstone with the Hythe Formation in the northeast corner of the site, comprising sandstone. No superficial deposits are noted to be beneath the site. There is also likely to be made ground associated with former development and demolition of historic structures on site. A commercial groundwater abstraction licensed for spray irrigation is located on site. The nearest off site groundwater abstraction is 434 m west of the site at Smock Alley at West Chiltington boreholes 1 for a potable water supply. The Envirocheck report indicates that the site lies within Zone III and Zone II of a groundwater Source Protection Zone (SPZ) for the potable abstraction 434 m west of the site.
Initial conceptual site model (CSM) and preliminary risk assessment (PRA)	Potentially complete contaminant linkages identified with a risk estimate of moderate to low or above include: • future site users – residential users [oral, dermal and inhalation exposure with impacted soil, soil vapour and dust/fibres, ingestion of home-grown produce, inhalation of vapours from groundwater and / or NAPL if present] • future adjacent site users – residential, public open space users [migration of contamination via dust/fibre deposition, vapour or groundwater migration combined with inhalation]

	• future buildings and services [direct contact with contaminated soils or groundwater and chemical attack] • groundwater in secondary A aquifer/ source protection zone within Fittleworth Member bedrock deposits [leaching from soils/ percolation to aquifer/ lateral migration of dissolved phase/ NAPL etc.] • groundwater within underlying Principal aquifer (Hythe Formation) , non-potable abstraction on site, potable abstraction 400m west of site- [leaching from soils/ percolation to aquifer/ lateral migration of dissolved phase/ NAPL etc.] • future site users – residential users [migration and ingress of ground gases (including radon) into buildings, build-up in confined spaces and explosion/ asphyxiation].
INTRUSIVE INVESTIGATION & ASSESSMENT	
SI scope	The SI comprised 14 No. window sample boreholes were drilled to a maximum depth of 5.45 m bgl and five locations were installed with combined gas and groundwater monitoring wells. 23 no. trial pits were excavated in the external areas of site using tracked machine to a maximum depth of 3.10 m bgl. Nine hand excavated trial pits were completed internally within the existing buildings to a maximum depth of 1.05 m bgl.
SI factual findings	The ground investigation encountered a strata sequence comprising Topsoil and/or Made Ground of over the Fittleworth Member. Perched groundwater within the made ground was only encountered within TP11 at 0.50 m bgl. Groundwater water observed within TP9 at the base of the trial pit at 2.8 bgl. No other groundwater strikes were encountered during the intrusive investigation. Two groundwater and three ground gas monitoring visits were undertaken to date and encountered groundwater levels between 3.17 m and 4.45 m bgl. Potential asbestos containing material was encountered across the site at the surface and was also observed within the structures of the farmhouse buildings. Potential asbestos containing material was observed within the made ground at locations TP14, WS2, and TPi6. Visual and olfactory evidence of potential hydrocarbon contamination was also encountered at TP4, WS3, WS4, and WS6,
Refined conceptual site model and geo-environmental assessment	Based on the results of the site investigation and GQRA, the contaminant linkages that have been identified to be potentially complete (relevant contaminant linkages) and to require further action are: • risk to future site users from oral, dermal and inhalation exposure with contaminants in the made ground (PAHs and asbestos) • chemical attack on potable water supply pipes Based on the current understanding of the conceptual site model and the assessment undertaken, the site has been classified as CS1 with respect to methane and carbon dioxide. Considering the foregoing and in accordance with BS8485, ground gas protective measures are not considered necessary within proposed buildings in the eastern half of the site, however consideration with regard to basic radon precautions for the western half need to be allowed for at this stage.

	The investigation undertaken to date has incorporated an appropriate number of ground gas monitoring visits, the data is considered reliable, and spatially representative of the site. It is also noted that 1 round was completed during low and falling atmospheric pressure (<1000 mb) indicating that possible worst-case conditions have been present during monitoring. However, it is recommended that a further 3no monitoring visits are undertaken in order to confirm the Characteristic Situation 1 classification. It is considered likely that residential development of the site would require remedial action to render the development suitable for the proposed residential with gardens end use. Within proposed garden/soft landscaping, it is proposed that where there is made ground (due to asbestos and polyaromatic hydrocarbon compound contamination) the incorporation of a clean cover of 600 mm/450 mm respectively is allowed for. Such a clean cover system comprising verified topsoil and subsoil would not necessitate soil removal off site, for example if it were site levels were raised to accommodate the thickness. Allowance should also be made for site arisings to be incorporated beneath any such cover system. A separate Remediation Strategy will need to be produced (including a discovery strategy for any isolated unknown contamination encountered during demolition/site preparation works), and agreed with the statutory authorities.
Geotechnical assessment	The key findings of the initial geotechnical assessment are as follows: • Low rise housing may be founded upon lightly reinforced conventional strip foundations within the majority of the northern half of the site, whilst over the remainder there is a need to allow for piling at this stage. The possibility of an alternative to piling (i.e lightly reinforced strip foundations upon ground improved soils) is to be assessed further; • The use of ground floor slabs is considered unsuitable due to the presence of soft natural soils, such that it is recommended that floor slabs are suspended; • An ACEC Classification of AC-2 with a Design Sulphate Class of DS-2 can be utilised on the site; and • It is anticipated that a foundation works risk assessment report will be required for the development.
Recommendations including issues for further assessment	The following recommendations are made for further assessment of the site to investigate the risks identified above and to address remaining uncertainties: • Deep boreholes for piled foundation design • Radon class in western half of site to be re-assessed
The information given in this summary is necessarily incomplete and is provided for initial briefing purposes only. The summary must not be used as a substitute for the full text of the report.	

1 INTRODUCTION

1.1 Commissioning

RSK Environment Limited (RSK) was commissioned by Alder King on behalf of Monaghan Mushrooms Limited to carry out a geo-environmental and geotechnical investigation of the land at Storrington Road, Thakeham, RH20 3DY. The project was carried out to an agreed brief as set out in RSK's proposal (Ref. 305276 T02 (00), dated 21st July 2022).

RSK's service constraints are shown in Appendix A.

The works are being undertaken to provide an assessment of the environmental risks and liabilities associated with site ownership or redevelopment. Currently we understand that a residential development is being considered for the site.

1.2 Objectives

The objective of the work is:

- to identify any land contamination and/or geotechnical constraints to the proposed development and to support discharge of relevant planning conditions and relevant building control requirements
- to identify the need for any additional investigation or remediation works to demonstrate that the site is suitable for its proposed use
- to evaluate potential client environment liabilities as part of the due diligence process for acquisition/ disposal
- to inform land asset management.

1.3 Scope of works

The scope of this assessment has been developed in accordance with relevant British Standards and authoritative technical guidance as referenced through the report. The assessment of the contamination status of the site is in line with the technical approach presented in Land Contamination Risk Management (LCRM) (Environment Agency, 2021) – which supersedes CLR11 Model Procedures for Land Contamination – and in general accordance with BS 10175: 2011 + A2 2017 (BSI, 2017). It is also compliant with relevant planning policy and guidance.

The scope of the intrusive investigation has been designed in line with the recommendations of BS5930:2015+A1:2020 Code of practice for ground investigations (BSI, 2020), which maintains compliance with BS EN 1997-1 and 1997-2 and their related standards. It has also been developed in general accordance with BS 10175: 2011 + A2 2017.

A brief summary of relevant legislation and policy relating to land contamination is given in Appendix B.

The scope of works for the assessment has included the following:

Desk Study:

- review of the history of development on the site and surroundings, including a study of archival Ordnance Survey mapping, unexploded ordinance records (UXO) and other sources of historical information as appropriate, e.g. local archives, trade directories and planning records
- assessment of local geology, hydrogeology and hydrology
- the identification of potential geological hazards, including radon
- review of relevant information held by appropriate statutory authorities, e.g. the local Environmental Health Department and the Environment Agency, obtained in the form of an environmental database report (Envirocheck or GroundSure Report) and through direct contact where appropriate
- review of any previous site investigation reports made available
- completion of a site reconnaissance survey to assess the visual condition of the site
- development of an initial conceptual site model (CSM) of contamination on the site identifying possible pollutant linkages
- preliminary consideration of geotechnical constraints and hazards
- an assessment of the environmental risks and liabilities associated with site ownership or redevelopment
- identification of the need for further action, e.g. intrusive investigations, if any.

Intrusive Investigation

- design and implementation of an intrusive investigation, in situ testing, soil sampling, laboratory geo-environmental and geotechnical testing, groundwater and ground gas monitoring of installed boreholes
- interpretation of data to develop a refined conceptual site model (CSM)
- generic quantitative risk assessment (GQRA) of relevant contaminant linkages
- interpretation of ground conditions and geotechnical data to provide preliminary recommendations with respect to foundations and infrastructure design
- preparation of this factual and/or interpretative report.

1.4 Existing reports and information

The following reports detailing previous works at the site were made available for review:

- a ‘Pre-Demolition’ Asbestos Survey, Asbestos Survey Consultants, ref 13/009/RD, dated 07/04/2014.
- Soakaway Testing, Albury S.I. Ltd, ref 09/8845/C/NAM/lo dated 27/05/2010.

The following information and drawings were provided to RSK by the client for review:

- Borehole Sample Analysis of water abstraction in 2016.

- Water Abstraction Licence for Thakeham Mushrooms Ltd ref 25/097/R01. Issued 04/05/2016 (original issue 03/02/1966)
- Topographic Survey ref 3756, by CCS Land Survey Services, dated 02/04/2012
- Site Layout Plan ref TH-008, by Monaghan Engineering and Construction Services Ltd, dated 12/11/2015
- Site Layout Plan ref TH-000, by Monaghan Engineering and Construction Services Ltd, dated 21/04/2016
- Site Layout Plan ref TH-006 Buildings Retained, by Monaghan Engineering and Construction Services Ltd, dated 25/11/2017
- Site Layout Plan ref TH-006 Buildings and Hard Surfaces Demolished, by Monaghan Engineering and Construction Services Ltd, dated 25/11/2017
- Site Layout Plan ref TH-006 Buildings not included in Asbestos Survey 2014, by Monaghan Engineering and Construction Services Ltd, dated 25/11/2017
- Annotated version of Site Layout Plan ref TH-008 showing water settlement, sump & holding tank locations on site, by Monaghan, dated 14/09/2022

1.5 Limitations

This report is subject to the RSK service constraints given in Appendix A and limitations that may be described through this document.

2 SITE DETAILS

2.1 Site location

Site location details are presented in **Table 1** and a site location plan is provided on Figure 1.

Table 1 Site location details

Site name	Storrington Road, Thakeham
Full site address and postcode	Storrington Road, Thakeham, RH20 3DY
National Grid reference (centre of site)	TQ 10291 17117

2.2 Site description

The site boundary and current site layout are shown on Figure 2. The site covers an area of circa 30.1 hectares. It is currently occupied by a series of buildings and access roads associated with mushroom production.

2.3 Surrounding land uses

The site is located in Thakeham, within a predominantly residential setting. Immediate surrounding land uses are described in **Table 2**.

Table 2 Surrounding land uses

North	Residential/Agricultural (Thakeham Village)
East	Agricultural (green fields) / sports pitches
South	Residential/Commercial (Abingworth Village)
West	Agricultural/forested land (Greyhound Brewery (380m)

2.4 Development plans

We understand that the site in question is being considered for development for residential use.

At the time of preparing this report, no proposed development plans are available.

No details of the proposed ground levels have been provided therefore for the purpose of this report it has been assumed that the current levels will remain unchanged.

3 DESK-BASED ASSESSMENT

The desktop study was designed generally to meet the objectives of a preliminary (phase 1) investigation, as defined by BS 10175:2011 + A2 2017 (BSI, 2017) and this assessment relates to LCRM Stage 1, Tier 1 preliminary risk assessment. The "vicinity" of the site for the purposes of this report is defined as locations situated within an approximate 250 m radius of the site, although certain sources and/ or sensitive targets further than 250 m may also have been considered.

The study aims principally to identify and assess the potential risks and liabilities associated with contamination of the ground, on and in the vicinity of the site. While this includes consideration of current operations and housekeeping on the site, the report does not constitute a comprehensive environmental audit of the site, as covered under ISO 14001.

3.1 Site history

3.1.1 Historical development record

The development history of the site and surrounding area based upon assessment of historical plans and records is detailed in **Table 3**. The historical maps reviewed are shown within the environmental database report in Appendix C.

Table 3 Summary of historical development

Date from	Date to	Historical Land Use (on-site)	Area of site
1938	2006	Chesswood nursery	Central/eastern boundary
1961	2006	Demolition of several nursery buildings and construction of new agricultural buildings with several tanks and an electricity substation in the southeast corner of site	SE corner
1978	2021	Sewage works including filter beds and tanks	Western field area
1982	2006	Covered and raised reservoir	Northeast
1991		Some further demolition of agricultural/nursey buildings in southeast corner, adjacent to tanks	
2000	Present	Electrical substations 4no.	Central
2006	Present	Old House farm	Central

Date from	Date to	Historical Land Use (off-site)	Distance (m) and orientation
1879	Present	Townhouse farm	100 m NE
1938	2006	Rushfield nursery	100 m S
1938	1978	High Bar nursery	250 m S
1974	2006	Sludge Beds	190 m N
1974	1993	Refuse Tip	210 m N
1982	2021	Pump house (now labelled stream house)	Adjacent to southern site boundary
Relevant information sources: Historical OS maps ☒ Town plans ☒ Information from the Local Planning Authority ☐ Aerial photography ☒ Additional information provided by Envirocheck reports ☒ Previous reports ☐			
Note: Reference to published historical maps provides invaluable information regarding the land use history of the site, but historical evidence may be incomplete for the period pre-dating the first edition and between successive maps.			

Historical maps have identified that the site has been largely used for agricultural purposes for the last 142 years. Tree nurseries have populated the site for the majority of the time, with several phases of construction and demolition. The maps have highlighted a sewage works on site dating 1978 to 2021. The structure of these works still remains on site and can be seen on Google Earth. In addition, 4no. electrical substations are situated in the centre of the site.

Between 2006 and 2021 some structures to the east of the sewage farm appear to have been demolished, and the reservoir in the north of the site is no longer present.

3.1.2 Unexploded ordnance

A review of publicly available unexploded ordnance (UXO) risk maps indicates that the site is located in an area with low potential for wartime bombs to be present (Zetica, 2022).

3.2 Information from environmental database report

Relevant environmental permits and incidents detailed within the environmental database report (see Appendix C) are summarised below in **Table 4**.

Table 4 Summary of environmental permits, landfills and incidents

Data type	Entries on-site	Entries <250 m from site	Entries >250 m from site of relevance	Details
Agency and hydrological				

Data type	Entries on-site	Entries <250 m from site	Entries >250 m from site of relevance	Details
Environmental permits – incorporating Integrated Pollution Prevention and Control, Integrated Pollution Controls, Local Authority Integrated Pollution Prevention and Control	1	-	-	Monaghan Mushrooms T/A Thakeham Mushrooms Storrington Road, Thakeham, West Sussex, RH20 3DY Horsham District Council, Environmental Health Department. Local Authority Pollution Prevention and Control PG6/30 Production of compost for mushrooms Permit reference: EPR2 Status: Permitted
Enforcement and prohibition notices	-	-	-	-
Pollution incidents to controlled waters, Prosecutions relating to controlled waters, Substantiated pollution incident register, Water Industry Act referrals	2	2	-	<u>Pollution Incidents to controlled waters:</u> Rear of Fir Tree Lane, West Chillington (77m E of site) on 8th March 1994. Pollutant: Organic Wastes Note: River Is Blue/Grey In Colour And Smells Level Risen; Horticultural Ramble Down Lane (123 m W of site) on 22nd January 1996. Pollutant: Organic Wastes Note: Brown Sludge In River <u>Prosecutions relating to controlled waters:</u> Chesswood Nurseries Site, Thakeham, RH20 (on site) on 3rd December 2001. Prosecution: Allowing compost effluent to enter a tributary of the River Chilt. <u>Substantiated pollution incident register:</u> On site, 4th July 2017 - Water Impact: Category 2 - Significant Incident. Pollutant agricultural materials and wastes.

Data type	Entries on-site	Entries <250 m from site	Entries >250 m from site of relevance	Details
Discharge consents	-	3	11	Nearest discharge consent located 159 m south east of site at domestic property for discharge of other matter – surface water
Registered radioactive substances	-	-	-	-
Landfill and waste				
Active landfills	-	-	-	-
Historic / closed landfills	-	1	-	Dukes Hill, Thakeham, located 179 m north east of site. Active between 1988 and 1990 for inert & industrial waste.
Other waste management licences	-	-	-	-
Potentially in-filled land (pit, quarry, pond, marsh, river, stream, dock etc)	-	-	-	-
Hazardous substances/ industrial land uses				
Control of Major Accident Hazards (COMAH) sites	-	-	-	-
Explosives sites, Notification of Installations Handling Hazardous Substances (NIHHS), Planning hazardous substance consents/ enforcements	-	-	-	-
Contaminated land Part 2A register entries and notices	-	-	-	-
Contemporary trade directory entries	4	2	-	On site: The Magic Log Co Ltd, Samson Services, Extra Mile Logistics. Thakeham cooling services Ltd. Coal & Smokeless Fuel Merchants & Distributors (169 m SE) Oven Rescue, 30, Chestnut Drive, Thakeham, Pulborough (243 m SE)

Data type	Entries on-site	Entries <250 m from site	Entries >250 m from site of relevance	Details
Fuel station entries	-	-	-	-
Note: Entries have only been included within the table where they are located within a 250 m radius of the site or, where they fall outside of this radius but are considered to comprise a significant entry.				

3.3 Information from regulatory authorities

3.3.1 Planning records

Planning records held by the Local Authority Planning Department pertaining to the site and relevant to the current assessment are summarised in **Table 5**.

Table 5 Planning information

Year	Details and application reference no.	Part of site
2019	Ref No. DC/19/0350 Alteration of an existing access, associate engineering operations and landscaping	Monaghan Mushrooms, Storrington Road, Thakeham, Pulborough, West Sussex, RH20 3DY
2015	Ref No. DC/15/2417 Erection of pump house and associated covered water storage tank	Monaghan Mushrooms, Storrington Road, Thakeham, Pulborough, West Sussex, RH20 3DY
2014	Ref No. DISC/14/0221 Discharge of conditions 2, 3, 5, 11, 12, 13, 15 and 23 on DC/12/0841	Thakeham Mushrooms, Storrington Road, Thakeham, Pulborough, West Sussex, RH20 3DY
2012	Ref No. DC/12/1028 Change of use of building from Fuel Store Building (DC/10/0860) to Tray and Crate Storage and Filling involving external alterations to the building	Sussex Mushrooms, Storrington Road, Thakeham, Pulborough, West Sussex, RH20 3DY
2012	Ref No. DC/12/0841 Demolition of existing growing rooms and surrounding ancillary buildings, removal of compost production on site. Erection of new growing rooms (farms) required for the cultivation of mushrooms, a replacement office building, staff cafeteria, pack house building, ancillary plant structures and provision of open space and landscaped areas (including re-directed footpaths). Refurbishment and extension of existing production and package buildings including alterations to entrance of the site.	Sussex Mushrooms, Storrington Road, Thakeham, Pulborough, West Sussex, RH20 3DY

Year	Details and application reference no.	Part of site
2011	Ref No. DC/11/1236 Prior notification relating to the installation of solar panels onto the roofs of buildings on the Chesswood site	Sussex Mushrooms, Storrington Road, Thakeham, Pulborough, West Sussex, RH20 3DY
2010	Ref No. DC/10/1316 Erection of new bunkers (1,697 sq metres) with aerated floors which will reduce odours, a replacement Gypsum and material store (2,800 sq metres), pasteurising tunnels (1,840.5 sq metres) and growing rooms (16,698.5 square metres) required for the cultivation of mushrooms, open space and landscaped areas (Including footpaths)	Sussex Mushrooms, Storrington Road, Thakeham, Pulborough, West Sussex, RH20 3DY
2010	Ref No. DC/10/0860 Fuel storage building	Sussex Mushrooms, Storrington Road, Thakeham, Pulborough, West Sussex, RH20 3DY
2004	Ref No. DC/04/0348 Change of use to coach storage and maintenance	Heveco Mushrooms Ltd, Storrington Road, Thakeham, Pulborough, West Sussex, RH20 3DY

3.3.2 Local Authority environmental health department information

The Environmental Health Department of Horsham District Council has been contacted for records of contamination in connection with the site

We are awaiting a response and an addendum letter will be issued once the information is received.

3.3.3 Water Resources Licence to Abstract Water

RSK have been provided with a copy of the Environment Agency "Full Licence to Abstract Water" for Thakeham Mushrooms Ltd, Licence Serial No 25/097/R01 issued 04 May 2016, expiry 31 March 2028. The point of abstraction is Borehole B at National Grid Reference TQ 10179 16931 to the south of the site, by means of abstraction from a borehole not exceeding 67.1 m in depth and 300 mm in diameter with a submersible pump. The purpose of abstraction is for agriculture other than spray irrigation at a rate not exceeding 40 m^3 per hour.

The original abstraction licence was issued on 03 February 1966 ref 10/41/314302.

Borehole records provided by the client show that the borehole extended to a depth of 72 m. Made ground was encountered to a depth of 0.8m, underlain by stiff yellow brown clay, to a depth of 2 m bgl. This was underlain by yellow grey sandstones/ hard grey sandy clay with mudstone bands, and hard grey silty sandstone to depths of 48m bgl (possibly comprising the Hythe Formation. This was underlain by grey hard silty clay to the base of the borehole at 72 m bgl.

The borehole records indicate that the well was installed with ca 10 m of plain 225 mm casing, and 55 m of slotted 225 mm casing, with a pumped cement seal installed from 0.4 m bgl to 6 mbgl. This indicates that the response zone of the well is predominantly within the yellow grey sandstones/ hard grey sandy clay with mudstone bands, and hard grey silty sandstone, thought to comprise the Hythe Formation. Resting groundwater level within the borehole was recorded at depths of typically 11 m to 12 m bgl.

3.4 Site geology

3.4.1 Anticipated geological sequence

Published records (British Geological Survey, 2022) for the area and available historical borehole logs indicate the geology of the site to be characterised by the succession recorded in **Table 6**. There are 3 publicly available BGS historical boreholes located on or within 250 m of the site, a selection of which are presented in Appendix D.

Table 6 Site geology

Strata	Description	Estimated thickness	Permeability
Fittleworth Member	Glauconitic sandy clays and clayey sands: orange-brown where weathered; bright green where unweathered.	Ca 2 to 60 m	Permeable
Hythe Formation (possibly outcropping in the north east corner)	Fine to medium grained, sparsely glauconitic sands, sandstones and silts, locally pebbly, with calcareous or siliceous cement in beds or lenses in some areas.	Ca 18 to 100 m	Permeable
Relevant information sources: BGS Geoindex BGS borehole logs Previous SI reports			

As discussed in Section 3.3.3, borehole records for the abstraction well installed at the site were provided by the client and show that the borehole extended to a depth of 72 m. Made ground was encountered to a depth of 0.8 m, underlain by stiff yellow brown clay, to a depth of 2 m bgl. This was underlain by yellow grey sandstones/ hard grey sandy clay with mudstone bands, and hard grey silty sandstone to depths of 48 m bgl (possibly comprising the Hythe Formation. This was underlain by grey hard silty clay to the base of the borehole at 72 m bgl.

With reference to the historical data there have clearly been some/several phases of construction and demolition on the site and therefore the presence of made ground should be expected.

3.4.2 Radon

The environmental database report obtained by RSK prior to December 2022 indicated that the site was not located within an ‘Affected Area’. An ‘Affected Area’ is one with 1% or more homes above the radon Action Level of 200 Bq m^{-3}.

However, the UK radon map as produced by UK Health Security Agency and the British Geological Survey was updated in December 2022 and this now indicates that the western half of the site has a risk of ingress of radon into structures and therefore basic protection measures are potentially necessary subject to a site specific re-assessment.

3.5 Mining and quarrying

No evidence has identified any mining and quarrying, past and present, within 500 m of the site.

3.6 Hydrogeology

A summary of the hydrogeological setting of the site, with respect to the anticipated geological sequence set out in Section 3.4 is presented below in **Table 7**.

Table 7 Summary of hydrogeological setting

Condition	Description
Aquifer characteristics	The site is underlain by bedrock aquifers which comprise a Secondary A aquifer relating to the Fittleworth Member and a Principal aquifer within the Hythe Formation. The presence of the cohesive fraction of the Fittleworth Member would be expected to restrict vertical and lateral migration of groundwater (and therefore mobile contamination, if present). However, where more granular material within the Fittleworth Member is present or the Hythe Formation is present, vertical and lateral migration of groundwater (and therefore mobile contamination, if present) would be considered to be a potentially higher risk.
Depth to groundwater and flow	The anticipated depth to the groundwater table is in the order of 1.80 m below ground level estimated from historic borehole log data. Shallow groundwater in the site area is anticipated to flow in a northeast-southwest direction, down the topography and with direction of flow of the River Store. It is also likely that shallow water may be present in any made ground deposits present on-site. The piezometric surface in the deeper aquifer is anticipated to be at approximately 0 AOD (some 50 m bgl), however resting groundwater levels within the abstraction well on site (which is thought to be installed with a response zone within the Hythe Formation) is indicated by records provided by the client to be at ca. 11- 12 m bgl. The regional direction of groundwater flow is expected to be to the southwest in line with local topography.
Rising groundwater levels	BGS groundwater flooding susceptibility: Potential for groundwater flooding of property situated below ground level as well as at the surface.
Groundwater recharge/ attenuation	The site has a combined coverage of hardstanding, buildings and unsurfaced ground. Therefore, there be some limit to infiltration into ground and groundwater recharge, except where SUDS are present. Where unsurfaced ground is present direct drainage to ground will be occurring.

Condition	Description
Licensed groundwater abstractions	For details of the existing borehole abstraction on the site please see Section 3.3.3. The nearest off site groundwater abstraction is 434 m west of the site at Smock Alley at West Chiltington boreholes 1 for a potable water supply. The borehole log from this abstraction (publicly available via the BGS) indicates that the perforated section of this well is installed within the underlying Hythe Formation, which at the borehole location is underlain by a significant thickness (ca 35 m) of the Fittleworth beds.
Source protection zones	The Envirocheck report indicates that the site lies within Zone III and Zone II of a groundwater Source Protection Zone (SPZ) for the potable abstraction 434 m west of the site. Groundwater within the Hythe Formation is likely to be in hydraulic continuity with the potable abstraction.

3.7 Hydrology

Table 8 Summary of hydrology in site area

Condition	Description
Surface watercourses / features	There is a small pond like feature within north-eastern area of the site, and a number of drains present in lower elevation areas of site to the southwest. The nearest identified surface watercourse is the Lancing Brook, located approximately 400 m to the north east of the site.
Surface water abstractions	There are no surface water abstractions identified by the environmental database, within a 1 km radius of the site.
Site drainage	Evidence from Google Earth and aerial photography of the site indicates that a ditch/stream formerly crossed the centre of the site east to west. This feature appears to have been infilled or culverted beneath the site.
Preliminary flood risk assessment	The indicative floodplain map for the area, shows that the site does not lie within a floodplain of a surface water feature. The risk of surface water flooding each year has been assessed by the EA as low risk. A flood risk assessment (FRA) is outside the scope of this report. There is a risk of groundwater flooding on-site. BGS groundwater flooding susceptibility states there is potential for groundwater flooding of property situated below ground level as well as at the surface, due to rising groundwater levels.

3.8 Sensitive land uses

Table 9 provides a summary of any environmentally sensitive areas identified within 250 m of the site based on the environmental database report.

Table 9 Environmentally sensitive areas

Feature	Present within 250 m of site?	Details	Likely pathways from site?
International designations – Ramsar wetland, Special Area of Conservation (SAC), Special Protection Area (SPA)	No	-	n/a
National designations – Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), ancient woodland	No	-	n/a
Local designations – Local Nature Reserve, Site of Importance for Nature Conservation (SINC)	No	-	n/a
Nearest high sensitivity development, e.g., residential	n/a	-	n/a

4 SITE RECONNAISSANCE FINDINGS

A site reconnaissance survey was completed on 18th August 2022 by RSK. The characteristics of the site observed during the walkover and from current Ordnance Survey maps are summarised in **Table 10**. There was no access to most buildings on site, with exception to the offices and western farm building. Access was limited to the far north-western areas of field due to 1 m to 2 m high grasses and overgrown shrubs and weeds.

A site plan is provided in Figure 2 with photographic records included in Appendix F detailing the main features identified below.

Whilst the walkover summary includes consideration of current operations and housekeeping on the site as potential sources of contamination, it does not constitute a comprehensive environmental audit of the site, as covered under ISO 14001.

Table 10 Site reconnaissance findings

Feature	Description
Physical characteristics	
Access constraints	Far north-eastern fields were inaccessible due to high grasses and overgrown shrubs. There was limited access to buildings.
Site topography	The Site is essentially level, sloping gradually to the south-west. There were steep gradient differences between the eastern edge of the site and the adjacent offsite road and within the eastern soft landscaping area and edge of the former growing house in the east of the site.
Surface cover	Surface cover is approximately 40% hard landscaping and 60% soft landscaping. The hard landscaping includes former mushroom production farm buildings, concrete and asphalt paving and public right of way and other structures. The soft landscaping includes straw and grass fields, grass areas and trees and vegetation. Some areas were inaccessible, and other area of crushed concrete had been deposited on top of soft landscaping areas.
Site drainage	There are many drain covers, drainage channels, drainage gullies, and soakaways located throughout the site on the hardstanding areas. There were not outfalls to surface watercourses observed There was stagnant water within observed open concrete infiltration tank in the west of the site. The site walkover was conducted during heavy rain. Large puddles formed as would be expected but no waterlogging or flooding was observed.
Surface water	Although not observed during the walkover, mapping indicates that a small pond like feature is present within the north-eastern area of the site, and a number of drains present in lower elevation areas of site to the south-west.
Trees and hedges	The Site contains a mixture of mature and young trees which bordered the fields onsite. Tree lines are found to border the far north, north-east and south-west of the site. A small woodland area/tree line also runs north to south across the western area of the site towards the marked sewage

Feature	Description
	works. These trees surround the most northern field of the site entirely. There was a substantial number of shrubs and overgrown vegetation in the north and west of the site.
Invasive species	Based upon the walkover survey, obvious evidence of Japanese Knotweed or other invasive species has not been identified on-site. However, it should be noted that a detailed survey of the possible presence or absence of invasive species is outside of the scope of investigation and consideration should be given to commissioning a specialist survey, as necessary.
Existing buildings on-site	The Site contains 15 derelict former mushroom production farm buildings. The buildings usages include: Office buildings, storage, workshops, former tipping, packing, recycling, dispatch buildings, former peat shed, refrigerators, boiler rooms. The Site contains the remnants of former buildings/structures, demolished down to ground in the centre of the western area of the site There was no evidence observed of gas protection measures in buildings.
Retaining walls and adjacent buildings on or close to site boundary	There are no such structures on or close to the site boundary There is a two-storey residential building on the northern boundary approximately 50m from site boundary.
Basements on-site	No evidence of existing or infilled basements was observed.
Made ground, earthworks and quarrying	Crushed concrete is located in the north-western area of the site.
Potentially unstable slopes on or close to site	None observed.
Buried and overhead services present	There are several manhole covers on-site. Overhead services were noted too. It is to be noted that there is no electricity onsite due to vandalism.
Environmental characteristics	
Underground/ above ground storage tanks and pipework	There is a significant number of pipes leading to ground in the southern area of the site. There is also a number of oil, gas and cooling tanks located around the site adjacent to the buildings.
Potentially hazardous materials storage and use	There are connected and disused gas and oil tanks located throughout the site. There are also large piles of concrete blocks, timber and refuse in the centre and western areas of the site.
Asbestos-containing materials	Corrugated concrete and crushed concrete which may contain asbestos was observed on site. A detailed survey of the buildings would be required to confirm the presence or otherwise of asbestos-containing materials.
Waste storage	Recycling bins were observed in farm buildings in the west of the site.

Feature	Description
Fly-tipping	Evidence of possible fly-tipping was noted in the centre of the site, west of the former peat shed and within the crush concrete west of the Public Right of Way (PRoW) in the centre of the site.
Electricity sub-stations/ transformers	There are existing sub-stations located in the east and centre of the site.
Evidence of possible land contamination on-site	Oil leakage was not observed on site but there was evidence of derelict tipped over tanks which could potentially have previously leaked oil. There is also evidence of a sewage works on site. The surrounding areas are overgrown, and access was limited.
Potential off-site sources of ground contamination	Not observed.

Potentially significant land contamination or geotechnical issues arising from the survey are summarised below:

- a number of oil, gas and cooling tanks located around the site adjacent to the buildings
- large piles of concrete blocks, timber and refuse in the centre and western areas of the site
- corrugated concrete and crushed concrete which may contain asbestos was observed on site
- fly-tipping was noted in the centre of the site
- derelict tipped over tanks which could potentially have previously leaked oil
- existing sub-stations located in the east and centre of the site
- evidence of sewage works on site.

5 PRELIMINARY GEOTECHNICAL CONSTRAINTS

5.1 Design class

BS EN 1997-1 defines three different Geotechnical Categories that structures may fall into, which are summarised as follows:

- Category 1: Small and relatively simple structures for which it is possible to ensure that the fundamental requirements will be satisfied on the basis of experience and qualitative geotechnical investigations; with negligible risk
- Category 2: Conventional types of structure and foundation with no exceptional risk or difficult ground or loading conditions
- Category 3: Structures or part of structures, which fall outside limits of Geotechnical Categories 1 and 2. Examples include very large or unusual structures; structures involving abnormal risks, or unusual or exceptionally difficult ground or loading conditions; structures in highly seismic areas; structures in areas of probable site instability or persistent ground movements that require separate investigation or special measures.

Based on the information provided above on the proposed development and in view of the anticipated ground conditions, a Geotechnical Category of Category 1 has been assumed for the purposes of designing the geotechnical investigation. This should be reviewed at all stages of the investigation and revised where necessary.

5.2 Preliminary geotechnical hazards assessment

A summary of commonly occurring geotechnical hazards associated with the anticipated geology outlined in Section 3.4 above is given in **Table 11** together with an assessment of whether the site may be affected by each of the stated hazards.

Table 11 Summary of preliminary geotechnical risks that may affect site

Hazard category	Hazard status based on desk study findings and proposed development		Engineering considerations if hazard affects site
	Could be present and/or affect site	Unlikely to be present and/or affect site	
Sudden lateral changes in ground conditions	☒	☐	Likely to affect ground engineering and foundation design and construction
Shrinkable clay soils	☒	☐	Design to NHBC Standards Chapter 4 or similar

Hazard category	Hazard status based on desk study findings and proposed development		Engineering considerations if hazard affects site
	Could be present and/or affect site	Unlikely to be present and/or affect site	
Highly compressible and low bearing capacity soils, (including peat and soft clay)	☒	☐	Likely to affect ground engineering and foundation design and construction
Silt-rich soils susceptible to rapid loss of strength in wet conditions	☒	☐	Likely to affect ground engineering and foundation design and construction
Running sand at and below water table	☒	☐	Likely to affect ground engineering and foundation design and construction
Karstic dissolution features (including 'swallow holes' in Chalk terrain)	☐	☒	May affect ground engineering and foundation design and construction – refer to Section 4.1.2
Evaporite dissolution features and/or subsidence	☐	☒	May affect ground engineering and foundation design and construction
Ground subject to or at risk from landslides	☐	☒	Likely to require special stabilisation measures
Ground subject to peri-glacial valley cambering with gulls possibly present	☒	☒	Likely to affect ground engineering and foundation design and construction
Ground subject to or at risk from coastal or river erosion	☐	☒	Likely to require special protection/stabilisation measures
High groundwater table (including waterlogged ground)	☒	☐	May affect temporary and permanent works
Rising groundwater table due to diminishing abstraction in urban area	☐	☒	May affect deep foundations, basements and tunnels
Geological faults, fissures and breaklines	☐	☒	May affect ground engineering and foundation design and construction
Underground mining, including shafts and adits (e.g., coal, mineral)	☐	☒	Likely to require further assessment including potentially special stabilisation measures
Effects of extreme temperature (e.g., cold	☐	☒	Likely to affect ground engineering and foundation design and construction

Hazard category	Hazard status based on desk study findings and proposed development		Engineering considerations if hazard affects site
	Could be present and/or affect site	Unlikely to be present and/or affect site	
stores or brick kilns/furnaces)			
Existing sub-structures (e.g., tunnels, foundations, basements, and adjacent sub-structures)	☒	☐	Likely to affect ground engineering and foundation design and construction
Filled and made ground (including embankments, infilled ponds and quarries)	☒	☐	Likely to affect ground engineering and foundation design and construction
Adverse ground chemistry (including expansive slags and weathering of sulphides to sulphates)	☐	☒	May affect ground engineering and foundation design and construction
Site topography	☐	☒	May affect ground engineering and foundation design and construction
Note: Seismicity is not included in the above table as this is not normally a design consideration in the UK.			

The environmental database report and the British Geological Survey, National Geoscience Information Service has stated that although they may be present, there is very low risk of landslides, hazards associated with shrinking/swelling of clay ground and hazards associated with running sands. Made ground is expected on site due to the site's history of redevelopment, and evidence of debris identified on the site walkover survey.

6 INITIAL CONCEPTUAL SITE MODEL

In the UK land contamination is assessed using a risk-based approach taking account of the magnitude (severity of the hazard) and likelihood (probability) of occurrence. A 'receptor' is something that could be adversely affected by contamination (e.g. people, an ecological system, property or a water body). A 'pathway' is a route or means by which a receptor is or could be exposed to or affected by a contaminant. A 'contaminant source' is a hazard but it can only pose a risk to a receptor where a pathway is present. The relationship between sources, pathways and receptors are referred to as a conceptual site model. A risk can only be released where a contaminant source, pathway and receptor are all in place, referred to as a 'pollutant linkage'.

In line with LCRM (Environment Agency, 2021) and BS 10175: 2011 + A2 2017 (BSI, 2017), RSK has used information in the preceding sections to identify hazards (sources of contaminants), receptors that may be impacted and plausible linking pathways. Where all three are present this is termed a potentially complete contaminant linkage and a qualitative risk estimation is made.

6.1 Potential soil, soil vapour and groundwater linkages

6.1.1 Potential sources of contamination

Potential sources of soil and groundwater contamination identified from current activities and the history of the site and surrounding area are presented in **Table 12**. Ground gas sources are addressed in the next section.

Table 12 Potential sources of soil and groundwater contamination

Potential sources	Contaminants of concern
On-site	
Made ground (i.e. fill material)	Unknown fill material but potentially including brick, ash and clinker and containing toxic and phytotoxic metals, inorganics, polycyclic aromatic hydrocarbons (PAHs), asbestos
Former sewage works (1978-2021)	Ammoniacal nitrogen, chloride, coliforms and e-coli (faecal coliforms), toxic and phytotoxic metals, inorganics, polycyclic aromatic hydrocarbons (PAHs), asbestos, petroleum hydrocarbons
Nurseries and mushroom farming	Herbicides, pesticides, fungicides, formaldehyde, Petroleum hydrocarbons (petrol/diesel), fertilisers
Old oil/gas tanks	Petroleum hydrocarbons, chlorinated solvents, toxic and phytotoxic metals
Electrical substations	Polychlorinated Biphenyls (PCBs)
Abandoned vehicles	Petroleum hydrocarbons (petrol/diesel), chlorinated solvents, toxic and phytotoxic metals

Potential sources	Contaminants of concern
Fly tipping refuse	Inert/ commercial/ industrial/ municipal waste. Landfill leachate including ammoniacal nitrogen, chloride
Off-site	
Pump House (adjacent south)	Toxic and phytotoxic metals, inorganics, polycyclic aromatic hydrocarbons (PAHs), asbestos, petroleum hydrocarbons
Nurseries (100 m & 250 m south)	Petroleum hydrocarbons (petrol/diesel), fertilisers and pesticides
Sludge Beds (190 m north)	Ammoniacal nitrogen, chloride, coliforms and e-coli (faecal coliforms), toxic and phytotoxic metals, inorganics, polycyclic aromatic hydrocarbons (PAHs), asbestos, petroleum hydrocarbons
Refuse Tip (210 m north)	Unknown fill material but potentially including brick, ash and clinker and containing toxic and phytotoxic metals, inorganics, polycyclic aromatic hydrocarbons (PAHs), asbestos

There is potential for LNAPL sources to be situated within the ground on-site due to the presence of abandoned vehicles and disused oil and gas storage tanks.

6.1.2 Sensitive receptors and linking exposure/ migration pathways

Sensitive receptors identified at or in the vicinity of the site that could be affected by the potential sources identified above comprise:

- future site users – residential users [oral, dermal and inhalation exposure with impacted soil, soil vapour and dust/fibres, ingestion of home-grown produce, inhalation of vapours from groundwater and / or NAPL if present]
- future adjacent site users – residential, public open space users [migration of contamination via dust/fibre deposition, vapour or groundwater migration combined with inhalation]
- future buildings and services [direct contact with contaminated soils or groundwater and chemical attack]
- future vegetation [direct contact with contaminated soils or groundwater and root uptake leading to phytotoxicity]
- groundwater in Secondary A aquifer within Fittleworth Member bedrock deposits; nearby drains; groundwater within the principal aquifer within the Hythe Formation, non-potable abstraction on site, potable abstraction and SPZ [leaching from soils/ percolation to aquifer/ lateral migration of dissolved phase/ NAPL etc.].

Potential linking pathways are show in brackets for each item above.

Please note that construction workers and future maintenance workers have not been identified in the conceptual model as receptors because risks are considered to be managed through health and safety procedures according to the CDM Regulations.

Ecological receptors are only considered within the conceptual model in the context of statutory protected sites.

6.2 Potential ground gas linkages

6.2.1 Ground gas generation potential

Potential ground gas sources identified for the site and surrounding are shown in **Table 13**.

Table 13 Potential ground gas sources

Potential sources	Indicative ground gas generation potential (CIEH, 2008)	Additional information
On-site		
Made ground with low degradable organic content (e.g. up to 5% organic material and no easily degradable waste).	Very low	BGS geology viewer has not mapped made ground on-site. However, it is expected likely to be present as a result of historical development at the site.
Sewage sludge	Moderate	The south western area of the site has a former sewage works. There is potential for sewage sludge to be present in the ground.
Fly tipping and refuse	Low	Potential for buried refuse on-site as mound of fly tipping debris and refuse were found at the centre of the site during the walkover.
Radon	Moderate	Updated UK Radon Atlas (December 2022) has identified the western half as potentially requiring basic protection against radon, subject to a site-specific re-assessment
Off-site		
Sludge Beds (190 m north)	Low	-
Refuse Tip (210 m north)	Moderate	The site accepted inert, industrial waste between 1988 and 1990.

Given the anticipated ground conditions set out above, significant potential sources of ground gas generation have been identified associated with the former sewage works and potential presence of sewage sludge and an offsite historical landfill 210 m north of the site, as well as the potential for basic protection from radon in the western half.

6.2.2 Preferential pathways for ground gas migration

Credible preferential pathways potentially connecting the source and receptor through vertical and lateral migration are:

- geology of the Fittleworth member if found to be relatively permeable
- building foundations, piled foundations and vibro-stone columns
- construction joints and cracks within building structure
- utility routes and service penetrations into buildings.

6.2.3 Sensitive receptors and linking pathways

Sensitive receptors identified at or in the vicinity of the site that could be affected by the potential ground gas sources identified above comprise:

- future site users – residential users [migration and ingress of ground gases into buildings, build-up in confined spaces and explosion/ asphyxiation]
- adjacent site users – residential users [migration and ingress of ground gases into buildings, build-up in confined spaces and explosion/ asphyxiation]
- future buildings and services [migration and ingress of ground gases into buildings, build-up in confined spaces and explosion].

The assessment has identified receptors to include building structures and current/ proposed end-users.

Construction workers have not been identified as receptors for the purposes of this assessment. Risks may still be present to construction workers especially where works include the entry into excavations within the ground. Construction workers should undertake appropriate risk assessments and risks should be managed through health and safety procedures and the use of PPE.

6.3 Preliminary risk assessment

The preliminary risk assessment findings and potentially complete contaminant linkages are shown in **Table 14** overleaf. The risk classification based on the combination of hazard consequence and probability using a risk matrix from CIRIA C552 (Rudland et al., 2001), a summary of which is included in Appendix G. This relates to Tier 1 preliminary risk assessment in LCRM (Environment Agency, 2021).

Table 14 Risk estimation for potentially complete contaminant linkages

Potential source	Potential receptor	Possible pathway	Likelihood	Severity	Potential risk	Justification
On-site sources						
Former sewage works and potential buried sewage Sludge Made ground (i.e. fill material) Nurseries and mushroom farming	Future Users	Ingestion of contaminated soil and dust	Likely	Medium	Moderate	Ground investigation required.
	Adjacent Site Users	Inhalation of contaminated dust and potential vapours	Low Likelihood	Medium	Moderate / Low	
	Vegetation	Uptake of phytotoxic COPCs	Low Likelihood	Minor	Low	Ground investigation required.
	Water supply pipes	Direct contact and permeation	Low Likelihood	Medium	Moderate / Low	Water supply pipelines are likely to have been laid in a designated trench with “clean” backfill, and therefore there is considered to be a low likelihood that any potential contaminants would be in contact with the water supply pipes. Ground investigation required.
	Groundwater within underlying secondary A aquifer (Fittleworth beds) and nearby drains/shallow surface watercourses	Leaching from soils and subsequent vertical and lateral migration of potential COPCs	Low Likelihood	Medium	Moderate / Low	Potential for soil contaminates to leach into the shallow groundwater within the secondary A aquifer.
	Groundwater within underlying Principal aquifer (Hythe Formation) , non-potable	Leaching from soils and subsequent vertical and lateral migration of potential COPCs	Low Likelihood	Medium	Moderate / Low	Site is expected to be underlain by the Fittleworth Beds which, if found to comprise predominantly cohesive material, may restrict contamination migration to the Principal Aquifer within the Hythe Formation.

Potential source	Potential receptor	Possible pathway	Likelihood	Severity	Potential risk	Justification
	abstraction on site, potable abstraction 400m west of site					However, it should be noted that BGS records indicate that the Fittleworth Beds may be absent in northern areas of the site.
	Future Users (residents) / Adjacent site users / Buildings	Migration and accumulation of ground gas	Low Likelihood	Severe	Moderate	Presence of sewage sludge and the condition of the sewage works is unknown. Potential for Ground gas accumulation if buried waste is present.
Fly tipping/refuse, abandoned vehicles/fuel tanks and demolition rubble	Future Users	Ingestion of contaminated soil and dust Inhalation of contaminated dust and potential vapours	Likely	Medium	Moderate	As identified by the site reconnaissance walkover, several piles of refuse and evidence of potential fly-tipping were observed. Potential for furth buried waste on-site should not be discounted.
	Adjacent Site Users		Unlikely	Medium	Low	
	Vegetation	Uptake of phytotoxic COPCs	Likely	Minor	Low	Potential for localised contamination to be present based on walkover findings, however severity is likely to be minor so considered risk is to be low.
	Water supply pipes	Direct contact and permeation	Low Likelihood	Medium	Moderate / Low	Water supply pipelines are likely to have been laid in a designated trench with “clean” backfill, and therefore there is considered to be a low likelihood that any potential contaminants would be in contact with the water supply pipes.
	Groundwater within underlying secondary A aquifer	Leaching from soils and subsequent vertical and lateral migration of potential COPCs	Low Likelihood	Medium	Moderate / Low	Potential for soil contaminates to leach into the shallow groundwater within the secondary A aquifer.
	Groundwater within underlying Principal aquifer	Leaching from soils and subsequent vertical and	Low Likelihood	Medium	Moderate / Low	Site is expected to be underlain by the Fittleworth Beds which, if found to comprise predominantly cohesive material may restrict

Potential source	Potential receptor	Possible pathway	Likelihood	Severity	Potential risk	Justification
	(Hythe Formation) , non-potable abstraction on site, potable abstraction 400m west of site	lateral migration of potential COPCs				contamination migration to the Principal Aquifer within the Hythe Formation. However, it should be noted that BGS records indicate that the Fittleworth Beds may be absent in northern areas of the site.
	Future Users (residents) / Adjacent site users / Buildings	Migration and accumulation of ground gas	Unlikely	Severe	Low	Unlikely to be a significant source of ground gases.
Electrical Substations	Future Users	Ingestion of contaminated soil and dust	Low Likelihood	Medium	Moderate / Low	There is a low likelihood that PCBs may have migrated into soils.
	Adjacent Site Users	Inhalation of contaminated dust and potential vapours	Unlikely	Medium	Low	Given that PCBs have very low mobility it is unlikely that any contaminates will migrate to adjacent site users.
	Water supply pipes	Direct contact and permeation	Unlikely	Medium	Low	Given that PCBs have very low mobility it is unlikely that any contaminates will migrate to water supply pipes.
	Groundwater within underlying secondary A aquifer	Leaching from soils and subsequent vertical and lateral migration of potential COPCs	Unlikely	Medium	Low	Given that PCBs have very low mobility it is unlikely that any contaminates will migrate to the groundwater.
Electrical Substations	Groundwater within underlying Principal aquifer (Hythe Formation), non-potable abstraction on site, potable abstraction 400m west of site	Leaching from soils and subsequent vertical and lateral migration of potential COPCs	Unlikely	Medium	Low	Site is expected to be underlain by the Fittleworth Beds which, if found to comprise predominantly cohesive material may restrict contamination migration to the Principal Aquifer within the Hythe Formation. However, it should be noted that BGS records indicate that the Fittleworth Beds may be absent in northern areas of the site.

Potential source	Potential receptor	Possible pathway	Likelihood	Severity	Potential risk	Justification
Radon (western half)	Site Users	Vertical and lateral migration	Low Likelihood	Medium	Moderate	The radon classification has only been updated in December 2022 and therefore as the western half of the site potentially requires basic protection measures to be put in place, a site-specific re-assessment is recommended
Off-site Sources						
Pump House (adjacent south)	Site Users	Vertical and lateral migration	Unlikely	Medium	Low	There is the low likelihood that contaminates may have migrated onto site.
			Unlikely	Medium	Low	
Nurseries (100 m & 250 m south)	Site Users	Vertical and lateral migration	Unlikely	Medium	Low	Given distance to site and low likelihood of a significant sources, risks are considered to be low.
			Unlikely	Medium	Low	
Sludge Beds (190 m north)	Site Users	Inhalation of vapours associated with groundwater impacted by volatile substances	Unlikely	Medium	Very Low	Given distance to site and low likelihood of a significant sources, risks are considered to be low.
	Site Users/ building	Migration and accumulation of ground gas	Unlikely	Severe	Low	Given distance to site and low likelihood of a significant sources, risks are considered to be low.
Refuse Tip (210 m north)	Site Users	Inhalation of vapours associated with groundwater impacted by volatile substances	Unlikely	Medium	Low	Given distance to site and low likelihood of a significant sources, risks are considered to be low.
	Site Users/ building	Migration and accumulation of ground gas	Low Likelihood	Severe	Moderate	Given the uncertainty regarding the degree of ground gas production at this potential source, risks are considered to be moderate at this stage.

Risk matrix		Consequences			
		Severe	Medium	Mild	Minor
Probability	Highly likely	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very low	Very low

Potentially complete contaminant linkages with a potential risk of moderate or higher identified in **Table 14** comprise:

- future site users – residential users [oral, dermal and inhalation exposure with impacted soil, soil vapour and dust/fibres, ingestion of home-grown produce, inhalation of vapours from groundwater and / or NAPL if present]
- future adjacent site users – residential, public open space users [migration of contamination via dust/fibre deposition, vapour or groundwater migration combined with inhalation]
- future buildings and services [direct contact with contaminated soils or groundwater and chemical attack]
- groundwater in secondary A aquifer within Fittleworth Member [leaching from soils/ percolation to aquifer/ lateral migration of dissolved phase/ NAPL etc.]
- groundwater within underlying Principal aquifer (Hythe Formation), non-potable abstraction on site, potable abstraction 400m west of site- [leaching from soils/ percolation to aquifer/ lateral migration of dissolved phase/ NAPL etc.]
- future site users – residential users [migration and ingress of ground gases into buildings, build-up in confined spaces and explosion/ asphyxiation].

These potentially complete contaminant linkages need to be assessed further through appropriate site investigation to target the identified sources of potential contamination and assess the feasibility of identified pathways.

6.4 Data gaps and uncertainties

Key data gaps and uncertainties identified in the CSM at desk study stage include:

- access not available to certain parts of site due to overgrown vegetation. Particularly surrounding the former sewage works
- identified geological succession across the site
- chemical testing of soil and groundwater
- ground gas monitoring results
- groundwater depth and flow direction are conceptual at this stage
- no development plans or information regarding the site's future use has been provided.

7 SITE INVESTIGATION STRATEGY & METHODOLOGY

7.1 Introduction

At the time of this report, RSK has carried out intrusive investigation works on 22nd – 23rd and 27th September 2022 and return monitoring visits on 4th and 13th October 2022.

Based on further correspondence with the client after the initial intrusive works, an additional intrusive phase of investigation was undertaken on 27th October – 1st November and 9th – 18th November 2022 and return monitoring visits between 23rd November and 7th December 2022.

7.2 Objectives

The specific objectives of the investigation were as follows:

- to establish the ground conditions underlying the site including the extent and thickness of any made ground
- to investigate specific potential sources of contamination identified in initial CSM
- to determine groundwater depth and flow direction
- to assess geotechnical properties of soils
- to address data gaps identified in section 6.4.

7.3 Selection of investigation methods

The techniques adopted for the investigation were chosen with consideration of the objectives and site constraints, which are described below:

- window sample drilling was chosen based on the requirement for manoeuvrability around site, proposed drill depth of 5.00 m bgl or refusal, requirement for in-situ geotechnical data, and installation of monitoring wells
- 8-tonne tracked mechanical excavator to excavate trial pits across the site
- hand excavated trial pits within the existing buildings

Prior to conducting intrusive works, utility service plans were obtained and buried service clearance undertaken in line with RSK's health and safety procedures. Copies of statutory service records obtained by RSK as part of the agreed scope of works are contained in Appendix E.

7.4 Investigation strategy

The ground investigation was carried out using intrusive ground investigation techniques in general accordance with the recommendations of BS5930:2015+A1:2020, which maintains compliance with BS EN 1997-1 and 1997-2 and their related standards. Whilst every attempt was made to record full details of the strata encountered in the boreholes,

techniques of hole formation and sampling will inevitably lead to disturbance, mixing or loss of material in some soils and rocks.

The investigation strategy involved targeted boreholes and trial pits with the selected locations based upon the information provided by the client and obtained in the desk study.

The constraints to the investigation were as follows:

- stockpiles of demolition rubble and derelict building structures prevented access to certain areas of the site
- due to delays with utility clearance, TP1 and TP7 were not completed.

Exploratory hole locations were proposed to avoid known service locations and buried service clearance was undertaken in line with RSK's health and safety procedures. The locations were positioned across the site and in targeted areas of suspected potential contamination, to obtain good coverage with the most relevant data.

Details of the September investigation locations, installations and rationale are presented in **Table 15**. 16No. machine excavated trial pits were dug to a maximum depth of 3.00 m bgl before being backfilled with arisings. Window sample boreholes were drilled to a maximum depth of 5.00 m bgl or refusal and each was installed with a gas / groundwater monitoring well.

Details of the November investigation locations, installations and rationale are presented in **Table 16**. 18No. machine excavated trial pits were dug to a maximum depth of 2.50 m bgl before being backfilled with arisings. 10No. hand excavated trial pits were dug to a maximum depth of 1.20 m bgl before being backfilled with arisings. Window sample boreholes were drilled to a maximum depth of 5.00 m bgl or refusal and each was installed with a groundwater monitoring well.

An exploratory hole location plan showing all exploratory hole locations from both investigations is shown on Figure 2.

Table 15 Exploratory hole and monitoring well location rationale – September investigation

Investigation type	Number	Designation	Monitoring well installation	Rationale examples below
Boreholes by window sampling methods	5	WS1 to WS5	Gas/ groundwater	To determine the contamination and geotechnical status of the ground beneath the site and to install groundwater monitoring wells.
Trial-pits excavated by mechanical excavator	16	TP2 to TP6; TP8 to 16	n/a	To accurately log the upper strata in targeted and non-targeted locations beneath the site, principally in areas of suspected potential contamination.

Investigation type	Number	Designation	Monitoring well installation	Rationale examples below
				Collect samples from the shallow made ground soils.

Table 16 Exploratory hole and monitoring well location rationale – November investigation

Investigation type	Number	Designation	Monitoring well installation	Rationale examples below
Boreholes by window sampling methods	13	WS6 – WS15 & BHA1 – BHA3	Gas/ groundwater	To further assess the contamination and geotechnical status of the ground beneath the site and existing buildings and to install monitoring wells.
Trial-pits excavated by mechanical excavator	18	TP17 – TP24 & TPA1 – TPA11	n/a	To further assess the contamination and geotechnical status of the ground beneath the site
Trial pits excavated by hand	10	TPi1 – TPi10	n/a	To determine the contamination status of the ground beneath the existing buildings.

7.4.1 Implementation of investigation works

The exploratory holes were logged by an engineer in general accordance with the recommendations of BS5930:2015+A1:2020 (which incorporates the requirements of BS EN ISO 14688-1, 14688-2 and 14689-1).

The monitoring well construction and associated response zones are detailed on the exploratory hole records in Appendix H.

The soil sampling and analysis strategy was designed to characterise each encountered soil strata, permit an assessment of the potential contaminant linkages identified and investigate the geotechnical characteristics. In addition, samples were taken to allow for geo-environmental and geotechnical testing to be undertaken.

Soils collected for laboratory analysis were placed in a variety of containers appropriate to the anticipated testing suite required. They were dispatched to the laboratory in cool boxes under chain of custody documentation. Samples were stored in accordance with the RSK quality procedures to maintain sample integrity and preservation and to minimise the chance of cross contamination.

Selected samples were placed in polythene bags for headspace screening with a photo-ionisation detector (PID) fitted with a 10.6 eV bulb. The PID screening results are presented on the exploratory hole records.

7.5 Monitoring programme

7.5.1 Ground gas monitoring

In line with the initial CSM, response, zones were installed to target the sources or pathways as detailed in **Table 14**.

Three monitoring rounds have been undertaken to provide data to support refining of the CSM. The number of monitoring rounds undertaken is in general accordance with the decision matrix presented as Figure 6 of BS8576 for a very low source generation potential and low sensitivity development.

A calibrated infrared gas meter was used to measure gas flow, concentrations of carbon dioxide (CO_2), methane (CH_4) and oxygen (O_2) in percentage by volume, while hydrogen sulphide (H_2S) and carbon monoxide (CO) were recorded in parts per million.

Initial and steady state concentrations were recorded. In addition, during the first monitoring round, all wells were screened with a PID to establish if there are any interferences and cross-sensitivity of other hydrocarbons with the infrared gas meter

The atmospheric pressure before and during monitoring, together with the weather conditions, were recorded. The monitoring included periods of falling atmospheric pressures and after/during rainfall.

All ground gas monitoring results together with the temporal conditions are contained within Appendix I. Equipment calibration certificates are available on request.

7.5.2 Groundwater monitoring and sampling

Two rounds of groundwater monitoring were undertaken on a weekly basis on 4th and 13th October 2022 with three combined ground gas and groundwater rounds being undertaken between 23rd November and 7th December 2022.

One round of groundwater sampling was carried out in the September investigation on 13th October 2022 and two additional groundwater samples were collected during the November investigation on 23rd November and 6th December 2022. The monitoring records, including dates, are shown in Appendix I.

Development of the monitoring wells following installation was undertaken comprising the removal of three well volumes using a disposable bailer.

Depths to groundwater were recorded using an electronic interface probe.

Groundwater samples were retrieved using a United States Environment Protection Agency (USEPA) approved low-flow purging and sampling methodology. Details of the low-flow sampling procedure are set out in Appendix G. Water samples were dispatched to the laboratory in cool boxes under chain of custody documentation.

7.6 Laboratory testing

Laboratory testing was undertaken at a UKAS accredited laboratory with ISO17025 and MCERTS accredited test methods were specified where applicable for contamination testing and as shown in the laboratory test certificates appended.

7.6.1 Chemical analysis of soil samples

The soil sampling strategy was designed to characterise made ground and/or natural strata typically within the upper 1.0 m of the ground profile whilst also characterising deeper strata and the potential for contaminant migration from relevant sources identified within the preliminary CSM.

The programme of chemical tests undertaken on soil samples obtained from the intrusive investigation is presented in **Table 17** with the laboratory testing results contained in Appendix J.

Table 17 Summary of chemical testing of soil samples

Stratum	Tests undertaken	No. of tests
Topsoil	Asbestos screening and ID	20
	Speciated PAH-16MS	9
	Standard Metals Suite (Soil) As, Cd, Cr, Cu, Hg, Pb, Ni, Se, Zn., ,	13
	Cr hexavalent	5
	TPH CWG (spec.TPH),	4
	VOCs	4
	TOC	4
	Organochlorine and organophosphorus pesticides, Herbicides	1
	Leachable metals	1
Made ground	Asbestos screening and ID	21
	Speciated PAH-16MS	20
	Standard Metals Suite (Soil) As, Cd, Cr, Cu, Hg, Pb, Ni, Se, Zn., ,	21
	Cr hexavalent	8
	TPH CWG (spec.TPH),	5
	pH	5
	TOC	4
	Cyanide total and cyanide free, Sulphate, Sulphide, Ammoniacal Nitrogen as N, Nitrate, Phosphates, Total coliforms and e-coli (faecal coliforms)	5
	Leachable metals	4
	Bulk asbestos ID	2
	VOCs	4
Fittleworth Member	Asbestos screening and ID	6
	Speciated PAH-16MS.	9

Stratum	Tests undertaken	No. of tests
	Standard Metals Suite (Soil) As, Cd, Cr, , Cu, Hg, Pb, Ni, Se, Zn.	6
	Cr hexavalent	8
	TPHCWG (spec.TPH),	12
	TOC	2
	PCBs	1
	VOCs	2

7.6.2 Geotechnical analysis of soils

Where appropriate disturbed, bulk and undisturbed soil samples were taken for geotechnical classification testing with the depth and nature of samples detailed within the exploratory hole records.

Where appropriate, testing was undertaken in accordance with BS 1377:1990 Method of Tests for Soils for Civil Engineering Purposes or, where superseded, by the relevant part of BS EN ISO 17892:2014 Geotechnical investigation and testing - Laboratory Testing of Soil. Tests carried out in order to classify the concrete class required on-site have been undertaken following the procedures within BRE SD1:2005.

The programme of geotechnical tests undertaken on samples obtained from the intrusive investigation is presented in **Table 18**.

Table 18 Summary of geotechnical testing undertaken

Strata	Tests undertaken	No. of tests
Fittleworth Member	Moisture content %	45
	Liquid/ plastic limits	30
	Sieve analysis	30
	BRE Suite	13

7.6.3 Chemical analysis of groundwater

Groundwater and surface water samples were collected in containers appropriate to the anticipated testing suite required. The containers were filled to capacity and placed in a cool box to minimise volatilisation.

Chemical testing undertaken on water samples obtained during the monitoring programme is presented in **Table 19** with the laboratory testing results contained in Appendix K.

Table 19 Summary of chemical testing of water samples

Sample type	Tests undertaken	No. of tests
Groundwater	Speciated PAH-16MS, TPH CWG (spec.TPH), Formaldehyde (Water)	5

	Ammoniacal Nitrogen as NH4, Standard, free cyanide, Cr VI, Nitrate, OCP suite, Opp suite, Sulphate, Sulphide, total cyanide, triazine herbicides, VOCs	2
	Formaldehydes and Fungicides	2
	Metals suite	3
	Total dissolved solids	1

8 SITE INVESTIGATION FACTUAL FINDINGS

The results of the intrusive investigation and subsequent geo-environmental and geotechnical laboratory analysis undertaken are detailed below.

8.1 Ground conditions encountered

The descriptions of the strata encountered, notes regarding visual or olfactory evidence of contamination, list of samples taken, field observations of soil and groundwater, in-situ testing and details of monitoring well installations are included on the exploratory hole records presented in Appendix H.

The exploratory holes revealed that the site is underlain by a variable thickness of topsoil and made ground over clayey sands (the Fittleworth Member). This appears to confirm the stratigraphical succession described within the preliminary CSM.

Table 20 General succession of strata encountered

Stratum	Exploratory holes encountered	Depth to top of stratum m bgl	Proven thickness (m)
Topsoil	WS1, WS4-WS15, BHA1, TP2, TP3, TP5, TP8, TP9, TP13, TP13, TP16-TP19, TP21, TP24, TPA1-TPA5, TPA7-TPA11	GL	0.10 – 0.45 (0.28 average)
Concrete	BHA2-BHA4, TPA6, TPi1-TPi10	GL	0.10-0.20
Made ground	WS1-WS4, WS6, BHA2-BHA4, TP3, TP4, TP6, TP10-TP12, TP14, TP15, TP20, TP22, TP23, TPA6, TPi1-TPi10	GL – 0.20	0.30 – 1.50 (0.42 average)
Fittleworth Member - Cohesive	WS1, WS3-WS5, WS7-WS11, WS14, WS15, BHA1-BHA3, TP2-TP4, TP6, TP9, TP12-TP14, TP16-TP18, TP20, TP22-TP24, TPA2, TPA4-TPA7, TPA10, TPi1-TPi5, TPi8, TPi9,	0.20 – 1.50	0.80 - >4.95*
Fittleworth Member – Granular	WS1, WS4-WS6, WS8-WS15, BHA1, BHA2, BHA4, TP2-TP8, TP10, TP12-TP15, TP17, TP19, TP21, TPA1, TPA3, TPA7-TPA11, TPi7, TPi10	0.10 – 4.40	>4.05*
Notes * full thickness not proven			

8.1.1 Topsoil

Topsoil was encountered within 33no. exploratory hole locations to depths of between 0.20 m and 0.45 m bgl and generally comprised of dark brown soft slightly gravelly sandy clay with frequent rootlets and organic material. Sand is fine to medium. Gravel is subangular to subrounded fine to medium flint.

8.1.2 Made ground

Made Ground was encountered within 29no. exploratory hole locations to depths of between 0.30 m and 1.5 m bgl and generally comprised of dark to light brown, black, and greyish brown slightly clayey gravelly fine to coarse sand. Gravel is subangular to subrounded fine to coarse flint with occasional fine fragments of brick, glass, ash, clinker, concrete, asphalt, mortar and plastics and frequent rootlets and rare timber.

Within TP4 between 0.25 m and 0.40 m bgl reworked chalk was recovered as structureless white mottled dark grey and black clayey subangular to subrounded fine to medium chalk gravel with ash, clinker and glass fragments.

8.1.3 Fittleworth Member

The Fittleworth Member was encountered beneath the Topsoil / Made Ground at a depth of between 0.20 m and 1.50 m bgl. The base of the Fittleworth Member was not proven in any of the exploratory locations but was encountered to a maximum depth of 5.45 m bgl. Based on the site descriptions and in-situ tests carried out, this layer can be described as blueish, greyish, yellowish, and orangish brown mottled grey sandy clay or clayey sand. Sand is fine to coarse with occasional organic material. Sandstone gravels were encountered within the Fittleworth Member in WS5, and below 2.30 m bgl in TP13.

The soils of the Fittleworth Member are predominantly cohesive near surface in the central east, southeast and southwest of the site, with predominantly granular soils in the northern half of the site as shown in Figure 2.

A summary of the in-situ and laboratory test results recorded in the stratum are presented in **Table 21**.

Table 21 Summary of in-situ and laboratory test results for Fittleworth Member

Soil parameters		Cohesive / Granular	Value	Reference
Grading (%)	Gravel	-	0.0 – 3.6	Appendix L
	Sand		40.4 – 68.8	
	Silt & clay		30.1 – 70.9	
Moisture content (%)		Cohesive	17.2 - 31	
		Granular	17.8 – 31.5	
Modified moisture content (%)		Cohesive	17 - 32	-
		Granular	20 - 32	
Liquid limit (%)		Cohesive	31 - 61	Appendix L

Soil parameters	Cohesive / Granular	Value	Reference
	Granular	36 - 47	
Plasticity limit (%)	Cohesive	17 - 24	
	Granular	17 - 23	
Plasticity index (%)	Cohesive	13 - 37	
	Granular	15 - 30	
Modified plasticity index (%)	Cohesive	12.74 – 37	
	Granular	12.87 - 30	
Plasticity term	Cohesive	Low – High	
	Granular	Intermediate	-
Volume change potential	Cohesive	Low - Medium	
	Granular	Low - Medium	
Consistency Term	Cohesive	Soft – Very stiff	
Density term	Granular	Loose – Very dense	
SPT 'N' values	Cohesive	0 - 73	Appendix H
	Granular	2 - 72	

8.1.4 Visual/olfactory evidence of soil contamination

Potential asbestos containing material was observed at locations TP14, WS2 and TPi6.

Hydrocarbon and chemical odours and black staining were observed at locations TP4, TP15, WS3, WS4, WS6, TPi1 and TPi7. A summary of the PID readings collected from these locations is presented below in **Table 22**. In addition, low levels of PID readings were identified within WS8, WS10 and WS14.

Table 22 PID readings

Location	Depth	PID reading
TP4	0.10	0.1
	0.30	0.0
	1.70	0.0
	2.20	162.0
TP15	0.65	0.3
WS3	2.50	205.1
	3.50	215.9
	4.50	39.6
	4.80	0.0

WS4	2.70	24.9
	3.50	0.5
	3.80	3.8
WS6	3.10	3.8
	3.80	5.4
WS8	4.80	0.5
WS10	4.70	0.3
WS14	2.40	0.6
WS15	2.40	0.1

8.2 Groundwater and surface water

8.2.1 Groundwater encountered during intrusive works

Perched groundwater within the made ground was only encountered within TP11 at 0.50 m bgl. Groundwater water observed within TP9 at the base of the trial pit at 2.8 bgl. No other groundwater strikes were encountered during the intrusive investigation.

8.2.2 Groundwater encountered during monitoring

Rest groundwater levels recorded during the monitoring programme are summarised in **Table 23** based on the data provided in Appendix I.

Table 23 Summary of groundwater monitoring results

Monitoring well	Date	Response zone stratum	Depth to water (m bgl)	Depth to base of borehole (m bgl)
WS1	04/10/22	1.00 – 4.00	3.70	3.86
WS3		1.00 – 5.00	4.45	4.92
WS4		1.00 – 4.00	3.17	3.87
WS5		1.00 – 3.50	Dry	3.53
WS1	13/10/22	1.00 – 4.00	3.67	3.87
WS3		1.00 – 5.00	3.66	4.93
WS4		1.00 – 4.00	3.22	3.86
WS5		1.00 – 3.50	Dry	3.51
WS1	23/11/22	1.00 – 4.00	1.22	3.9
WS3		1.00 – 5.00	2.05	4.89
WS4		1.00 – 4.00	0.70	3.86
WS5		1.00 – 3.50	1.75	3.55

Monitoring well	Date	Response zone stratum	Depth to water (m bgl)	Depth to base of borehole (m bgl)
WS6		1.00 - 4.00	1.76	4.00
WS8		1.00 – 5.00	2.49	4.50
WS9		1.00 – 5.00	0.70	4.92
WS10		1.00 – 5.00	0.60	4.89
WS11		1.00 – 5.00	1.08	4.79
WS12		1.00 – 3.50	1.70	3.60
WS13		1.00 – 2.00	0.05	2.00
WS14		1.00 – 2.60	0	2.87
WS1	28/11/22	1.00 – 4.00	0.97	3.9
WS3		1.00 – 5.00	1.09	4.96
WS4		1.00 – 4.00	0.67	3.84
WS5		1.00 – 3.50	1.35	4.51
WS6		1.00 - 4.00	1.41	3.96
WS8		1.00 – 5.00	1.76	4.70
WS9		1.00 – 5.00	0.82	4.90
WS10		1.00 – 5.00	0.40	4.97
WS11		1.00 – 5.00	0.90	4.76
WS12		1.00 – 3.50	0.97	3.59
WS13		1.00 – 2.00	0.15	2.00
WS14		1.00 – 2.60	0	2.87
WS1	07/12/22	1.00 – 4.00	1.54	3.85
WS3		1.00 – 5.00	1.94	3.04
WS4		1.00 – 4.00	1.42	3.86
WS5		1.00 – 3.50	2.14	3.55
WS6		1.00 - 4.00	2.25	3.94
WS8		1.00 – 5.00	2.62	4.47
WS9		1.00 – 5.00	1.08	4.87
WS10		1.00 – 5.00	1.54	3.98
WS11		1.00 – 5.00	1.45	3.96
WS12		1.00 – 3.50	2.77	3.61
WS13		1.00 – 2.00	0.26	1.98

Monitoring well	Date	Response zone stratum	Depth to water (m bgl)	Depth to base of borehole (m bgl)
WS14		1.00 – 2.60	0.10	2.85
BHA1		1.00 – 3.00	1.39	2.04

The findings are considered to potentially reflect the groundwater table in the Fittleworth Member.

It should be noted that groundwater levels might fluctuate for a number of reasons including seasonal variations. It is worth noting that the monitoring round carried out on the 23rd November was conducted after a week of intense heavy rainfall. This is reflected in the monitoring results, where higher groundwater levels can be observed. On-going monitoring would be required to establish both the full range of conditions and any trends in groundwater levels.

8.2.3 Visual/olfactory evidence of groundwater contamination

No visual evidence of groundwater contamination however PID readings of 71.4 ppm in WS3 were encountered during monitoring. In addition, PID readings identified 0.3 ppm in WS4 and 0.1 ppm in WS5.

8.3 Chemical laboratory results

The soil testing results are presented in Appendix J.

8.4 Geotechnical laboratory results

The results of the geotechnical testing are discussed in Section 10 and presented in Appendix L.

8.5 Ground gas monitoring

The results of the ground gas monitoring and testing carried out are given in Appendix I and discussed in section 9.

9 GEO-ENVIRONMENTAL ASSESSMENT

9.1 Refinement of initial CSM

Hydrocarbon odours and black staining have been observed at locations TP4, WS3 and WS4.

The Hythe Formation was not encountered during the site investigation.

The preliminary risk assessment highlighted the possibility of potential contamination associated with the former sewage works in the east of the site. However no visual or olfactory evidence of contamination was encountered in these areas during the intrusive investigation.

Where encountered, made ground was proven to depths of between 0.30 m and 1.5 m bgl and therefore is considered unlikely to represent a significant source of hazardous ground gases.

Potential contamination associated with potential asbestos containing material (ACM) at the surface (and within many of the building structures) was detailed in the preliminary risk assessment and the asbestos survey report undertaken by Asbestos Survey Consultants. Potential ACMs were encountered at several exploratory locations in the east and centre of the site. The laboratory results have confirmed that the suspected materials comprise asbestos cement, containing chrysotile. A quantification was additionally requested following the positive identification of ACM.

9.2 Linkages for assessment

As described in LCRM (Environment Agency, 2021), there are two stages of quantitative risk assessment (QRA), Tier 2 generic (GQRA) and Tier 3 detailed (DQRA). The GQRA comprises the comparison of soil, groundwater, soil gas and / or ground gas results with generic assessment criteria (GAC) that are appropriate to the linkage being assessed. This comparison can be undertaken directly against the laboratory results or following statistical analysis depending upon the sampling procedure that was adopted. This assessment relates to LCRM Stage 1, Tier 2 generic quantitative risk assessment

Following the refinement of the CSM, the potentially complete contaminant linkages that require further assessment and the methodology of assessment are presented in **Table 24**.

Table 24 Linkages for GQRA

Potentially relevant contaminant linkage	Assessment method
Human health and phytotoxic-related linkages	
H1. Oral, dermal and inhalation exposure with impacted soil, soil vapour and dust by future residents	Human health GAC in Appendix M for a proposed residential end use with home-grown produce since the proposed end use is assumed to include residential gardens.

Potentially relevant contaminant linkage	Assessment method
H2. Inhalation exposure of future residents to asbestos fibres	Qualitative assessment based on the asbestos minerals present, their form, concentration, location and the nature of the proposed development.
H3. Organic contaminants permeating potable water supply pipes	Comparison of soil data to GAC in Appendix N for plastic water supply pipes using UKWIR (2010) guidance.
H4. Inhalation exposure of future residents to vapour from groundwater	GrAC in Appendix M for groundwater based on indoor air inhalation exposure to contaminants in the vapour-phase allowing for a consideration of a capillary fringe.
Controlled waters-related linkages	
W1. Leaching of soil contaminants and dissolved phase migration to wider secondary aquifer	Comparison of leachate data to the relevant GAC in Table 1 of Appendix O.
W2. Migration of dissolved phase contaminants to wider secondary aquifer, and nearby drains/shallow surface watercourses. Also groundwater within underlying Principal aquifer (Hythe Formation), non-potable abstraction on site, potable abstraction 400m west of site	Comparison of groundwater data to relevant GAC based on Environmental Quality Standard (EQS) and Drinking Water Standard (DWS) in Table 1 of Appendix O.
Ground gas-related linkages	
G1. Concentrations of methane and carbon dioxide in ground gas entering and accumulating in enclosed spaces or small rooms in new buildings, which could affect future site users. For methane this could create a potentially explosive atmosphere, while death by asphyxiation could result from carbon dioxide.	Borehole hazardous gas flow rates (Qhg) have been calculated using maximum (peak) methane and carbon dioxide concentrations and steady state flow rates in accordance with BS8485. This is subject to interpretation and use of professional judgement to designate the site or zones of the site characteristic situation by comparison to a Gas Screening Value (GSV) as appropriate and in line with the CSM. For applicable low-rise residential developments reference to NHBC guidance has also been considered.
Radon potential within western half of site	Based upon the updated UK radon map, allowance should be made for basic protection precautions in the western half of the site at this stage, however it is recommended that a new site-specific radon report is obtained as this potentially may remove the need.

9.3 Methodology and assessment of human health and phytotoxic-related linkages

9.3.1 H1. Oral, dermal and inhalation exposure with impacted soil by future occupants/site users

A soil organic matter (SOM) of 1% has been selected since laboratory results within the total organic carbon results range from 0.3 % and 2.2%. The soil screening output spreadsheet is presented as Appendix P, and exceedance presented in **Table 25**.

Table 25 Soil exceedances of GAC – future residents

Location/depth (m bgl)	Strata	Determinand	GAC (mg/kg)	Concentration detected (mg/kg)
WS3 @ 0.4-0.5	Made Ground	Benzo(a)anthracene	7	7.22
		Benzo(b)fluoranthene	2.6	8.61
		Benzo(a)pyrene	5	6.92
		Dibenz(a,h)anthracene	0.24	0.97
WS3 @ 2.5- 2.6	Fittleworth Member	Aliphatic >EC8 - EC10	27	283
		Aliphatic >EC10 - EC12	130	356
		Aromatic >EC8 - EC10	30	38
		Aromatic >EC10 - EC12	80	186
		Aromatic >EC12 - EC16	140	235

Given the depth of the sample obtained from WS3 @ 2.5 m – 2.6 m, the exceedances of the petroleum hydrocarbon GAC in this soil sample are unlikely to pose a significant risk to end users of a residential development at the site. However, further assessment of risks associated with the inhalation of vapour associated with the observed petroleum hydrocarbon impact is undertaken in relation to vapour inhalation risks via a groundwater (dissolved phase) source, which is provided in Section 9.3.4.

With regards to testing of e coli & coliforms within the boreholes and trial pits surrounding the sludge beds, low levels total coliforms and faecal coliforms were encountered within TP9 and TP10. However, within WS1 total coliforms from both soil samples collected from this borehole are recorded as 21,077 cfu/g and >112,918 cfu/g respectfully indicating a presence of potential buried sewage sludge. The coliforms concentrations would not be

expected to pose a significant risk to human health assuming all sewage sludge is removed during decommissioning.

9.3.2 H2. Inhalation exposure of future occupants/site users to asbestos fibres

Visually identifiable asbestos containing materials (ACM) were observed within the made ground at exploratory location TP14, WS2 and TPi6, in the form of broken tile fragments. The samples taken of this material identified chrysotile cement bulk asbestos fibres in all three locations. In addition, asbestos chrysotile fibres in the made ground were encountered within made ground at WS2, WS3 and TP10 and amosite asbestos fibres were detected in TPi5. Asbestos quantifications of the chrysotile fibres within WS2, WS3 and TP10 indicated results of <0.001%, 0.002% and 0.001% respectfully.

It should be noted that asbestos is in several of the buildings on site and asbestos fragments were noted to be at ground level. It should also be noted that asbestos contamination can be extremely localised, and it may not be possible to delineate asbestos contamination within the made ground.

No asbestos has been detected in any of the 20no samples of topsoil tested for an asbestos screen.

9.3.3 H3. Organic contaminants permeating potable water supply pipes

For initial assessment purposes, the results of the investigation have been compared with the GAC presented in Appendix N for this linkage, which are reproduced from *UKWIR Report 10/WM/03/21. Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites* (UKWIR, 2010).

The results indicate that a relevant linkage may exist associated with organic contaminants and therefore pollutant polyethylene (PE) and/or polyvinyl chloride (PVC) water supply pipes are expected to be unsuitable within areas where made ground or hydrocarbon impacted ground is present for use on the development unless remedial measures are implemented that mitigate the risk.

It should be noted that at the time of this investigation the future routes of water supply pipes had not been established, hence the investigation and sampling strategy may not be fully compliant with UKWIR recommendations. Consequently, a targeted investigation and specific sampling/analytical strategy may be required at a later date once the route(s) of the supply pipe(s) are known. In addition, it is recommended that the relevant water supply company be contacted at an early stage to confirm its requirements for assessment, which may not necessarily be the same as those recommended by UKWIR.

9.3.4 H5. Inhalation exposure of future residents to vapours from groundwater

Inhalation exposure from VOC within groundwater has initially been assessed through the direct comparison of groundwater data with the RSK GrAC presented in Appendix M.

The GrAC for groundwater are based on indoor inhalation exposure to contaminants in the vapour-phase. Based on the refined conceptual model, a sand soil has been selected and a groundwater depth of 0.65 m.

The analytical results are below the GrAC indicating that the contaminant linkage is incomplete.

9.4 Methodology and assessment of controlled waters-related linkages

9.4.1 W1. Leaching of soil contaminants and dissolved phase migration to wider secondary aquifer (heavy metals)

4no soil samples of made ground and one sample of topsoil were tested for leachable concentrations of heavy metal contaminants. The results were compared against the lowest of freshwater EQS or DWS, with the results presented in Appendix Q. No exceedances were detected, although of the EQS/DWS were detected, and with the exception of boron and zinc, no metals were detected above the laboratory method detection limits (LMDL). It should be noted that the LMDLs exceed the EQS/DWS for cadmium, copper, lead, and nickel.

9.4.2 W2. Migration of dissolved phase contaminants

The analytical results for groundwater samples have been assessed against the lowest of freshwater EQS values and DWS.

The groundwater results found to exceed the GAC presented in Appendix Q are summarised in **Table 26**.

Table 26 Summary of groundwater GQRA and GAC exceedances

Determinand	EQS (µg/l)	DWS (µg/l)	Exceedances (monitoring well and concentration µg/l)
Fluoranthene	0.0063	-	WS1 (0.07 µg/l), BHA1 (0.03µg/L)
Copper	2000	1	WS3 (14 µg/l), BHA1 (11 µg/L)
Nickel	4	20	WS3 (11 µg/l), BHA (11 µg/L)
Selenium	-	10	WS3 (71 µg/l)
Zinc	10.9	3000	WS3 (99 µg/l), BHA1 (25 µg/L)
Iron	1000	200	Abstraction well (703 µg/l)

Exceedances of EQS were detected for fluoranthene, nickel, zinc in samples from groundwater beneath the site. However, given the marginal nature of the exceedances detected, it is not considered that they pose a significant risk to surface waters in the vicinity of the site.

Exceedances of DWS were detected for copper and selenium, however given the marginal size of the exceedances it is not considered that these pose a significant risk to the Principal Aquifer within the Hythe Formation or the potable abstractions in the vicinity of the site.

Furthermore, the Fittleworth Member has been found to comprise a variable orange-brown mottled grey sandy clay or clayey sand. Based on the thickness of the Fittleworth Member encountered within the investigation, coupled with the relatively high degree of fine-grained material within this stratum, it is considered that risks to the Principal Aquifer within the Hythe Formation (and the potable abstraction located 434 m west of the site) can be considered as low.

The results of the sample obtained from the on-site commercial abstraction has also been screened against the lowest of the EQS/DWS. No exceedances were detected with the exception of iron which exceeds the DWS of 200 µg/L. However, given that iron is not a contaminant of concern within the CSM, this result is not considered to be of significant concern.

9.5 G1: Methodology and assessment of ground gas-related linkages

9.5.1 Appropriate guidance

The risks to development from ground gases have been assessed in accordance with BS8485:2015+A1:2019 (BS8485), which provides guidance on ground gas (methane and carbon dioxide) characterisation and hazard assessment, as well as providing a framework for the prescription of protection measures within new buildings.

The process involves characterising the gas hazard from combining the qualitative assessment of risk (using the CSM) with ground investigation data so that a 'characteristic situation' (CS) can be derived for the site or zones within the site. Characteristic situations range from CS1 to CS6, the higher the CS, the higher the hazard potential. Gas protection measures within new buildings can be prescribed using a point scoring system, taking into consideration the CS and the proposed building type.

BS8485 indicates that the gas hazard can be characterised using the following methods:

- an empirical semi-quantitative approach using gas monitoring data to determine the 'characteristic situation' of the site (or zones of the site) and subsequent protective measures (Wilson and Card approach).
- an empirical semi-quantitative approach using TOC data to determine the 'characteristic situation' of the site (or zones of the site) and subsequent protective measures (CL:AIRE RB17 approach)
- detailed quantitative assessment methodologies

For the purpose of this assessment, the empirical semi-quantitative approach above has been used to characterise the gas hazard and provide advice on the protective measures likely to be required within new buildings at the site.

9.5.2 Summary of the refined CSM for ground gas

In the assessment of risks and selection of appropriate mitigation measures, BS8485 highlights the importance of the conceptual model. In summary, potential sources of ground gas within influencing distance of the site identified in section 6.2 comprise:

- Sewage sludge;

- Fly tipping and refuse;
- Sludge beds (190 m north); and,
- Refuse tip (210 m north)
- Naturally occurring radon (western half of site)

This assessment has been undertaken to assess risks to building structures and proposed end users. The assessment has not taken into consideration the health and safety of construction workers. Risks may still be present to construction workers especially where works include the entry into excavations within the ground. Construction workers should undertake appropriate risk assessments and risks should be managed through health and safety procedures and safe systems of work.

The risk assessment has been undertaken based on the current understanding of the CSM.

9.5.3 Empirical semi-quantitative approach using borehole monitoring data (Wilson and Card approach, BS8485)

9.5.3.1 Background

The empirical semi quantitative approach using gas monitoring data requires the designation of a gas screening value (GSV) for the entire site or zones within the site, which informs the hazard potential and associated prescribed ground gas protection measures within new buildings (where necessary). BS8485 defines the GSV as the *'flow rate (l/hr) of a specific hazardous gas* ***representative of a site or zone****, derived from assessment of borehole concentration and flow rate measurements and taking account of all other influencing factors, in accordance with a conceptual site model'.*

BS8485 Section 6.3.1 outlines the process for developing a GSV for the site or a zone as follows:

- borehole hazardous gas flow rate (Q_{hg}) is calculated for each borehole standpipe for each monitoring event. The borehole hazardous gas flow rate is defined in BS8485 as the '*flow rate of a specific hazardous gas, either methane or carbon dioxide, from a borehole standpipe'*. The Q_{hg} is calculated from individual borehole measurements of total gas flow and the concentration of the specific hazardous gas. BS8485 states in Section 6.3.4 that the **maximum** gas concentration recorded during the monitoring event should be used, together with **steady-state** values of gas flows
- the reliability of the measured gas flow rates and concentrations are assessed taking into account borehole construction
- decisions are made about how to deal with any temporal or spatial shortages in the data
- judgements are made about what GSV to designate for use for design purposes taking all relevant information and the conceptual site model into account.

Once the Q_{hg} has been calculated for methane and carbon dioxide, individual borehole measurements are compared to the thresholds presented in Table 2 of BS8485 which inform the CS that directly relates to each individual measurement. Taking into account

the site data (i.e. borehole gas concentration and flow rate to calculate the Q_{hg}) and all other influencing factors in accordance with the CSM, a decision can then be made regarding the GSV that is considered to be representative of the site or a zone within it.

Typical threshold concentrations of methane (1% v/v) and carbon dioxide (5% v/v), and flow rates (>70 l/h), are also considered when designating the GSV for the site or zone, which in turn dictates the hazard potential and CS. It is important to note that the site or zone characteristic GSV and maximum concentration or flow thresholds are guideline values and not absolute. The thresholds may be exceeded in certain circumstances, if the CSM indicates it is safe to do so.

9.5.3.2 Designation of a GSV for the site or zone

The results of the ground gas monitoring and testing undertaken, alongside site conditions at the time of monitoring, are given in Appendix I.

Consideration has been given to the presence of flooded or partially flooded response zones at the time of monitoring with details of fully or partially flooded response zones detailed in Appendix I.

For the purposes of the current ground gas risk assessment, data from entirely flooded response zones has not been included in the risk assessment.

A summary of the maximum recorded concentrations per borehole (or minimum for oxygen) is presented in **Table 27** overleaf. This table also presents details of the response zone, maximum recorded initial and steady state flow rates and minimum recorded depth to water across all monitoring rounds.

The range of atmospheric pressure over the 3 monitoring rounds completed was 985-1020 mbar and this was recorded to be low and falling at the time of one round.

Table 27 Summary of ground gas monitoring results – all data

Exploratory position ID	Response zone top (mbgl)	Response zone base (mbgl)	Response zone geological unit	No. of monitoring rounds	Peak CH_4 max. (%/vol)	Steady-state CH_4 max. (%/vol)	Peak CO_2 max. (%/vol)	Steady-state CO_2 max. (%/vol)	Oxygen min. (%/vol)	Peak gas flow max. (l/hr)	Steady-state gas flow max. (l/hr)	Depth to water min. (m)	Depth to water max. (m)	Atm. pressure min. (mb)	Atm pressure max. (mb)
BHA1	1.00	3.00	FM	1	0.3	0.3	3.2	3.2	17.1	0	0	1.39	1.39	1020	1020
WS1	1.00	4.00	FM	3	0.3	0.3	3.1	2.6	11.9	0	0	0.97	1.54	991	1020
WS3	1.00	5.00	FM	3	0.2	0.2	5.8	5.7	1.7	0.2	0.2	1.09	2.05	987	1018
WS4	1.00	4.00	FM	3	0.3	0.3	7.2	7.2	3.4	0	0	0.67	1.42	989	1019
WS5	1.00	3.50	FM	3	0.3	0.2	6.8	6.7	9.8	0	0	1.35	2.14	987	1017
WS6	1.00	4.00	FM	3	0.3	0.2	4.1	4.1	8.7	0	0	1.41	2.25	988	1016
WS8	1.00	5.00	FM	3	0.3	0.3	3	3	16.8	0	0	1.76	2.62	988	1017
WS9	1.00	5.00	FM	3	0.5	0.2	2.8	2.7	18.7	0	0	0.7	1.08	991	1018
WS10	1.00	5.00	FM	3	0.3	0.3	3.5	3.5	8.6	1.8	0.2	0.4	1.54	990	1020
WS11	1.00	5.00	FM	3	0.2	0.2	3	3	17.2	0	0	0.9	1.45	990	1020
WS12	1.00	3.50	FM	3	0.3	0.2	4.3	4.3	14.8	0	0	0.97	2.77	985	1016
WS13	1.00	2.00	FM	3	0.3	0.3	1.4	1.3	10.5	1.9	1.9	0	0.26	985	1015
FM = Fittleworth Member															

9.5.3.3 *Summary of borehole hazardous gas flow rates*

Borehole hazardous gas flow rates (Q_{hg}) have been calculated for each borehole standpipe, for each monitoring round and are presented, alongside two 'worst case' checks in Appendix R comprising a probable 'worst case' and potential 'worst case' from the available monitoring data. Within this data, gas concentrations exceeding the thresholds presented in Table 2 of BS8485 are identified, alongside the CS that could be associated with each individual borehole monitoring event.

Gas concentration for CO2 exceeded the 5% in monitoring rounds 2 and 3 in WS3, recording peak concentrations at 5.6%v/v and 5.8%v/v and steady state CO2 concentrations at 5.5% v/v and 5.7 % v/v. CO2 concentrations exceeded the 5% threshold in monitoring round 1 in WS4, with a peak and steady-state CO2 concentration recording of 7.2% v/v, and in monitoring round 3 in WS5 with a peak CO2 recording of 6.8%v/v and a steady-state recording 6.7% v/v. Despite the CO2 exceedances, the GSV values indicates a very low hazard potential.

It should also be noted that visual/olfactory evidence of petroleum hydrocarbon impact was observed in WS3 and WS4, with WS5 located in proximity to these areas. It is possible that the source of the detected levels of CO2 is the degradation of petroleum hydrocarbons within groundwater in the wells. The degradation process and volume of hydrocarbon is generally small and will result in small volumes of methane and carbon dioxide giving high gas concentrations in the well head space. This provides an additional line of evidence that the CO2 concentrations detected are not of significant concern.

9.5.3.4 *Worst case check*

In accordance with BS8485, a 'worst case' Q_{hg} has been calculated per borehole by multiplying the maximum recorded flow from any monitoring round for that borehole by the maximum recorded methane or carbon dioxide concentration in that borehole. A further worst-case Q_{hg} check across all data collected is presented in Appendix R for the entire site (or zone), which has been calculated by multiplying the maximum recorded flow by the maximum recorded methane or carbon dioxide concentration.

9.5.3.5 *Designation of site gas screening value (GSV)*

Considering the calculated Q_{hg}, the CSM, monitoring conditions and response zone construction, **Table 28** presents the GSVs designated for the site.

Table 28 Summary of ground gas monitoring results

Hazardous gas	GSV (l/h)	Justification for the GSV
Methane	0.0006	Based on maximum methane concentration recorded in WS9 on 28/11/22 (0.3%v/v) and maximum flow rate of 0.2 l/hr
Carbon dioxide	0.0144	Based on maximum carbon dioxide concentration recorded in WS4 on 07/12/22 (7.2%v/v) and maximum flow rate of 0.2 l/hr

Based on the Q_{hg}, the maximum concentrations and flows recorded, the CSM and the method for determining the CS presented within Table 2 of BS8485, the site has been characterised as CS1 with respect to methane and carbon dioxide concentrations.

9.5.3.6 Data Limitations

It should be noted that there are inherent limitations in ground gas monitoring including spatial adequacy of monitoring locations, changes in groundwater levels, variation in temporal or atmospheric conditions and whether these have been adequately characterised by the scope of monitoring undertaken.

The investigation undertaken to date has incorporated an appropriate number of ground gas monitoring visits, the data is considered reliable, and spatially representative of the site. It is also noted that 1 round was completed during low and falling atmospheric pressure (<1000 mb) indicating that possible worst-case conditions have been present during monitoring. However, it is recommended that a further 3no monitoring visits are undertaken in order to confirm the Characteristic Situation 1 classification.

9.5.4 BS8485 recommended ground gas protection measures

Based on the current understanding of the conceptual site model and the assessment undertaken, the eastern half of the site has been classified as CS1, subject to confirmation by the additional recommended monitoring. Considering the foregoing and in accordance with BS8485, ground gas protective measures are not considered necessary within proposed buildings in this area. For the western half of the site, allowance should be made at this stage for basic protection precautions, however this may be reduced once a site-specific radon re-assessment has been undertaken.

9.5.5 Implications of ground improvement on foundation design

As detailed in section 11, foundation types potentially incorporating ground improvement may be considered for the development. Where such works may create preferential pathways for ground gas migration to the surface, this needs to be considered through the design process, such as through a foundation works risk assessment.

Should foundation solutions or building design change within the design process, then this gas risk assessment and mitigation should be reviewed and where applicable updated.

9.6 Uncertainties and implications in refined CSM and GQRA

In accordance with good practice, data gaps and uncertainties in the refined CSM have been identified at this stage. These are summarised in **Table 29** along with the likely implications.

Table 29 Data gaps and uncertainties

Data gap/ uncertainty	Details	Implications
Deep borehole for piled foundation design	Deep boreholes are required in the southeast, west and far north of the site.	To provide further information for vibro or piled foundation design.

Data gap/ uncertainty	Details	Implications
Radon class in western half of site	Due to an update of the radon map in December 2022, further assessment is required	Allowance should be made at this stage for basic protection precautions in the western half, potentially being removed subject to a site-specific re-assessment

10 GEOTECHNICAL ASSESSMENT

10.1 Proposed development

We understand that the site in question is being considered for development for residential use. At the time of preparing this report, no proposed development plans are available.

At this stage no specific information relating to building loads has been provided and therefore a wall loading of 100 kN/m has been considered. It has been assumed the ground-bearing floor slabs will not be required and that beam and block flooring will be utilised.

10.2 Key geotechnical hazards / development constraints

The key risks identified from the available ground investigation data are discussed below:

- ***Shrinkable clay soils***.

The investigation encountered cohesive Fittleworth Member, with low to medium volume change potential.

- ***Silt-rich soils susceptible to rapid loss of strength in wet conditions***.

The cohesive portion of the Fittleworth Member with silt content generally variable.

- ***Sudden lateral changes in ground conditions***

The investigation encountered varying depths of made ground.

- ***Filled and made ground***

The investigation encountered a significant thickness of made ground across the site between 0.30 m to 0.90 m bgl.

10.3 Foundations

10.3.1 Foundation options

Based upon the ground conditions encountered upon the site, the foundation solution is complex.

In summary the northern half of the site is generally more granular and competent within the top 2-3 m than the southern half and therefore conventional lightly reinforced strip foundations placed beneath any made ground upon the natural sands and firm clays at a minimum depth of 0.90 m below the lower of final or existing ground level, are recommended. Such foundations may be designed upon an allowable net bearing pressure of 85 kN/m^2. In the vicinity of past, present or future trees/shrubs, foundations should be deepened in accordance with NHBC Chapter 4.2 based upon medium shrinkable soils.

In the southern half and also in 2 small areas to the west and extreme north (see Figure 3), it is considered the presence of soft clays to variable depths ranging from 1.50 m to >4.20 m, precludes the use of conventional strip foundations. It is therefore recommended that recourse to a piled solution is allowed for at this stage.

A potential alternative may be to use ground improvement techniques to allow for the adoption of lightly re-inforced strip foundations, however this option needs to be agreed with bodies such as NHBC (National House Building Council) or similar – and the suitability of the method agreed with a specialist contractor.

10.3.2 Strip/Spread foundations

The recommendations for the design and construction of spread foundations in relation to the ground conditions are set out in **Table 30**.

Table 30 Design and construction of spread foundations

Design/construction considerations	Design/construction recommendations
Founding stratum	Fittleworth Member (sand)
Depth	Foundations should be taken to a minimum depth of 0.90 m below the lower of final or existing ground level or to any greater depth required in respect of the special design considerations given below.
Special design considerations	
Shrinkable soils	Owing to the presence of shrinkable clay soils, foundations should be designed taking into account all the normal precautions, including minimum founding depths, to minimise the risk of future foundation movements in accordance with NHBC standards or similar. The findings of the ground investigation indicate that foundations should be designed for shrinkable soils of medium volume change potential.
Variable founding soils	Owing to the significant lateral and vertical variability of the founding strata, consideration should be given to incorporating appropriate reinforcement into the strip foundations to minimise the risk of future differential foundation movements.
Presumed bearing capacity	Strip foundations with a width of up to 1.25 m and constructed on the Fittleworth Member at a minimum depth of 0.90 m may be designed using a presumed bearing capacity of 85 kN/m$^{2.}$ The presumed bearing capacity includes a partial factor on bearing resistance of 3 (fine soils) against bearing capacity failure. Total settlements associated with the presumed bearing pressure are anticipated to be less than 25 mm.
Construction considerations	All foundation excavations should be inspected, and any made ground and soft, organic or otherwise unsuitable materials removed and replaced with mass concrete. The proposed founding stratum is a relatively silt-rich soil, hence susceptible to rapid softening once exposed. Hence all foundation excavations should immediately be blinded with concrete, or the full foundation constructed.

10.3.3 Piled foundations

Recommendations for the construction of pile foundations in relation to the ground conditions are set out in **Table 31**. It is recommended that deep boreholes are undertaken to determine the strength profile of the soils at depth.

Table 31 Design and construction of piled foundations

Design/construction considerations	Design/construction recommendations
Pile type	The construction of both bored and driven piles is considered technically feasible at this site.
Possible constraints on choice of pile type	Given the close proximity of the site to a residential area it is considered possible that the vibration/noise associated with pile driving may not be acceptable. Given the contaminated nature of the made ground at the site it may not be cost effective to adopt bored piles at the site as disposal of arisings will be costly.
Temporary casing	Given the presence of groundwater, encountered during subsequent monitoring, over the full depth of the investigation bored piles will require temporary casing throughout their depth. Alternatively, the use of continuous-flight-auger (CFA) injected bored piles or driven piles usually overcomes this issue.
Soft superficial deposits	For the purpose of assessing preliminary pile capacities the made ground and soft clays have been presumed not to contribute to the load-carrying capacity for the piles. For following calculations, a negative skin friction of 10 kN/m^2 should be considered within the soft clay stratum.
Man-made obstructions	Buried obstructions were not encountered during the ground investigation. However, if buried obstructions are encountered at construction stage, it will be necessary to either relocate the pile(s) or make allowance for removing the obstruction.
Hard strata	Thin 'rock' bands were not encountered during the investigation; however an allowance should be made for chiselling thin 'rock' bands (sandstone) at depth within the Fittleworth Member.
Special precautions relating to bored pile shafts and bases	Bored pile concrete should be cast as soon after completion of boring as possible and in any event the same day as boring. Prior to casting the base of the pile bore should be clean, otherwise a reduced safe working load will be required. Similarly, if the pile bore is left open the shaft walls may relax/soften, leading to a reduced safe working load.

It is recommended that the detailed advice of a specialist piling contractor be sought as to the most suitable type of pile for the prevailing ground conditions and as to their lengths and diameters to support the required design loads.

10.3.4 Foundation works risk assessment

It is anticipated that a foundation works risk assessment report will be required for the development because:

- the type of deep foundation proposed has the potential to create preferential pathways for migration of ground gas to surface or groundwater to depth
- the type of foundation proposed may create preferential pathways for migration of this to deeper aquifers

10.3.5 Floor slabs

Due to the variable thickness of made ground and presence of soft clays, ground-bearing floor slabs would not be appropriate and suspended floor slabs should be used.

10.4 Excavations for foundations and services

Generally, the trial pits remained stable during excavation which indicates that excavations may potentially remain stable in the short term (1-2 hours). However, there is a strong likelihood that where excavations are to remain open for longer periods, there will be collapse/instability and therefore consideration should be given to the use of trench support systems, particularly in the southern half.

Man entry into any excavations should not be undertaken without provision of suitable shoring and support and dewatering or suitable regrading and battering of side slopes to safe angles. Confined spaces protocols for the Health and Safety of personnel should always be used where man entry into excavations is to be undertaken as low oxygen conditions may be present.

10.5 Chemical attack on buried concrete

This assessment of the potential for chemical attack on buried concrete at the site is based on BRE Special Digest 1: Concrete in aggressive ground, which represents the most up-to-date guidance on this topic currently available in the UK.

The desk study and site reconnaissance indicate that, for the purposes of assessing the aggressive chemical environment of the site, the site should be considered as comprising brownfield ground likely to contain pyrite.

Based on testing results, **Table 32** gives the characteristic pH, water-soluble and total sulphate content values for soils from each of the geological units and groundwater encountered on-site. Groundwater is not considered within this assessment.

Table 32 Characteristic pH, water soluble sulphate and total sulphate values

Stratum	pH	Water Soluble Sulphate (mg/l)	Total Potential Sulphate (%)
Fittleworth Member	7.8 – 8.6	<10 - 170	<0.03 – 0.30

Based on the results above and following the steps outlined in the BRE guidance, the Design Sulphate Classes and Aggressive Chemical Environment for Concrete classifications are summarised in **Table 33**, on the basis of water-soluble sulphate and total potential sulphate, respectively.

Table 33 Concrete design class

Stratum	Ground water	Water Soluble Sulphate		Total Potential Sulphate	
		DS Class	AC Class	DS Class	AC Class
Fittleworth Member	Mobile	DS-2	AC-2	DS-2	AC-2

Based on the above it is recommended that ACEC Classification of AC-2 with a Design Sulphate Class of DS-2 is used.

11 CONCLUSIONS AND RECOMMENDATIONS

11.1 Geo-environmental assessment

Based on the results of the site investigation and GQRA, the contaminant linkages that have been identified to be potentially complete (relevant contaminant linkages) and to require further action are:

- risk to future site users from oral, dermal and inhalation exposure with contaminants in the made ground (PAHs and asbestos)
- future service pipe - [direct contact with contaminated soils or groundwater and chemical attack]

The investigation has identified areas of made ground at the site (which appear to be located in south-eastern and central areas of the site which have been subject to historical phases of redevelopment) are present, which include asbestos and, locally PAH – impacted soils. However, it should also be noted that asbestos contamination can be extremely localised, and it may not be possible to delineate asbestos contamination within the made ground.

However, no asbestos has been detected in any of the 20no samples of topsoil tested for an asbestos screen, nor have any contaminants been detected in excess of generic assessment criteria within the topsoil samples tested. Therefore, on the basis of these results it is considered that the topsoil material present at the site is suitable for re-use within a residential with private gardens end use scenario.. The distribution of made ground and topsoil, as encountered during the site investigation, is shown in Figure 3.

Visual and olfactory evidence of petroleum hydrocarbon contamination has been encountered within TP4, WS3, WS4 and WS6. located in the southeast of the site. Historical mapping indicates the presence of historical tanks in this vicinity. Petroleum hydrocarbon concentrations above the GACs were identified in visually identifiable hydrocarbon impacted natural soils at WS3 from 2.50 m to 2.60 m bgl. Exceedances were detected for aliphatic fraction >EC8-EC10, >EC10- EC12; and aromatic fractions >EC8-EC10, >EC10-EC12, and >EC12-16. Given the depth of this sample (assuming basements are not proposed in this vicinity or site levels are otherwise not significantly reduced in this vicinity), these exceedances are considered unlikely to pose a significant risk to human health.

Low levels of total coliforms and faecal coliforms were encountered within TP9 and TP10. However, within WS1 total coliforms from both soil samples collected from this borehole are recorded as 21,077 cfu/g and >112,918 cfu/g respectfully indicating a presence of potential buried sewage sludge. However, given that coliforms would be expected to degrade significantly over time, the coliforms concentrations would not be expected to pose a significant risk to human health assuming all sewage sludge is removed during decommissioning.

A contaminant linkage to end users of a residential development is not considered to exist via vapour inhalation pathways.

A contaminant linkage to controlled waters is not considered to exist.

A relevant contaminant may exist associated with organic contaminants and therefore pollutant polyethylene (PE) and/or polyvinyl chloride (PVC) water supply pipes are expected to be unsuitable within areas where made ground or hydrocarbon impacted ground is present for use on the development unless remedial measures are implemented that mitigate the risk.

Based on the current understanding of the conceptual site model and the assessment undertaken, the site has been classified as CS1 with respect to methane and carbon dioxide. Considering the foregoing and in accordance with BS8485, ground gas protective measures are not considered necessary within proposed buildings in the eastern half of the site, however consideration with regard to basic radon precautions for the western half need to be allowed for at this stage.

The investigation undertaken to date has incorporated an appropriate number of ground gas monitoring visits, the data is considered reliable, and spatially representative of the site. It is also noted that 1 round was completed during low and falling atmospheric pressure (<1000 mb) indicating that possible worst-case conditions have been present during monitoring. However, it is recommended that a further 3no monitoring visits are undertaken in order to confirm the Characteristic Situation 1 classification.

It is considered likely that residential development of the site would require remedial action to render the development suitable for the proposed residential with gardens end use. Within proposed garden/soft landscaping, it is proposed that where there is made ground (due to asbestos and polyaromatic hydrocarbon compound contamination) the incorporation of a clean cover of 600 mm/450 mm respectively is allowed for. Such a clean cover system would not necessitate soil removal off site, for example if it were site levels were raised to accommodate the thickness. Allowance should also be made for site arisings to be incorporated beneath any such cover system.

A separate Remediation Strategy will need to be produced (including a discovery strategy for any isolated unknown contamination encountered during demolition/site preparation works) and agreed with the statutory authorities.

Disposal of excess soils for off site disposal will need further assessment for waste acceptance classification.

11.2 Geotechnical

The key findings of the initial geotechnical assessment are as follows:

- Low rise housing may be founded upon lightly reinforced conventional strip foundations within the majority of the northern half of the site, whilst over the remainder there is a need to allow for piling at this stage. The possibility of an alternative to piling (i.e lightly reinforced strip foundations upon ground improved soils) is to be assessed further;
- The use of ground floor slabs is considered unsuitable due to the presence of soft natural soils, such that it is recommended that floor slabs are suspended;

- An ACEC Classification of AC-2 with a Design Sulphate Class of DS 2 can be utilised on the site; and
- It is anticipated that a foundation works risk assessment report will be required for the development.

11.3 Recommendations

The following recommendations are made for further assessment of the site to investigate the risks identified above and to address remaining uncertainties:

- deep boreholes for piled foundation design.
- a further 3no ground gas monitoring visits are recommended to confirm the Characteristic Situation 1 classification
- radon requirements within the western half of the site.

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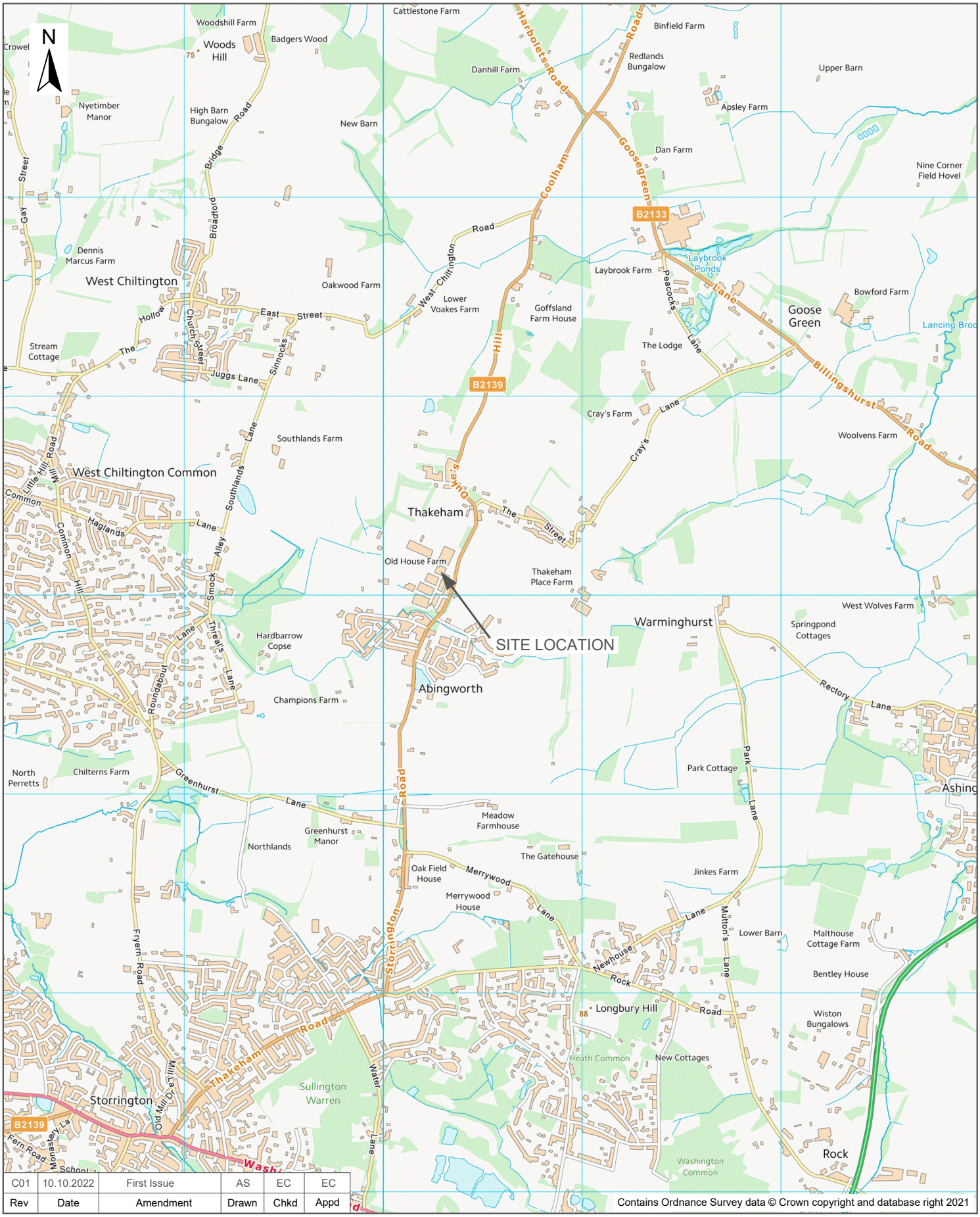
FIGURES

FIGURE 1 SITE LOCATION PLAN



Rev	Date	Amendment	Drawn	Chkd	Appd
C01	10.10.2022	First Issue	AS	EC	EC

RSK GEOSCIENCES
Unit 26 Premier Way
Abbey Park Industrial Estate
Romsey
S051 9AQ
Tel: +44(0)1794 329276
Email: info@rsk.co.uk
Web: www.rsk.co.uk

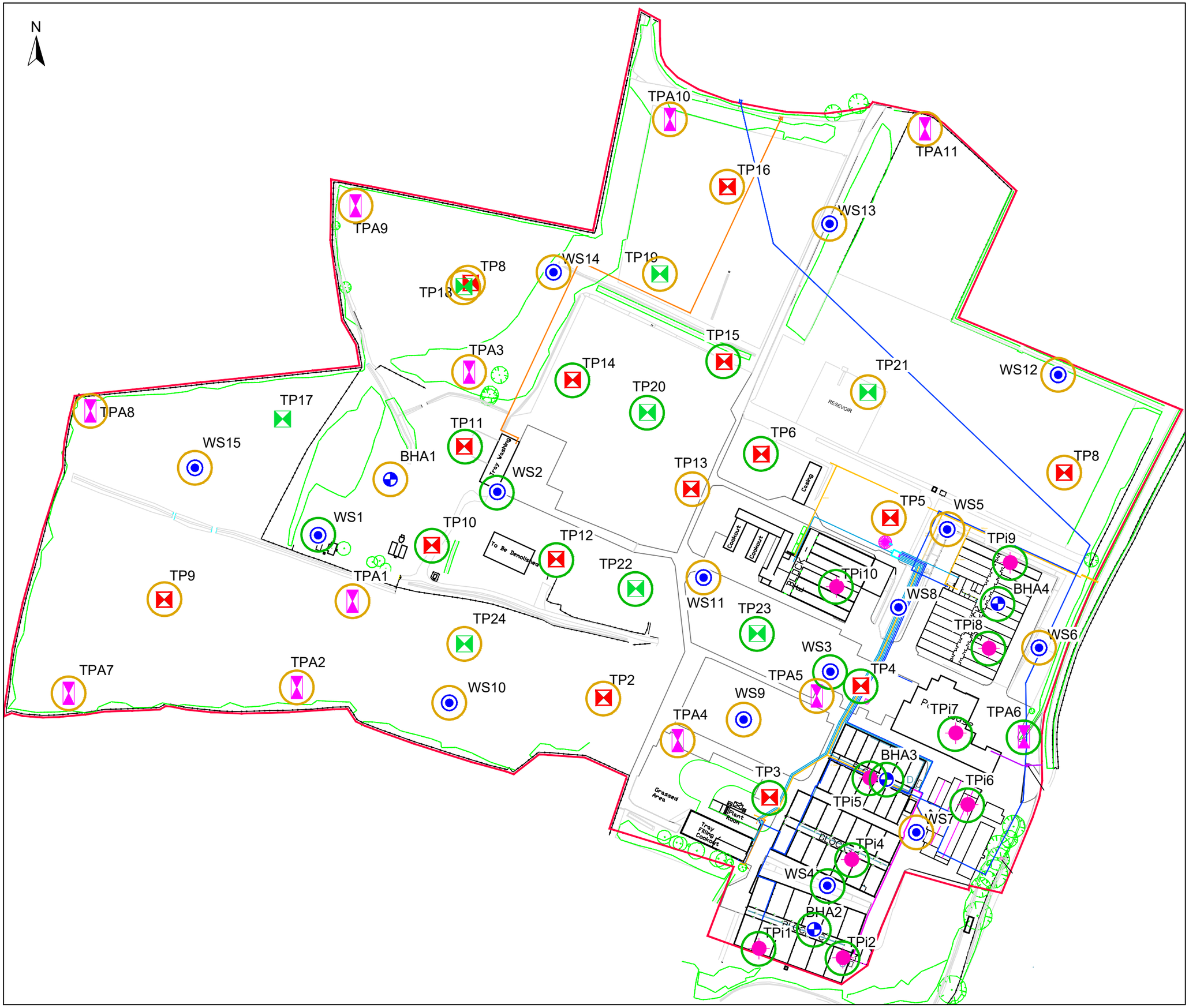
Client: Monagham Mushrooms Ltd

Project Name: Storrington Road, Thakeham

Description: Site Location Plan

Dimension	Size	Scale	Geolocation	Project ID	Drawing no.	Rev	File name
m	A4	1:25,000	510291,117117	305276	11101	C01	305276-ST-111-SS-D-C-11101-C01

FIGURE 2 EXPLORATORY HOLE LOCATION PLAN



LEGEND

- Site boundary
- Trial Pit Location
- Window Sample Location
- Internal Boreholes with groundwater install
- External trial pit locations
- Supplements trial pits
- Internal trial Pitting
- Topsoil encountered at exploratory location
- Made ground encountered at exploratory location

Rev	Date	Amendment	Drawn	Chkd	Appd
C01	15.12.22	First Issue	AS	EC	EC

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Web: www.rsk.co.uk

Client: Monagham Mushrooms Ltd

Project Name: Storrington Road, Thakeham

Description: Exploratory Hole Location Plan

Project ID	Drawing no.	Revision
305276	22202	C01

File name: 305276-ST-222-SS-D-C-22202-C01

Dimensions	Scale	Size
m	1:2500	A3

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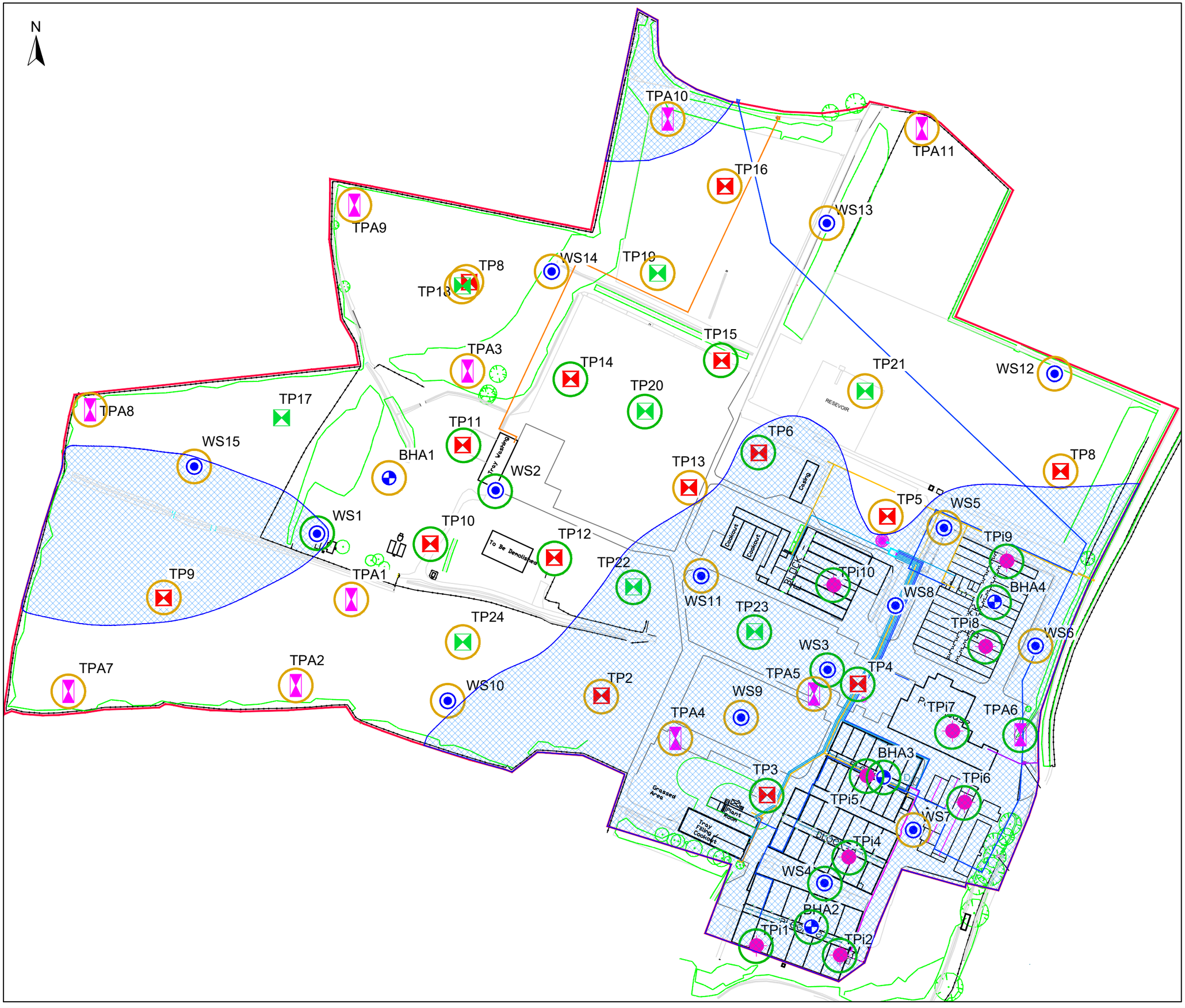
FIGURE 3 FOUNDATION ZONING PLAN



Rev	Date	Amendment	Drawn	Chkd	Appd
C01	19.12.22	First Issue	BS	EC	EC

RSK GEOSCIENCES
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Web: www.rsk.co.uk

Client
Monagham Mushrooms Ltd

Project Name
Storrington Road, Thakeham

Description
Piled Foundation Zone Plan

Project ID	Drawing no.	Revision
305276	24001	C01

File name
305276-ST-240-SS-D-C-24001-C01

Dimensions	Scale	Size
m	1:2500	A3

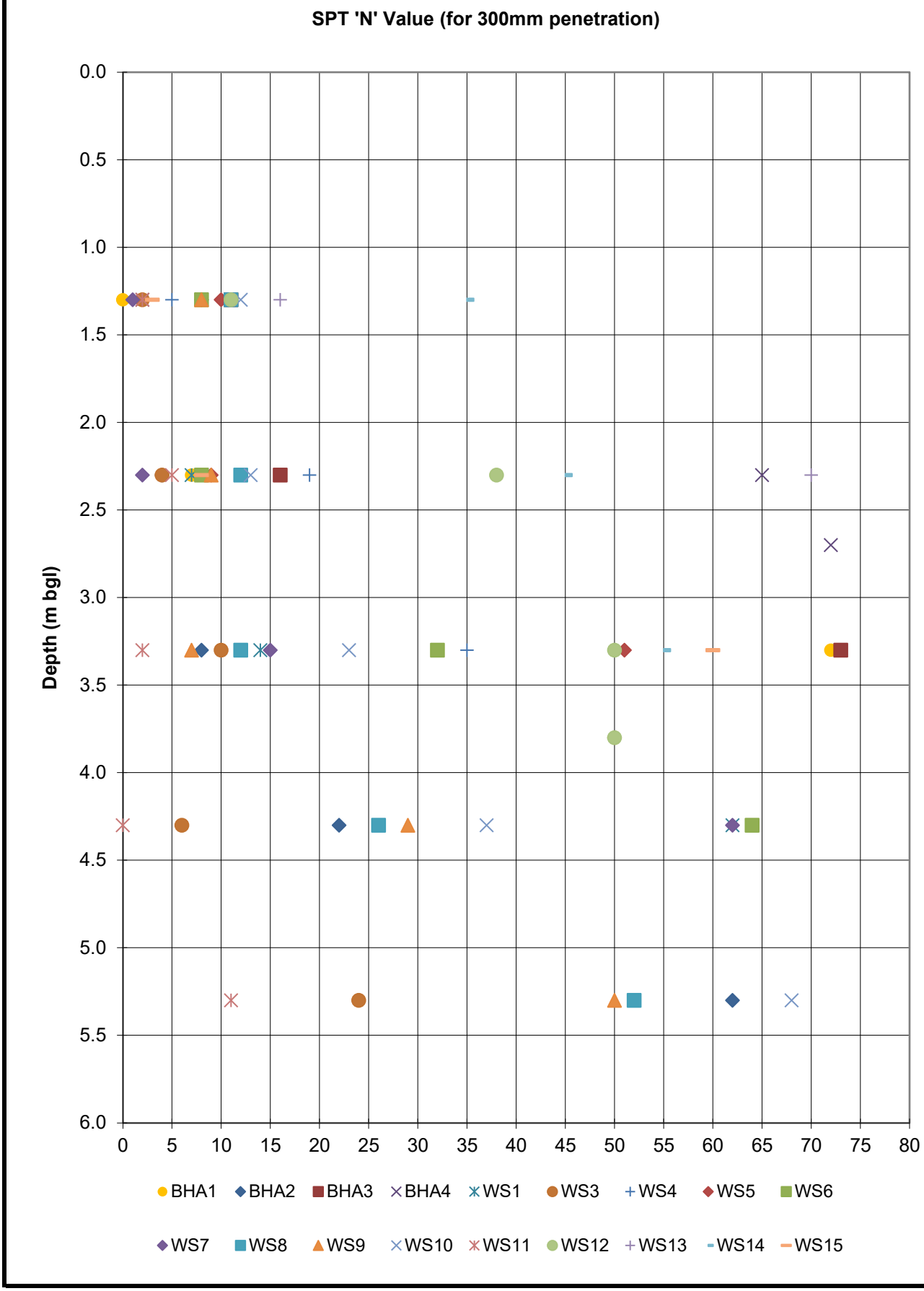
0 20 40 60 80 100m

FIGURE 4 SPT V DEPTH PLOT

RSK GEOSCIENCES

SPT 'N' Value vs Depth (m bgl)

Site:	Client:	Job Number:	305276
Storrington Road, Thakeham	Monaghan Mushrooms Limited	Figure:	5



Appendix D

GAS MONITORING FIELD SHEET

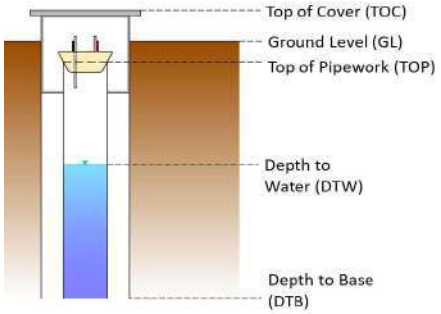
Monitoring Date:	07/12/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	3	Device:	GA5000	
First monitoring visit due to previous visits being wat		Weather:	Overcast	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:	Yes	
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	BHA1	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	09:50	09:58	1020	-0.02	Observations (e.g. on-site activities):	
Time End (hh:mm)	09:53	10:00				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.3	0.1	21.3	1	0		0
5	0	15	0.3	3.2	19.3	1	0		
10	0	30	0.3	3.2	17.7	1	0		0.4
15	0	60	0.3	3.2	17.1	1	0		0.4
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.39	Time:	10:00:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	2.04	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No
	Sample Media: Gas/Water	N/A
First monitoring visit due to previous visits being waterlogged.	Gas Cannister Start (mb)	
	Gas Cannister End (mb)	
	Gas Cannister Duration (mins)	

Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

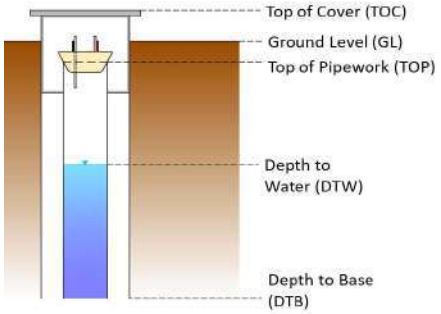
Monitoring Date:	23/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	11	Device:	GA5000	
		Weather:	Partly cloudy	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS1	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	14:58	15:00	991	0	Observations (e.g. on-site activities):	
Time End (hh:mm)	14:58	15:02				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.2	0.1	21.5	1	0		0
5	0	15	0.2	1.3	21.1	0	0		0.1
10	0	30	0.2	1.2	20.6	0	0		0.2
15	0	60	0.2	0.8	20.9	0	0		0.2
20	0	90	0.2	0.6	21.1	0	0		0.2
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.22	Time:	15:04:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	3.9	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

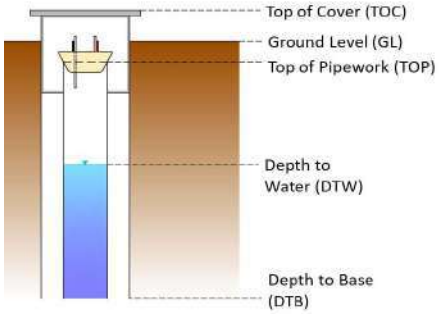
Monitoring Date:	28/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	8	Device:	GA5000	
		Weather:	Partly cloudy dry	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS1	Monitoring Round Number:	2	Test Number:	2	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	12:53	13:05	1006	0.03	Observations (e.g. on-site activities):	
Time End (hh:mm)	12:56	13:09				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.2	0.2	21.3	1	0		0.2
5	0	15	0.2	3.1	18	1	0		0.4
10	0	30	0.2	2.7	11.9	1	0		0.4
15	0	60	0.2	2.3	13.7	1	0		0.3
20	0	90	0.2	1.9	14.9	1	0		0.3
25	0	120	0.2	1.7	15.7	0	0		0.3
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	0.97	Time:	13:09:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	4.89	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

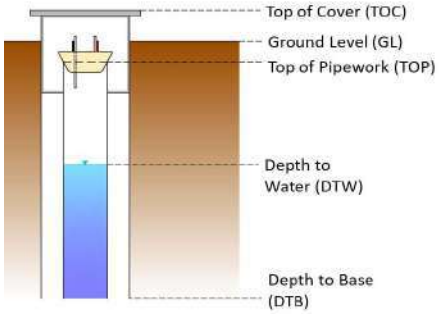
Monitoring Date:	07/12/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	3	Device:	GA5000	
		Weather:	Overcast	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:	Yes	
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS1	Monitoring Round Number:	3	Test Number:	3	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	10:31	10:32	1020	0.03	Observations (e.g. on-site activities):	
Time End (hh:mm)	10:32	10:34				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.3	0.2	21.3	0	0		0
5	0	15	0.3	3	18.8	0	0		0
10	0	30	0.3	2.9	16.3	0	0		0.1
15	0	60	0.3	2.6	16.5	0	0		0.1
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.54	Time:	10:34:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	3.85	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

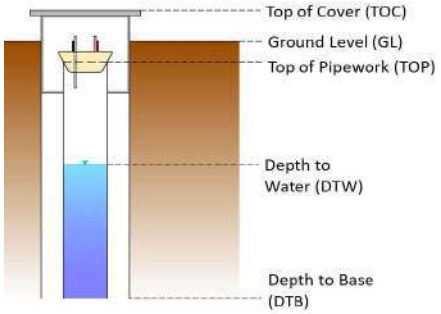
Monitoring Date:	23/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	11	Device:	GA5000	
		Weather:	Partly cloudy	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS3	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	11:55	12:01	987	30.03	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:56	12:03				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.1	0.1	21.2	1	0		
5	0	15	0.1	0.1	21.4	1	0		
10	0	30	0.1	0.1	21.3	1	0		
15	0	60	0.1	0.1	21.2	1	0		0.4
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	2.05	Time:	12:05:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	4.89	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

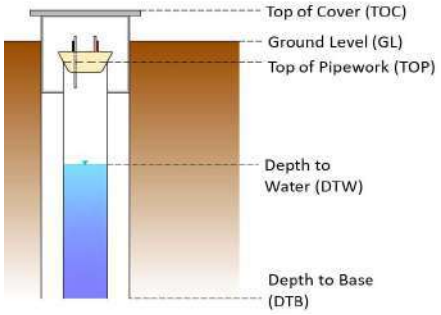
Monitoring Date:	28/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	8	Device:	GA5000	
		Weather:	Partly cloudy dry	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS3	Monitoring Round Number:	2	Test Number:	2	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	11:36	11:43	1016	-0.05	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:39	11:45				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.1	1.8	19	1	0		0.1
5	0	15	0.1	5.6	10.1	1	0		4.3
10	0	30	0.1	5.5	2.5	1	0		4.4
15	0.1	60	0.1	5.5	2.3	1	0		5
20	0.1	90							
25	0.2	120							
30	0.2	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0.2	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0.2	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.09	Time:	11:47:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	4.96	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

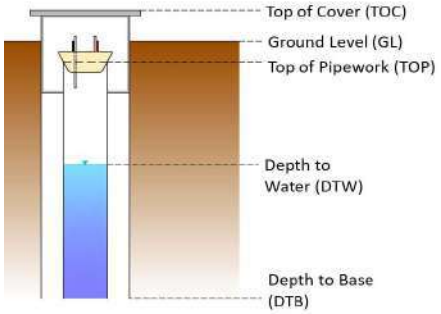
Monitoring Date:	07/12/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	3	Device:	GA5000	
		Weather:	Overcast	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:	Yes	
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS3	Monitoring Round Number:	1	Test Number:	3	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	12:21	12:22	1018	0.12	Observations (e.g. on-site activities):	
Time End (hh:mm)	12:22	12:24				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.2	0.2	21.1	1	0		0.2
5	0	15	0.2	5.7	3.4	1	0		0.3
10	0	30	0.2	5.8	1.8	1	0		0.4
15	0	60	0.2	5.8	1.7	1	0		0.4
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.94	Time:	12:27:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	3.04	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

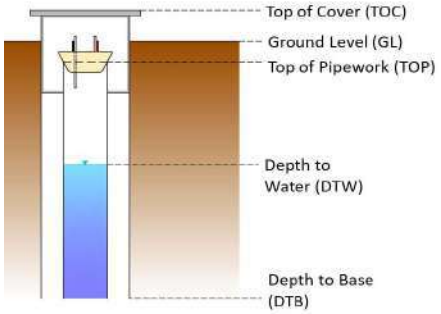
Monitoring Date:	23/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	11	Device:	GA5000	
		Weather:	Partly cloudy	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS4	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	13:21	13:23	989	-0.07	Observations (e.g. on-site activities):	
Time End (hh:mm)	13:21	13:25				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.2	0.2	21.3	5.6	0		
5	0	15	0.2	5.5	15.4	4	0		
10	0	30	0.2	5.4	15.1	4	0		0.4
15	0	60	0.2	5.1	15.3	3	0		0.4
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	0.7	Time:	13:04:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	3.86	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

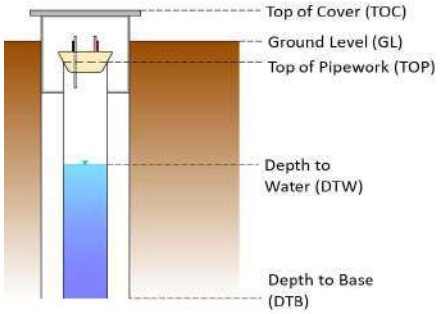
Monitoring Date:	28/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	8	Device:	GA5000	
		Weather:	Partly cloudy dry	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS4	Monitoring Round Number:	2	Test Number:	2	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	11:47	11:56	1016	-0.05	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:50	11:57				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.1	4.4	19	0	0		0.5
5	0	15	0.1	4.9	19	2	0		0.5
10	0	30	0.1	5	19.1	2	0		0.6
15	0	60	0.1	5	19.1	2	0		0.5
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	0.67	Time:	12:00:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	3.84	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

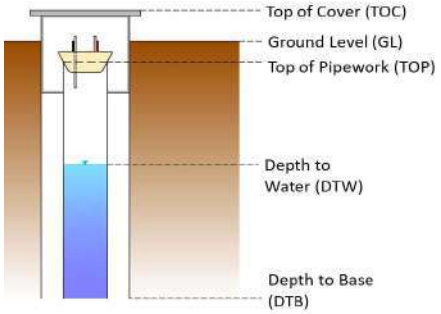
Monitoring Date:	07/12/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	3	Device:	GA5000	
		Weather:	Overcast	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:	Yes	
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS4	Monitoring Round Number:	3	Test Number:	3	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	11:23	11:25	1019	0.09	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:25	11:26				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.3	0.2	21.4	1	0		0
5	0	15	0.3	7.1	12.5	0	0		0.2
10	0	30	0.3	7.2	4	1	0		0.2
15	0	60	0.3	7.2	3.5	1	0		0.2
20	0	90	0.3	7.2	3.4	1	0		0.2
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.42	Time:	11:28:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	3.86	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

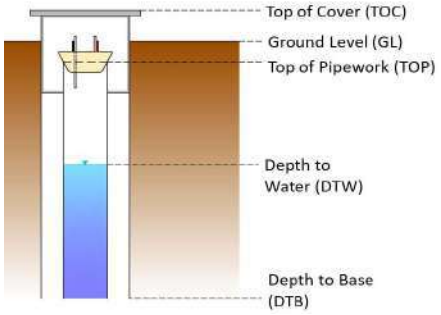
Monitoring Date:	23/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	11	Device:	GA5000	
		Weather:	Partly cloudy	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS5	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	11:26	11:30	987	38.55	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:29	11:32				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.2	0.1	20.9	1	0		0
5	0	15	0.2	0.1	21.5	1	0		0
10	0	30	0.1	0.1	21.4	1	0		0
15	0	60	0.1	0	21.3	1	0		0
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.75	Time:	11:26:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	3.55	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

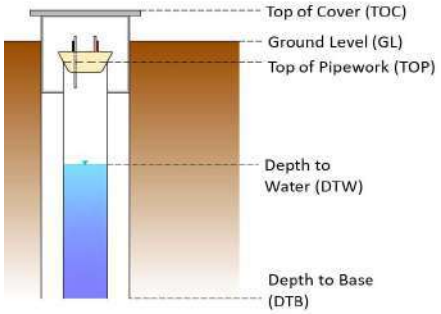
Monitoring Date:	28/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	8	Device:	GA5000	
		Weather:	Partly cloudy dry	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS5	Monitoring Round Number:	2	Test Number:	2	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	11:06	11:06	1004	0.1	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:06	11:04				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.2	0.1	20.6	0	0		0.1
5	0	15	0.1	0.2	20	0	0		0
10	0	30	0.1	0.3	19.9	0	0		0
15	0	60	0.1	0.4	19.6	0	0		
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.35	Time:	11:21:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	3.51	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

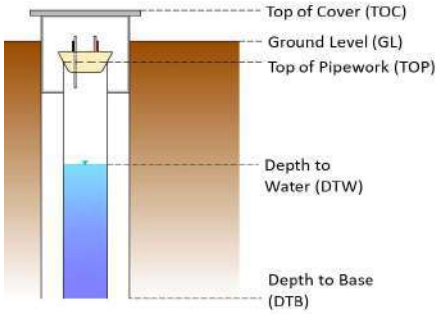
Monitoring Date:	07/12/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	3	Device:	GA5000	
		Weather:	Overcast	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:	Yes	
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS5	Monitoring Round Number:	3	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	12:54	12:55	1017	0.14	Observations (e.g. on-site activities):	
Time End (hh:mm)	12:55	12:57				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.3	0.2	21.5	1	0		0
5	0	15	0.2	6.7	12.4	1	0		0.1
10	0	30	0.2	6.7	10.3	1	0		0.1
15	0	60	0.2	6.8	9.9	0	1		0.1
20	0	90	0.2	6.8	9.8	1	0		0.1
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	2.14	Time:	12:58:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	3.55	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

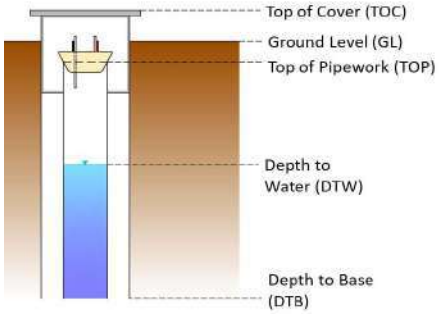
Monitoring Date:	23/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	11	Device:	GA5000	
		Weather:	Partly cloudy	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS6	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	12:58	13:00	988	0.03	Observations (e.g. on-site activities):	
Time End (hh:mm)	12:58	12:46				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.2	0.1	21.4	8	0		
5	0	15	0.2	1.4	17.1	10	0		
10	0	30	0.2	1.8	15	7	0		
15	0	60	0.1	2.9	11.2	4	0		0.4
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.76	Time:	12:34:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	4	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

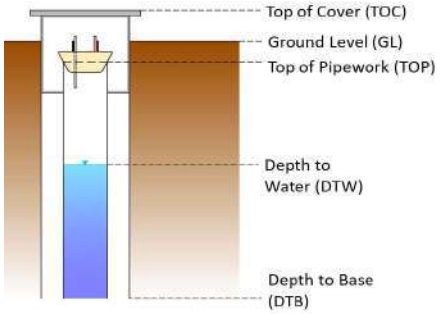
Monitoring Date:	28/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	8	Device:	GA5000	
		Weather:	Partly cloudy dry	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS6	Monitoring Round Number:	2	Test Number:	2	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	14:13	14:15	1005	0	Observations (e.g. on-site activities):	
Time End (hh:mm)	14:16	14:17				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.3	2.3	20.5	4	0		0.1
5	0	15	0.2	3.1	15.8	2	0		0.4
10	0	30	0.2	3.5	9.4	2	0		0.4
15	0	60	0.2	3.6	8.9	1	0		0.4
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.41	Time:	14:19:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	3.96	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

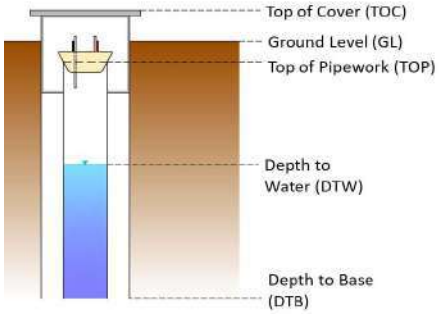
Monitoring Date:	07/12/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	3	Device:	GA5000	
		Weather:	Overcast	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:	Yes	
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS6	Monitoring Round Number:	3	Test Number:	3	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	14:28	14:31	1016	0	Observations (e.g. on-site activities):	
Time End (hh:mm)	14:31	14:33				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.2	0.2	21.6	3	0		0
5	0	15	0.2	4.1	10.3	1	0		0.1
10	0	30	0.2	4.1	8.9	1	0		0.1
15	0	60	0.2	4.1	8.7	1	0		0.1
20	0	90	0.2	4.1	8.7	1	0		0.1
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	2.25	Time:	14:37:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	3.94	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

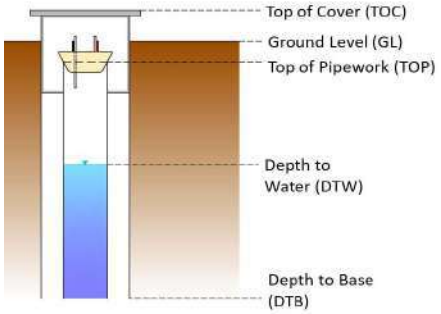
Monitoring Date:	23/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	11	Device:	GA5000	
		Weather:	Partly cloudy	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS8	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	12:20	12:22	988	24.47	Observations (e.g. on-site activities):	
Time End (hh:mm)	12:21	12:24				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.1	0.1	21.6	1	0		0.8
5	0	15	0	2.9	20.8	1	0		0.8
10	0	30	0.1	2.8	17.4	1	0		0.8
15	0	60	0.1	2.8	17	1	0		0.8
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	2.49	Time:	12:05:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	4.5	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

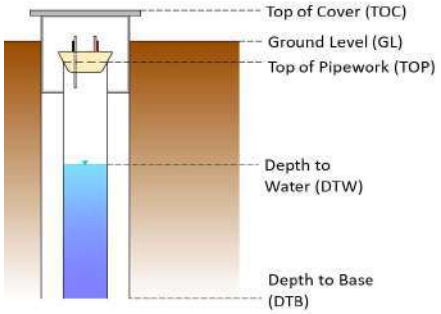
Monitoring Date:	28/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	8	Device:	GA5000	
		Weather:	Partly cloudy dry	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS8	Monitoring Round Number:	2	Test Number:	2	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	11:32	11:32	1016	-0.05	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:32	11:34				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	-0.1	0	0.1	0.3	20.1	3	0		0.1
5	-0.1	15	0.1	2.2	19.2	2	0		0.1
10	-0.1	30	0.1	2.2	18.6	1	0		0.4
15	-0.1	60	0.1	2.2	18.6	1	0		0.4
20	-0.1	90							
25	-0.1	120							
30	-0.1	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	-0.1	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	-0.1	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.76	Time:	11:34:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	4.7	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

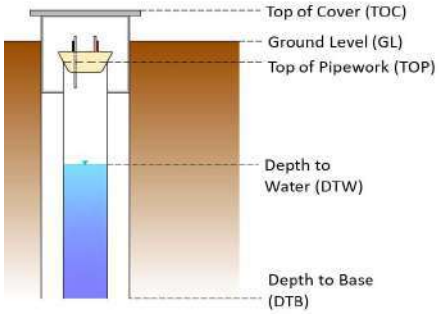
Monitoring Date:	07/12/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	3	Device:	GA5000	
		Weather:	Overcast	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:	Yes	
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS8	Monitoring Round Number:	3	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	12:36	12:39	1017	0.05	Observations (e.g. on-site activities):	
Time End (hh:mm)	12:39	12:41				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.3	0.2	21.3	1	0		0
5	0	15	0.3	3	18.4	0	0		0.2
10	0	30	0.3	3	17	0	0		0.2
15	0	60	0.2	3	16.8	0	0		0.2
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	2.62	Time:	12:41:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	4.47	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

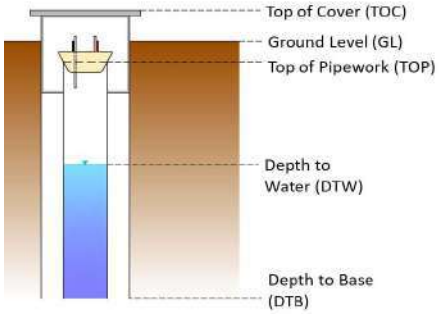
Monitoring Date:	23/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	11	Device:	GA5000	
		Weather:	Partly cloudy	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS9	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	15:24	15:23	991	-0.05	Observations (e.g. on-site activities):	
Time End (hh:mm)	15:24	15:25				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.3	0.1	21.6	5	0		
5	0	15	0.3	2.7	20.8	2	0		
10	0	30	0.2	2.7	20.6	2	0		
15	0	60	0.2	2.7	20.6	2	0		1.5
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	0.7	Time:	15:27:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	4.92	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

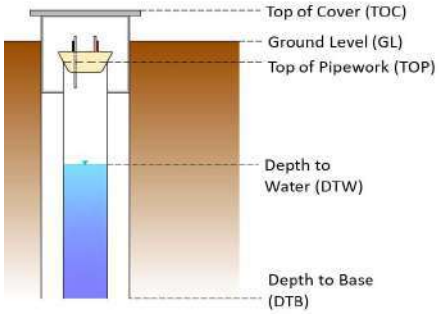
Monitoring Date:	28/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	8	Device:	GA5000	
		Weather:	Partly cloudy dry	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS9	Monitoring Round Number:	2	Test Number:	2	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	12:01	12:16	1005	0.07	Observations (e.g. on-site activities):	
Time End (hh:mm)	12:16	12:18				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.2	0.3	21.5	1	0		0.1
5	0	15	0.5	1.7	21.3	2	0		0.4
10	0	30	0.2	1.5	21.2	1	0		0.8
15	0	60	0.2	1.1	21.3	1	0		0.8
20	0	90	0.2	1.1	21.4	1	0		0.6
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	0.82	Time:	12:19:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	4.9	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

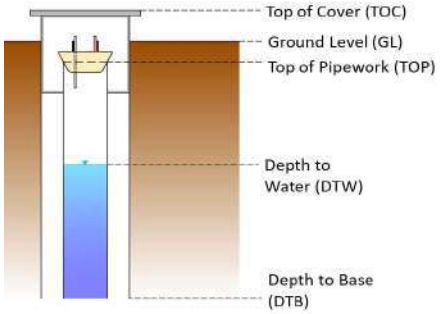
Monitoring Date:	07/12/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	3	Device:	GA5000	
		Weather:	Overcast	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:	Yes	
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS9	Monitoring Round Number:	3	Test Number:	3	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	11:45	11:48	1018	0	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:47	11:49				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.2	0.3	20.8	1	0		0
5	0	15	0.2	2.8	18.7	1	0		1.2
10	0	30	0.2	2.6	20.2	1	0		1
15	0	60	0.2	2.2	20.3	1	0		1
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.08	Time:	11:52:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	4.87	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

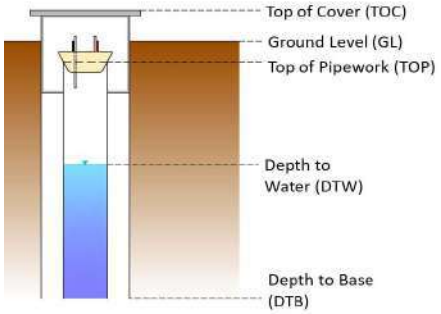
Monitoring Date:	23/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	11	Device:	GA5000	
		Weather:	Partly cloudy	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS10	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	14:13	14:16	990	0.07	Observations (e.g. on-site activities):	
Time End (hh:mm)	14:14	14:18				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0.7	0	0.2	0.1	21.6	1	0		0.8
5	0.9	15	0.2	3	9	1	0		1.3
10	1.1	30	0.2	3	8.8	2	0		1.5
15	1.3	60	0.2	3	8.6	2	0		2.4
20	1.5	90							
25	1.6	120							
30	1.7	180							
40	1.8	240							
50	1.7	300							
60	1.5	360							
90	1	420							
120	0.5	480							
150	0.2	540							
180	0.2	600							

Stage 1 gas flow - Peak (l/h)	1.8	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0.2	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	0.6	Time:	14:19:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	4.89	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

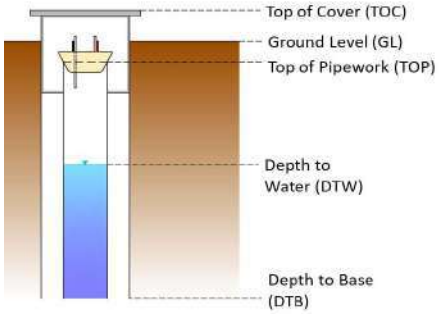
Monitoring Date:	28/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	8	Device:	GA5000	
		Weather:	Partly cloudy dry	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS10	Monitoring Round Number:	2	Test Number:	2	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	12:50	12:50	1005	0	Observations (e.g. on-site activities):	
Time End (hh:mm)	12:50	12:52				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	-4	0	0.2	3	20.8	1	0		0.4
5	-4.1	15	0.2	3	19.1	1	0		0.6
10	-4.2	30	0.2	3	17.6	1	0		1.5
15	-4.8	60	0.2	3	17.4	1	0		1.5
20	-4.9	90							
25	-5	120							
30	-5.2	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	-5.1	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	-5.2	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	0.4	Time:	12:52:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	4.97	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

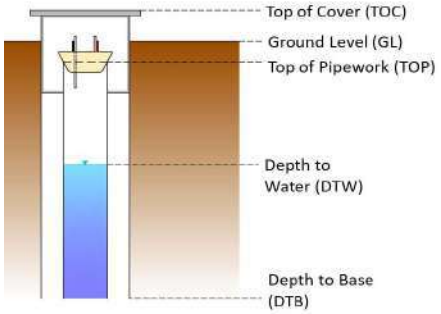
Monitoring Date:	07/12/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	3	Device:	GA5000	
		Weather:	Overcast	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:	Yes	
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS10	Monitoring Round Number:	3	Test Number:	3	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	10:47	10:51	1020	0.07	Observations (e.g. on-site activities):	
Time End (hh:mm)	10:50	10:52				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.3	0.2	21.4	1	0		
5	0	15	0.3	3.5	11.3	1	0		0.4
10	0	30	0.3	3.5	9.7	1	0		0.4
15	0	60	0.3	3.5	9	1	0		0.4
20	0	90	0.3	3.5	8.9	1	0		0.5
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.54	Time:	10:53:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	3.98	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

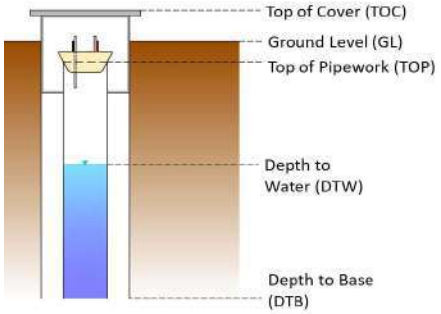
Monitoring Date:	23/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	11	Device:	GA5000	
		Weather:	Partly cloudy	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS11	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	13:50	13:50	990	-0.03	Observations (e.g. on-site activities):	
Time End (hh:mm)	13:50	13:52				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.2	0.2	21.6	1	0		
5	0	15	0	2.9	20.6	1	0		
10	0	30	0	2.9	20.2	1	0		0.9
15	0	60	0	2.9	20.1	1	0		1
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.08	Time:	13:53:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	4.79	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

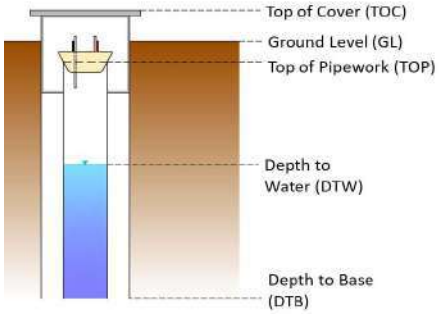
Monitoring Date:	28/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	8	Device:	GA5000	
		Weather:	Partly cloudy dry	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS11	Monitoring Round Number:	2	Test Number:	2	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	12:20	12:20	1004	0	Observations (e.g. on-site activities):	
Time End (hh:mm)	12:23	12:30				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.2	0.2	21.5	1	0		0.1
5	0	15	0.2	3	21.4	1	0		0.9
10	0	30	0.2	3	20.3	1	0		1
15	0	60	0.2	3	20.3	1	0		1
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	0.9	Time:	12:33:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	4.76	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

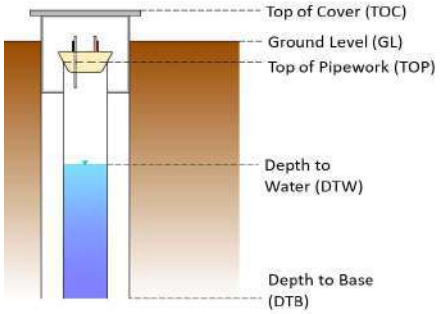
Monitoring Date:	07/12/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	3	Device:	GA5000	
		Weather:	Overcast	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:	Yes	
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS11	Monitoring Round Number:	3	Test Number:	3	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	11:59	12:01	1018	0.03	Observations (e.g. on-site activities):	
Time End (hh:mm)	12:01	12:03				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.2	0.1	20.1	1	0		
5	0	15	0.1	2.9	18.9	0	0		0.1
10	0	30	0.1	2.9	17.4	0	0		0.2
15	0	60	0.2	2.9	17.2	0	0		0.2
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.45	Time:	11:52:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	3.96	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

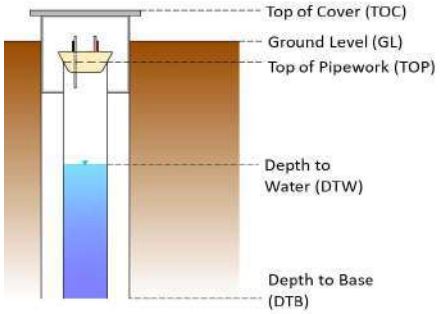
Monitoring Date:	23/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	11	Device:	GA5000	
		Weather:	Partly cloudy	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS12	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	11:00	11:09	985	37.14	Observations (e.g. on-site activities):	
Time End (hh:mm)	11:06	11:10				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.2	0.8	17.8	0	0		0.1
5	0	15	0.2	0.1	21.3	0	0		0.2
10	0	30	0.1	0.1	21.4	0	0		0.2
15	0	60	0.1	0.1	21.4	0	0		0.2
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	1.7	Time:	11:00:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	3.6	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

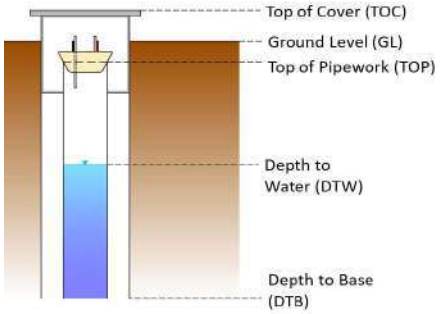
Monitoring Date:	28/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	8	Device:	GA5000	
		Weather:	Partly cloudy dry	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS12	Monitoring Round Number:	2	Test Number:	2	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	10:37	10:48	1003	0	Observations (e.g. on-site activities):	
Time End (hh:mm)	10:40	10:48				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.3	0.2	20.9	0	0		0.1
5	0	15	0.1	0.2	20.9	0	0		0.1
10	0	30							
15	0	60							
20	0	90							
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	0.97	Time:	10:50:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	3.59	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

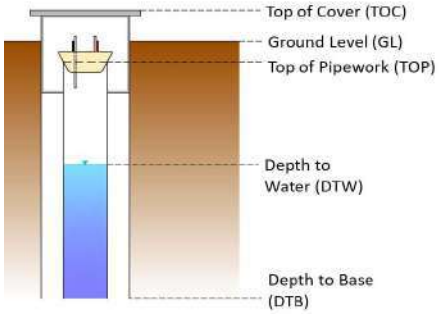
Monitoring Date:	07/12/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	3	Device:	GA5000	
		Weather:	Overcast	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:	Yes	
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS12	Monitoring Round Number:	3	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	13:15	13:20	1016	0.1	Observations (e.g. on-site activities):	
Time End (hh:mm)	13:19	13:22			Foul organic smell given off by well.	

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.2	0.3	21.3	1	0		0
5	0	15	0.2	4.3	17.8	1	0		0.1
10	0	30	0.2	4.3	15.1	0	0		0.1
15	0	60	0.2	4.3	14.9	0	0		0.1
20	0	90	0.2	4.3	14.8	0	0		0.1
25	0	120							
30	0	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	2.77	Time:	13:25:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	3.605	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

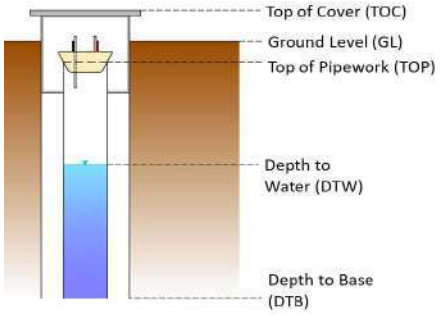
Monitoring Date:	23/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	11	Device:	GA5000	
		Weather:	Partly cloudy	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS13	Monitoring Round Number:	1	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	10:35	10:36	985	0.02	Observations (e.g. on-site activities):	
Time End (hh:mm)	10:36	10:38				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0.4	0	0.2	0.1	21.4	14	0		1.2
5	0.5	15	0.2	1.4	10.8	1	0		1.2
10	0.5	30	0.2	1.3	11.5	1	0		0
15	0.5	60	0.2	1.3	12.1	1	0		0
20	0.5	90							
25	0.5	120							
30	0.5	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0.5	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	0.5	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	0	Time:	10:25:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	0	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

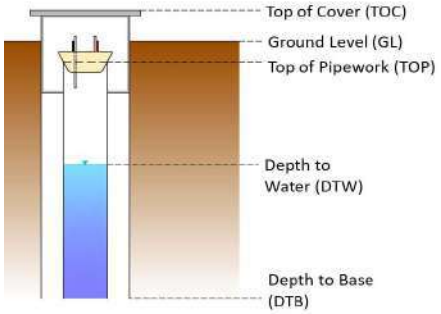
Monitoring Date:	28/11/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	8	Device:	GA5000	
		Weather:	Partly cloudy dry	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:		
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS13	Monitoring Round Number:	2	Test Number:	2	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)	50	

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	10:26	10:31	1003	-0.03	Observations (e.g. on-site activities):	
Time End (hh:mm)	10:29	10:33				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0	0	0.3	0.2	21	3	0		0
5	0	15	0.3	1.4	11.7	0	0		0
10	-0.1	30	0.3	1.3	10.5	0	0		0
15	-0.1	60							
20	-0.1	90							
25	-0.1	120							
30	-0.1	180							
40		240							
50		300							
60		360							
90		420							
120		480							
150		540							
180		600							

Stage 1 gas flow - Peak (l/h)	0	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	-0.1	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	0.15	Time:	10:37:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	2	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

GAS MONITORING FIELD SHEET

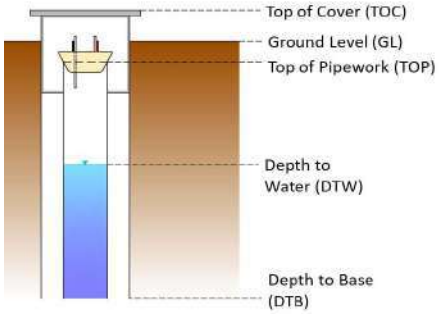
Monitoring Date:	07/12/2022	Measurement datum: TOC / GL / TOP / Other	TOC	Offset to GL (m):		0
Pre-Testing Remarks:		Air Temperature: °C	3	Device:	GA5000	
		Weather:	Overcast	Serial Number:	G505800	
		Ground Conditions:	Dry	Daily Check:	Yes	
		Wind: NONE / LIGHT / MEDIUM / STRONG		Light		
		Tidal State: (if applicable) High / Low / Rising / Falling		NA		
Exploratory Position ID:	WS13	Monitoring Round Number:	3	Test Number:	1	
Install Type: SINGLE / DOUBLE	Single	Pipe Ref: 1) Shallow 2) Deep	Shallow	Pipe Diameter: 19mm/ 40mm / 50mm / Other (mm)		50

Time of Monitoring (hh:mm)	Flow readings	Gas readings	Atmospheric Pressure (mb)	Differential Pressure (mb)	Gas tap: SINGLE / DOUBLE	Double
Time Start (hh:mm)	13:38	13:43	1015	0.05	Observations (e.g. on-site activities):	
Time End (hh:mm)	13:43	13:45				

Stage 1 Flow Readings	**Stage 1** Flow Readings	**Stage 2** Gas Monitoring:	Methane	Carbon Dioxide	Oxygen	Carbon monoxide	Hydrogen sulphide	LEL	PID
Time of flow monitoring (sec)	Flow Reading (l/hr)	Time of gas monitoring (sec)	(%/vol)	(%/vol)	(%/vol)	(ppm)	(ppm)	(%)	(ppm)
0	0.1	0	0.2	0.2	21.2	1	0		0
5	0.4	15	0.2	0.6	19.1	2	0		0.3
10	0.6	30	0.2	0.6	16.9	1	0		0.3
15	0.9	60							
20	1.1	90							
25	1.2	120							
30	1.2	180							
40	1.4	240							
50	1.4	300							
60	1.5	360							
90	1.7	420							
120	1.8	480							
150	1.9	540							
180	1.9	600							

Stage 1 gas flow - Peak (l/h)	1.9	**Note:** Flow should be recorded at 5 second intervals up to 30 seconds, 10 second intervals to 2 minutes and 30 second intervals up to 3 minutes or until steady-state readings are obtained. Typically, steady state conditions occur within 30 seconds to a minute. The differential pressure reading (in Pa) should also be recorded during this period.
Stage 1 gas flow - Steady State (l/h)	1.9	

STAGE 3 WATER LEVEL OBSERVATION						
	Depth (from datum) to water (DTW): (m)	0.26	Time:	13:45:00	LNAPL Top (from datum) (m):	
	Depth (from datum) to well base (DTB): (m)	1.98	Purge Start:		DNAPL Top (from datum) (m):	
	Hole Purged: Yes / No	No	Purge End:		Water Observations:	
	Purge Volume: (ltrs)		Post-Purge (DTW) (m)			



Post testing remarks:	Samples Taken: Yes / No	No		
	Sample Media: Gas/Water	N/A		
	Gas Cannister Start (mb)			
	Gas Cannister End (mb)			
	Gas Cannister Duration (mins)			
	Depth (from datum)	Sample Ref	Type (EW / G)	Container

RSK	Contract Name:	Storrington Road, Thakeham	Data Collected By:	James Lilley
	Project Manager / Engineer:	James Lilley	Checked:	
	Contract Ref:	305276	Page number:	

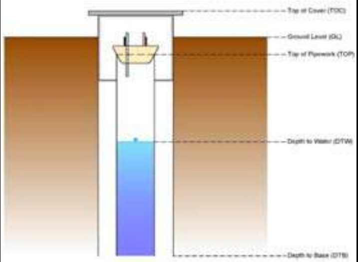
Groundwater Gauging Data Form

Project Information	Project Name:	Storrington Road, Thakeham		
	Project Number:	305276		
	Measurement Date:	04/10/2022	Sampled by:	James Lilley
	Weather:	Overcast		
	Well Notes - e.g. Condition, access, safety:			

Water Level Meter Used (X that applicable):			
Interface probe	X		

Measurement datum: ***Top Of Cover*** **(TOC),** ***Ground Level*** **(GL),** ***Top Of Pipework*** **(TOP).** If 'Ground Level', the offset from datum to GL will be 0m. **Record a positive offset if the datum is higher than GL or a negative offset if the datum is below GL.** See figure for definitions.

Measurement Datum:		Offset from **datum** to GL (m):	

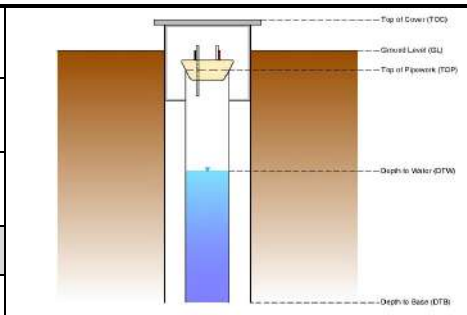


Time	**BH ID**	Offset from **datum** to GL (m)	Product present? (Y/N)	Depth to product from datum (m)	Type of product (LNAPL / DNAPL)	Depth to Water (m)	Depth to Base (m)	Notes
	WS1	0	N			3.700	3.860	
	WS3	0	N			4.450	4.920	PID 71.4ppm
	WS4	0	N			3.170	3.870	PID 0.3ppm
	WS5	0	N				3.530	Monitoring well Dry - PID 0.1ppm

Groundwater Sampling Data Form

This form is also available for RSK Mobile Data Capture.

Project Information	Project Name:	Storrington Road		
	Project Number:	305276		
	Sampling Date:	13/10/2022	Sampled by:	James Lilley
	Weather:	Overcast dry		
	Well Notes - e.g. Condition, access, safety:	YSI not used due to very low water level and slow recharge.		

Monitoring Information	Water Quality Meter Used:	YSI		
	Water Quality Meter Last Calibrated:			
	Dissolved oxygen probe last calibrated:			
	Water Level Meter Used (X that applicable):			
	Interface probe		Dip Meter	Yes

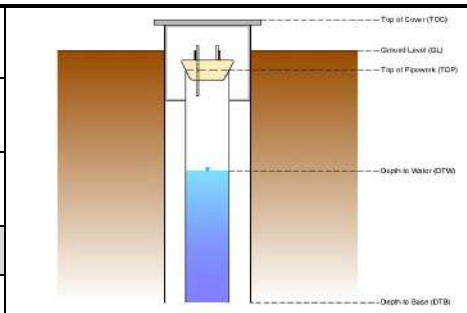
Typical Parameter Stabilisation Criteria for Low-Flow Sampling		
	Dissolved Oxygen (D.O.)	0.3 mg/l
	Specific Conductivity (Sp.Cond)	3%
	p.H	0.1 unit
	Oxygen Reduction Potential (ORP)	10mV
	* For REDOX correction, see separate guidance	

BH ID	WS1										
Measurement Datum Notes:	***Top Of Cover*** **(TOC),** ***Ground Level*** **(GL),** ***Top Of Pipework*** **(TOP).** If 'Ground Level', the offset from datum to GL will be 0m. **Record a positive offset if the datum is higher than GL or a negative offset if the datum is below GL.** See figure above for definitions.										
Measurement Datum:	GL						Offset from **datum** to GL (m):	0			
Start Time:	10:19:00	Time (HH:MM)	Temp (oC)	Sp.Cond (µS/cm)	D.O. (mg/l)	pH (units)	ORP (mV)	Depth to Water (m)	Turbidity (NTU)	Corr. REDOX (mV)	Notes / Flow (ml/min)
Well Diameter (mm)	50									YSI	<Select Probe
Well Material		10:19									
Initial Water Level (m)	3.67										
LNAPL Present? (Y/N)	No										
Initial LNAPL Level (m)											
Well Headspace Reading (PID/FID)											
Purge Method (Give details in Notes section)	Low Flow										
Sampling Method (Give details in Notes section.)	Peristaltic										
Pump Intake Depth (m)	3.77	Sampling Notes (e.g. oil/colour/odour), reasons if not monitored, include purge / sampling method if "Other" selected.									
Depth to Base (m)	3.87										
DNAPL Present? (Y/N)	No	Sample Containers Obtained						No			
Initial DNAPL Level (m)		Sample Collection Time						10:19:00			

Groundwater Sampling Data Form

This form is also available for RSK Mobile Data Capture.

Project Information	Project Name:	Storrington Road		
	Project Number:	305276		
	Sampling Date:	13/10/2022	Sampled by:	James Lilley
	Weather:	Overcast dry		
	Well Notes - e.g. Condition, access, safety:			

Monitoring Information	Water Quality Meter Used:	YSI		
	Water Quality Meter Last Calibrated:			
	Dissolved oxygen probe last calibrated:			
	Water Level Meter Used (X that applicable):			
	Interface probe		Dip Meter	Yes

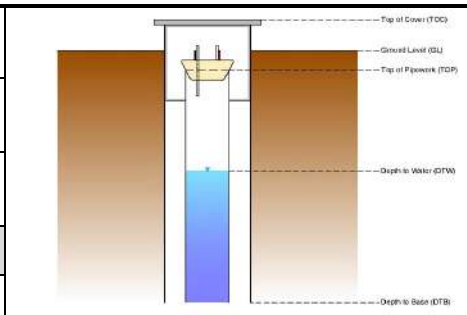
Typical Parameter Stabilisation Criteria for Low-Flow Sampling	Dissolved Oxygen (D.O.)	0.3 mg/l
	Specific Conductivity (Sp.Cond)	3%
	p.H	0.1 unit
	Oxygen Reduction Potential (ORP)	10mV
	* For REDOX correction, see separate guidance	

BH ID	WS3										
Measurement Datum Notes:	***Top Of Cover*** **(TOC),** ***Ground Level*** **(GL),** ***Top Of Pipework*** **(TOP).** If 'Ground Level', the offset from datum to GL will be 0m. **Record a positive offset if the datum is higher than GL or a negative offset if the datum is below GL.** See figure above for definitions.										
Measurement Datum:	TOC						Offset from **datum** to GL (m):	0			
Start Time:	12:37:00	Time (HH:MM)	Temp (oC)	Sp.Cond (µS/cm)	D.O. (mg/l)	pH (units)	ORP (mV)	Depth to Water (m)	Turbidity (NTU)	Corr. REDOX (mV)	Notes / Flow (ml/min)
Well Diameter (mm)	50									YSI	<Select Probe
Well Material	HDPE	13:04	16.2	2036	1.89	6.36	153.6			364.60	
Initial Water Level (m)	3.66	13:07	16.3	2036	1.83	6.35	151.8			362.80	
		13:10	16.6	2034	2.19	6.36	148.2			358.50	
LNAPL Present? (Y/N)	No	13:13	16.8	2036	2.2	6.37	145			355.30	
Initial LNAPL Level (m)		13:16	16.9	2039	1.88	6.38	142.7			353.00	
Well Headspace Reading (PID/FID)		13:19	16.9	2045	1.9	6.38	141.4			351.70	
Purge Method (Give details in Notes section)	Low Flow										
Sampling Method (Give details in Notes section.)	Peristaltic										
Pump Intake Depth (m)	4.66	Sampling Notes (e.g. oil/colour/odour), reasons if not monitored, include purge / sampling method if "Other" selected.									
Depth to Base (m)	4.93										
DNAPL Present? (Y/N)	No	Sample Containers Obtained					No				
Initial DNAPL Level (m)		Sample Collection Time					12:37:00				

Groundwater Sampling Data Form

This form is also available for RSK Mobile Data Capture.

Project Information	Project Name:	Storrington Road		
	Project Number:	305276		
	Sampling Date:	13/10/2022	Sampled by:	James Lilley
	Weather:	Overcast sunny		
	Well Notes - e.g. Condition, access, safety:			

Monitoring Information	Water Quality Meter Used:	YSI		
	Water Quality Meter Last Calibrated:			
	Dissolved oxygen probe last calibrated:			
	Water Level Meter Used (X that applicable):			
	Interface probe		Dip Meter	Yes

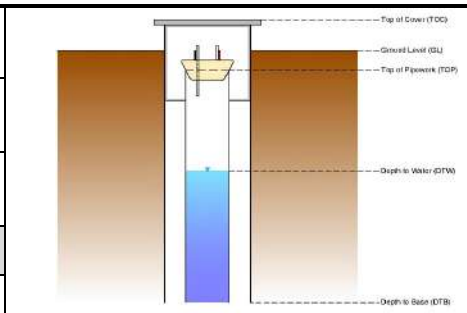
Typical Parameter Stabilisation Criteria for Low-Flow Sampling	Dissolved Oxygen (D.O.)	0.3 mg/l
	Specific Conductivity (Sp.Cond)	3%
	p.H	0.1 unit
	Oxygen Reduction Potential (ORP)	10mV
	* For REDOX correction, see separate guidance	

BH ID	WS4										
Measurement Datum Notes:	***Top Of Cover*** **(TOC),** ***Ground Level*** **(GL),** ***Top Of Pipework*** **(TOP).** If 'Ground Level', the offset from datum to GL will be 0m. **Record a positive offset if the datum is higher than GL or a negative offset if the datum is below GL.** See figure above for definitions.										
Measurement Datum:	TOC						Offset from **datum** to GL (m):	0			
Start Time:	14:41:00	Time (HH:MM)	Temp (oC)	Sp.Cond (µS/cm)	D.O. (mg/l)	pH (units)	ORP (mV)	Depth to Water (m)	Turbidity (NTU)	Corr. REDOX (mV)	Notes / Flow (ml/min)
Well Diameter (mm)	50									YSI	<Select Probe
Well Material	HDPE	14:41	16.4	1133	5.37	6.58	62.6	3.34		273.60	
Initial Water Level (m)	3.22	14:44	16.5	1124	2.27	6.58	65.4	3.39		275.70	
		14:47	16.3	1105	2.18	6.59	68.8	3.41		279.80	
LNAPL Present? (Y/N)	No	14:50	16.3	1098	2.16	6.6	72.5	3.43		283.50	
Initial LNAPL Level (m)		14:53	16.5	1092	2.34	6.61	76.9	3.46		287.20	
Well Headspace Reading (PID/FID)		14:56	16.5	1092	2.29	6.62	78.5	3.47		288.80	tarted due to lack
Purge Method (Give details in Notes section)	Low Flow										
Sampling Method (Give details in Notes section.)	Peristaltic										
Pump Intake Depth (m)	3.53										
Depth to Base (m)	3.86	Sampling Notes (e.g. oil/colour/odour), reasons if not monitored, include purge / sampling method if "Other" selected.									
DNAPL Present? (Y/N)	No	Sample Containers Obtained						No			
Initial DNAPL Level (m)		Sample Collection Time						13:20:00			

Groundwater Sampling Data Form

This form is also available for RSK Mobile Data Capture.

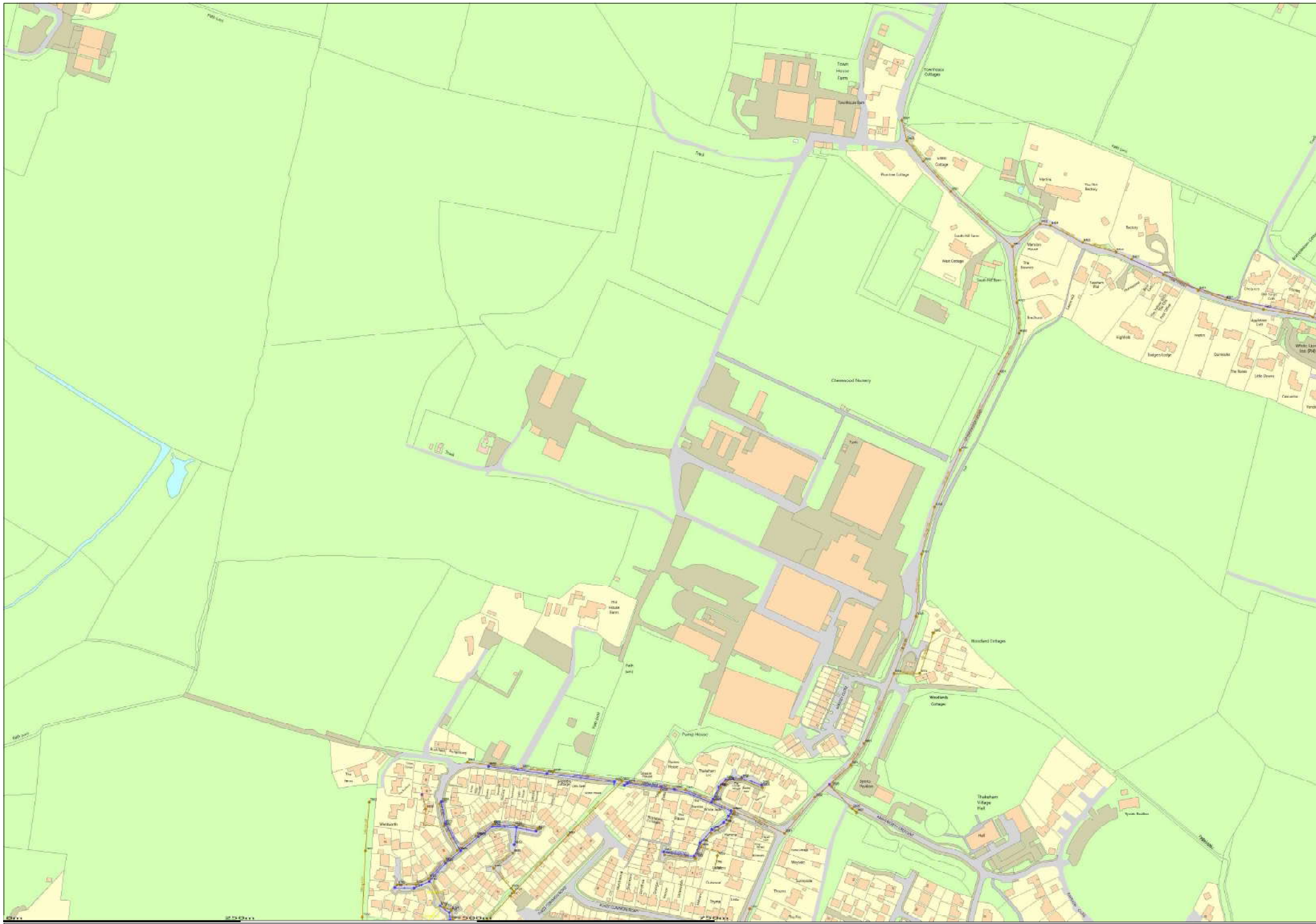
Project Information	Project Name:	Storrington Road		
	Project Number:	305276		
	Sampling Date:	13/10/2022	Sampled by:	James Lilley
	Weather:	Overcast dry		
	Well Notes - e.g. Condition, access, safety:	Well is dry.		

Monitoring Information	Water Quality Meter Used:	YSI		
	Water Quality Meter Last Calibrated:			
	Dissolved oxygen probe last calibrated:			
	Water Level Meter Used (X that applicable):			
	Interface probe		Dip Meter	Yes

Typical Parameter Stabilisation Criteria for Low-Flow Sampling		
	Dissolved Oxygen (D.O.)	0.3 mg/l
	Specific Conductivity (Sp.Cond)	3%
	p.H	0.1 unit
	Oxygen Reduction Potential (ORP)	10mV
	* For REDOX correction, see separate guidance	

BH ID	WS5										
Measurement Datum Notes:	***Top Of Cover*** **(TOC),** ***Ground Level*** **(GL),** ***Top Of Pipework*** **(TOP).** If 'Ground Level', the offset from datum to GL will be 0m. **Record a positive offset if the datum is higher than GL or a negative offset if the datum is below GL.** See figure above for definitions.										
Measurement Datum:	TOC						Offset from **datum** to GL (m):	0			
Start Time:	12:31:00	Time (HH:MM)	Temp (oC)	Sp.Cond (µS/cm)	D.O. (mg/l)	pH (units)	ORP (mV)	Depth to Water (m)	Turbidity (NTU)	Corr. REDOX (mV)	Notes / Flow (ml/min)
Well Diameter (mm)	50									YSI	<Select Probe
Well Material	HDPE	12:31									
Initial Water Level (m)											
LNAPL Present? (Y/N)	No										
Initial LNAPL Level (m)											
Well Headspace Reading (PID/FID)											
Purge Method (Give details in Notes section)	Low Flow										
Sampling Method (Give details in Notes section.)	Peristaltic										
Pump Intake Depth (m)		Sampling Notes (e.g. oil/colour/odour), reasons if not monitored, include purge / sampling method if "Other" selected.									
Depth to Base (m)	3.51										
DNAPL Present? (Y/N)	No	Sample Containers Obtained						No			
Initial DNAPL Level (m)		Sample Collection Time						12:31:00			

Appendix E



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Date: 10/09/22

Scale: 1:1250

Map Centre: 510131,117224

Date updated: 21/07/22

Our Ref: 923621 - 2

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 2022 Ordnance Survey 100031673. This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other use of the map data or further copies is not permitted.

WARNING: SAC pipes are constructed of Bonded Asbestos Cement.

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

mallsom@mx.co.uk

905076

WATER for LIFE

Southern Water.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0801	F	0,00	37,75	
0803	F	41,42	40,58	
0804	F	0,00	0,00	
1701	F	45,83	43,80	
1703	F	0,00	0,00	
1801	F	0,00	0,00	
1802	F	41,98	0,00	
1803	F	42,28	40,25	
1809	F	42,12	40,15	
1810	F	42,22	40,15	
1811	F	42,13	39,92	
1812	F	41,95	39,84	
1819	F	41,96	40,18	
1820	F	41,65	39,89	
1821	F	41,43	39,81	
1822	F	41,41	0,00	
1823	F	0,00	0,00	
2801	F	42,94	0,00	
2802	F	42,39	40,23	
2804	F	41,83	40,05	
2805	F	0,00	0,00	
2806	F	0,00	0,00	
2901	F	43,02	40,88	
3001	F	44,44	42,58	
3002	F	45,84	44,68	
3003	F	45,34	43,88	
3004	F	0,00	43,65	
3101	F	47,03	45,12	
3102	F	46,12	46,30	
3501	F	63,22	61,02	
3502	F	65,00	63,93	
3503	F	66,88	65,25	
3504	F	67,25	66,44	
3801	F	0,00	0,00	
3901	F	43,24	41,12	
4201	F	49,83	48,00	
4301	F	52,38	50,98	
4302	F	55,83	54,52	
4303	F	57,34	56,03	
4401	F	60,20	58,57	
4402	F	62,42	60,90	
5401	F	65,53	64,12	
5402	F	66,51	63,89	
5403	F	64,96	63,30	
5404	F	63,34	61,80	
6301	F	60,59	0,00	
6401	F	63,84	62,24	
6402	F	66,75	63,53	
7301	F	56,46	0,00	
7302	F	61,05	0,00	
7702	F	36,39	35,00	
7801	F	39,38	37,76	
7802	F	40,49	38,15	
8301	F	64,47	0,00	
8302	F	65,83	0,00	
8700	F	37,99	36,48	
8701	F	38,20	36,02	
8702	F	38,30	36,79	
8703	F	37,90	35,35	
8704	F	37,80	35,29	
8705	F	37,60	35,27	
8800	F	38,60	36,47	
8801	F	38,78	36,69	
8802	F	39,69	37,87	
8803	F	39,72	37,79	
8804	F	39,03	36,77	
8805	F	0,00	0,00	
8901	F	40,61	0,00	
9701	F	37,79	35,95	
9702	F	37,94	36,37	
9703	F	37,88	36,16	
9704	F	37,78	35,89	
9801	F	0,00	36,24	
9802	F	0,00	0,00	
9803	F	38,30	36,02	
9804	F	39,19	37,10	
9805	F	38,68	37,16	
9806	F	38,19	36,53	
9901	F	40,62	0,00	
0850	S	39,95	38,34	
0851	S	39,97	0,00	
0852	S	39,86	38,62	
0853	S	39,45	40,39	
1850	S	40,60	38,88	
1851	S	41,36	39,16	
1852	S	41,64	39,34	
1853	S	10,30	39,87	
1854	S	10,20	39,80	
1855	S	10,29	39,54	
1856	S	10,23	39,48	
1857	S	10,07	39,85	
1858	S	41,66	39,59	
1859	S	41,52	39,47	
1860	S	41,40	39,28	
1861	S	41,38	39,18	
2850	S	41,86	39,89	
8750	S	38,28	36,15	
8751	S	38,14	36,74	
8752	S	37,88	36,89	
8753	S	37,94	36,04	
8754	S	37,81	36,50	
8755	S	37,79	36,46	
8851	S	38,77	37,26	
8852	S	39,64	37,86	
8853	S	39,69	38,10	
8854	S	38,56	36,92	
9850	S	41,07	38,77	
9851	S	38,60	37,31	
9852	S	39,07	37,28	
9853	S	38,53	37,35	
9854	S	39,28	37,18	
9855	S	39,04	37,41	
9950	S	41,58	39,24	

Appendix F

Greenfield runoff rate estimation tool

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	18/09/2025
Calculated by	N. Chalmers
Reference	
Model version	2.1.2

Location

Site name	
Site location	

Site easting (British National Grid)	510233
Site northing (British National Grid)	117131

Site details

Total site area (ha)	1 ha

Greenfield runoff

Method

Method	FEH statistical

FEH statistical

	My value		Map value
SAAR (mm)	850 mm		850
BFIHOST	0.66		
QMed-QBar conversion	1.136		1.136
QMed (l/s)	2.66 l/s		
QBar (FEH statistical) (l/s)	3.02 l/s		

Growth curve factors

	My value		Map value
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

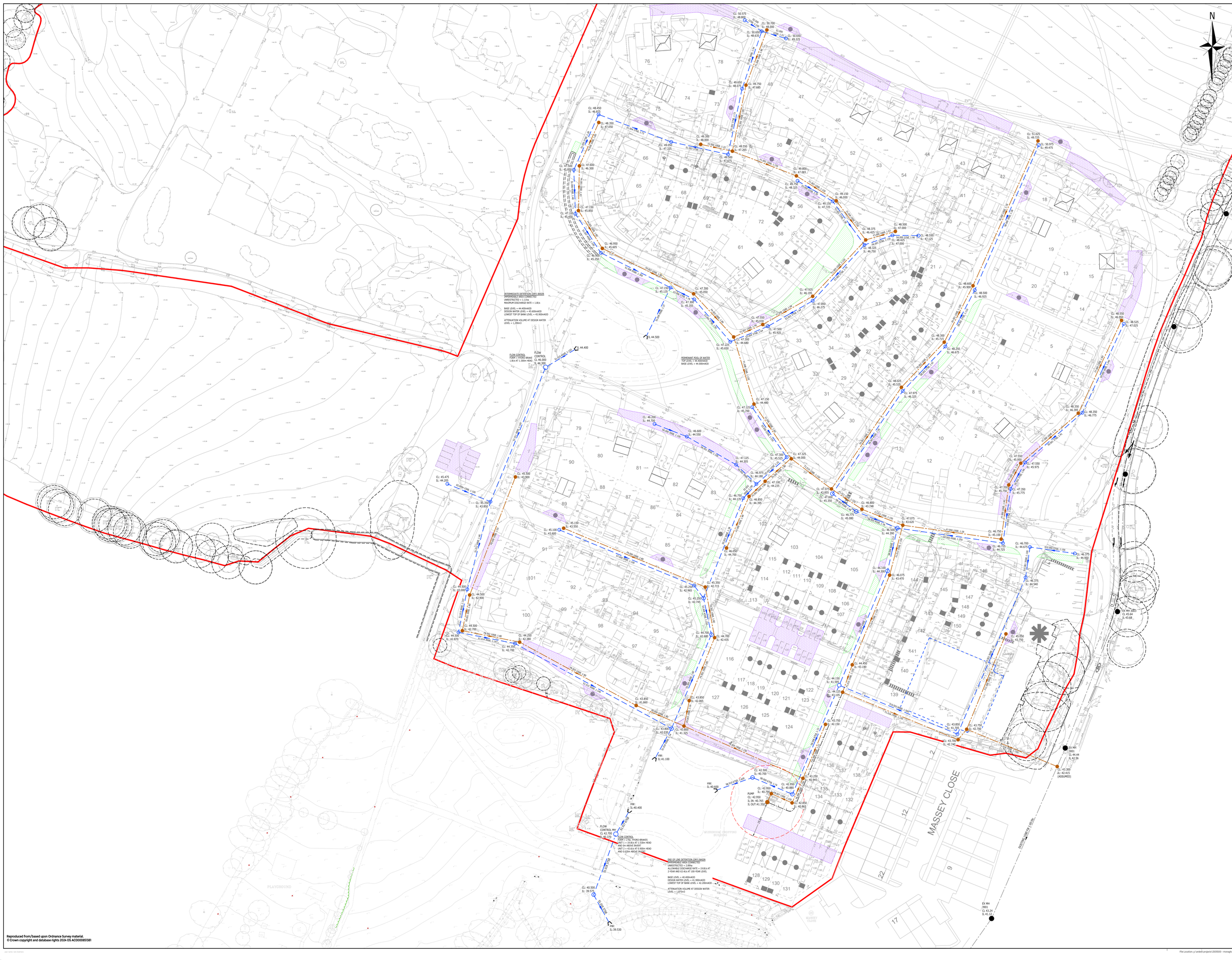
Method	FEH statistical
Flow rate 1 year (l/s)	2.6 l/s
Flow rate 2 year (l/s)	2.7 l/s
Flow rate 10 years (l/s)	4.9 l/s
Flow rate 30 years (l/s)	6.9 l/s
Flow rate 100 years (l/s)	9.6 l/s
Flow rate 200 years (l/s)	11.3 l/s

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 (2.1.2) 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 G



NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT SPECIFICATION, INC. RISK ASSESSMENTS (SEE CDM NOTES) AND ALL OTHER RELATED DRAWINGS ISSUED BY THE ENGINEER.
2. DO NOT SCALE FROM THIS DRAWING. WORK FROM FIGURED DIMENSIONS ONLY.
3. ALL DIMENSIONS SHOWN ON THIS DRAWING ARE IN METRES UNLESS OTHERWISE STATED.
4. ALL DIMENSIONS, LEVELS AND SURVEY GRID CO-ORDINATES ARE TO BE CHECKED ON SITE AND THE ENGINEER NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO THE COMMENCEMENT OF THE WORKS.
5. NO DEVIATION FROM THE DETAILS SHOWN ON THIS DRAWING IS PERMITTED WITHOUT PRIOR PERMISSION FROM THE ENGINEER.
6. ANY WORKS OUTSIDE RED SITE BOUNDARY ARE FOR INFORMATION PURPOSES ONLY. UNLESS SPECIFICALLY NOTED, ALL WORKS OUTSIDE THE SITE BOUNDARY WILL BE UNDERTAKEN BY OTHERS UNDER A SEPARATE CONTRACT.
7. REFER TO ARCHITECTS AND STRUCTURAL ENGINEERS DETAILS FOR BOTH RAISED DPC / FLUSH THRESHOLD DETAIL AND TANKING DETAIL.
8. ALL MATERIALS AND WORKMANSHIP SHALL COMPLY FULLY WITH THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, VOLUME ONE, SPECIFICATION FOR HIGHWAY WORKS AND THE LOCAL AUTHORITY SPECIFICATION FOR ROAD CONSTRUCTION AND STANDARD DETAILS.
9. THE PUBLIC HIGHWAY AND WORKS WILL BE KEPT CLEAN AND FREE OF DEBRIS BY USE OF WHEEL WASHING FACILITIES AND ROAD SWEEPERS TO THE COUNCIL'S SATISFACTION.
10. ALL SETTING OUT SHALL BE AGREED ON-SITE WITH THE ENGINEER, PRIOR TO THE COMMENCEMENT OF THE WORKS.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS FROM THE LOCAL AUTHORITY PRIOR TO COMMENCING WORKS ON THE HIGHWAY.

CONSTRUCTION NOTES:

1. ALL SOFT SPOTS AND VOIDS SHALL BE REMOVED BEFORE CONSTRUCTION AND REPLACED WITH SUITABLE FILL MATERIAL.
2. ROAD FORMATION TO BE IN ACCORDANCE WITH CLAUSE 616 AND COMPACTED IN ACCORDANCE WITH TABLE THE REQUIREMENTS OF 6/4 OF THE SPECIFICATION FOR HIGHWAY WORKS - SERIES 600 EARTHWORKS.
3. APPROVED RESIDUAL WEEDKILLER, WHICH DOES NOT CONTAIN ATRAZINE OR SIMAZINE, MUST BE APPLIED TO ALL FORMATIONS.
4. ALL CONCRETE AND CEMENT MORTAR MUST BE SULPHATE RESISTING TO BS 4021.
5. ALL CARRIAGEWAY MATERIALS SHALL BE SUPPLIED AND LAID IN ACCORDANCE WITH BS EN 13108-1.
6. ALL MATERIALS IN CARRIAGEWAYS TO BE LAID BY MACHINE.
7. MINIMUM DEPTH OF 450mm CONSTRUCTION IS REQUIRED FOR NON-FROST SUSCEPTIBLE MATERIAL.
8. THE CONTRACTOR MUST VERIFY CBR VALUES ALONG EACH ACCESS ROAD AT 30m INTERVALS, THE RESULTS OF WHICH MUST BE SENT TO THE ENGINEER FOR CONFIRMATION OF THE CARRIAGEWAY CONSTRUCTION SHOWN ON THIS DRAWING, PRIOR TO COMMENCING THE WORKS.

INFORMATION SUMMARY

INFORMATION TYPE	SOURCE	REFERENCE	REVISION & DATE
SITE LAYOUT	PEGASUS GROUP	P24-2268_DE_010_I_003	03/08/2026 FINAL
TOPOGRAPHICAL SURVEY	MK SURVEYS	32595	MAY 2023 -
	K.A. RYLANCE SURVEY	22:5659	SEPT 2022 REV B
TREE SURVEY	KEEN CONSULTANTS	2142-KC-XX-Y TREE	JUNE 2023 REVO

KEY

- SITE BOUNDARY
- PROPOSED SURFACE WATER SEWER
- PROPOSED FOUL WATER SEWER
- PROPOSED FOUL WATER RISING MAIN
- EXISTING FOUL WATER SEWER & MANHOLE
- EXISTING SURFACE WATER SEWER & MANHOLE
- PCC HEADWALL
- PROPOSED DETENTION BASIN
- PROPOSED PERMANENT POOL OF WATER
- PROPOSED COMMON PERMEABLE PAVING
- PROPOSED BIO-RETENTION FEATURE
- PROPOSED SWALE
- EXCEEDANCE FLOW ROUTE

Rev	Description	Drn	Chk	App	Date
A	ROUTE OF SURFACE WATER OUTFALL AMENDED	NC	JCH	DM	05.08.26
-	FIRST ISSUE	AF	NC	DM	12.02.26

Purpose: DRAFT

Status: NOT YET APPROVED

ARDENT CONSULTING ENGINEERS
AN EMPLOYEE OWNED COMPANY
Third Floor
The Hallmark Building
52-56 Leadenhall Street
London
EC3M 5JE
Tel: 020 7680 4088
Web: www.ardent-ce.co.uk
E-mail: enquiries@ardent-ce.co.uk

Client: BELLWAY HOMES LTD

Project Title: MONAGHAN MUSHROOMS, THAKEHAM - DUE DILIGENCE

Drawing Title: CONCEPT LEVELS STRATEGY - PLANNING

Drawn by	Checked by	Approved by	Revision
AF	NC	DM	A

Scale: 1:500@A0 Date: JANUARY '26

Drawing Number: 2505500-ACE-XX-XX-DR-C-101

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4. ALL DIMENSIONS, LEVELS AND SURVEY GRID CO-ORDINATES ARE TO BE CHECKED ON SITE AND THE ENGINEER NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO THE COMMENCEMENT OF THE WORKS.
5. NO DEVIATION FROM THE DETAILS SHOWN ON THIS DRAWING IS PERMITTED WITHOUT PRIOR PERMISSION FROM THE ENGINEER.
6. ANY WORKS OUTSIDE RED SITE BOUNDARY ARE FOR INFORMATION PURPOSES ONLY. UNLESS SPECIFICALLY NOTED, ALL WORKS OUTSIDE THE SITE BOUNDARY WILL BE UNDERTAKEN BY OTHERS UNDER A SEPARATE CONTRACT.
7. REFER TO ARCHITECTS AND STRUCTURAL ENGINEERS DETAILS FOR BOTH RAISED DPC / FLUSH THRESHOLD DETAIL AND TANKING DETAIL.
8. ALL MATERIALS AND WORKMANSHIP SHALL COMPLY FULLY WITH THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, VOLUME ONE, SPECIFICATION FOR HIGHWAY WORKS AND THE LOCAL AUTHORITY SPECIFICATION FOR ROAD CONSTRUCTION AND STANDARD DETAILS.
9. THE PUBLIC HIGHWAY AND WORKS WILL BE KEPT CLEAN AND FREE OF DEBRIS BY USE OF WHEEL WASHING FACILITIES AND ROAD SWEEPERS TO THE COUNCIL'S SATISFACTION.
10. ALL SETTING OUT SHALL BE AGREED ON-SITE WITH THE ENGINEER, PRIOR TO THE COMMENCEMENT OF THE WORKS.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS FROM THE LOCAL AUTHORITY PRIOR TO COMMENCING WORKS ON THE HIGHWAY.

CONSTRUCTION NOTES:

1. ALL SOFT SPOTS AND VOIDS SHALL BE REMOVED BEFORE CONSTRUCTION AND REPLACED WITH SUITABLE FILL MATERIAL.
2. ROAD FORMATION TO BE IN ACCORDANCE WITH CLAUSE 616 AND COMPACTED IN ACCORDANCE WITH TABLE THE REQUIREMENTS OF 6/4 OF THE SPECIFICATION FOR HIGHWAY WORKS - SERIES 600 EARTHWORKS.
3. APPROVED RESIDUAL WEEDKILLER, WHICH DOES NOT CONTAIN ATRAZINE OR SIMAZINE, MUST BE APPPLIED TO ALL FORMATIONS.
4. ALL CONCRETE AND CEMENT MORTAR MUST BE SULPHATE RESISTING TO BS 4021.
5. ALL CARRIAGEWAY MATERIALS SHALL BE SUPPLIED AND LAID IN ACCORDANCE WITH BS EN 13108-1.
6. ALL MATERIALS IN CARRIAGEWAYS TO BE LAID BY MACHINE.
7. MINIMUM DEPTH OF 450mm CONSTRUCTION IS REQUIRED FOR NON-FROST SUSCEPTIBLE MATERIAL.
8. THE CONTRACTOR MUST VERIFY CBR VALUES ALONG EACH ACCESS ROAD AT 30m INTERVALS, THE RESULTS OF WHICH MUST BE SENT TO THE ENGINEER FOR CONFIRMATION OF THE CARRIAGEWAY CONSTRUCTION SHOWN ON THIS DRAWING, PRIOR TO COMMENCING THE WORKS.

INFORMATION SUMMARY

INFORMATION TYPE	SOURCE	REFERENCE	REVISION & DATE
SITE LAYOUT	PEGASUS GROUP	P24-2268_DE_010_I_003	03/08/2026 FINAL
TOPOGRAPHICAL SURVEY	MK SURVEYS	32595	MAY 2023
	K.A. RYLANCE SURVEY	22:5659	SEPT 2022 REV B
TREE SURVEY	KEEN CONSULTANTS	2142-KC-XX-Y TREE	JUNE 2023 REVO

Rev	Description	Drn	Chk	App	Date
A	INDICATIVE NETWORK FLOOD EXTENTS ADDED	JCO	NC	JCH	06.08.26
-	FIRST ISSUE	DP	NC	DM	21.04.26

Purpose: DRAFT

Status: NOT YET APPROVED

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Client: BELLWAY HOMES LTD

Project Title: MONAGHAN MUSHROOMS, THAKEHAM - DUE DILIGENCE

Drawing Title: SURFACE WATER DRAINAGE EXCEEDANCE FLOWS

Drawn by	Checked by	Approved by	Revision
DP	NC	DM	A

Scale: 1:500@A0 | Date: MARCH 2026

Drawing Number: 2505500-ACE-XX-XX-DR-C-105

Appendix H1

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	1.000
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	x
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Circular Link Type

Shape Circular | Barrels 1 | Auto Increment (mm) 75 | Follow Ground x

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.102	5.00	50.650	1350	510217.869	117309.804	1.425
S2	0.072	5.00	50.575	1200	510199.990	117317.737	1.775
S3	0.024	5.00	50.650	1200	510207.354	117312.920	2.015
S4	0.050	5.00	49.650	1350	510198.830	117287.966	1.575
S5	0.099	5.00	49.500	1350	510192.742	117259.439	1.825
S6	0.020	5.00	49.050	1350	510168.011	117264.856	1.715
S7	0.090	5.00	48.450	1350	510136.486	117276.775	1.575
S8	0.026	5.00	47.500	1350	510125.725	117252.697	1.650
S9	0.048	5.00	47.100	1350	510126.450	117233.579	1.650
S10	0.053	5.00	46.900	1350	510137.466	117216.677	1.650
S11	0.077	5.00	49.750	1350	510222.928	117247.914	1.425
S12	0.060	5.00	49.150	1350	510238.181	117239.052	1.425
S13	0.065	5.00	48.550	1350	510275.499	117224.126	1.425
S14			48.425	1350	510264.141	117224.263	1.425
S15	0.120	5.00	48.325	1350	510251.984	117220.111	1.575
S16	0.041	5.00	47.850	1350	510229.514	117195.840	1.575
S17			47.500	1350	510210.055	117184.735	1.575
S18	0.087	5.00	47.225	1350	510193.715	117178.036	1.575
S19	0.071	5.00	47.300	1200	510178.040	117196.411	1.945
S20			47.150	1350	510167.758	117201.547	2.015
S21			45.900		510157.332	117180.672	1.400
S22			45.900		510126.179	117174.651	1.500
S23			45.900	2100	510113.478	117166.928	1.600
S24a	0.047	5.00	45.475	1200	510070.819	117116.256	1.270
S24	0.139	5.00	45.350	1350	510089.528	117108.538	1.500
S25			44.500	1350	510079.463	117070.476	1.500
S26			44.500	1350	510075.631	117051.794	1.630
S27	0.131	5.00	44.350	1350	510100.203	117046.907	1.650
S28	0.109	5.00	47.125	1350	510203.209	117149.545	1.425
S29			47.300	1200	510218.193	117127.837	1.775
S30	0.084	5.00	46.200	1200	510160.812	117142.303	1.500
S31	0.021	5.00	46.600	1200	510174.809	117136.819	2.050
S32			47.125	1200	510196.228	117124.621	2.820
S33	0.108	5.00	47.000	1200	510205.085	117116.220	2.820
S34	0.114	5.00	46.750	1200	510199.300	117109.988	2.615
S35	0.174	5.00	45.100	1350	510119.407	117096.317	1.500
S36			45.250	1200	510177.986	117072.109	2.285
S37	0.019	5.00	45.250	1350	510182.085	117066.647	2.505
S38	0.066	5.00	44.700	1350	510185.475	117050.806	2.020
S39			43.800	1350	510168.164	117009.963	1.770
S40			43.000		510162.966	116997.581	1.900
S41	0.244	5.00	50.975	1350	510327.972	117263.441	1.500

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Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S42	0.091	5.00	48.500	1200	510299.910	117200.493	1.575
S43	0.085	5.00	48.250	1200	510287.138	117175.978	1.575
S44	0.117	5.00	47.975	1200	510268.634	117156.631	1.650
S45	0.094	5.00	47.000	1350	510238.052	117112.009	1.650
S46	0.048	5.00	46.775	1350	510248.394	117104.288	1.695
S47	0.223	5.00	48.525	1200	510364.633	117185.808	1.500
S48	0.147	5.00	48.350	1350	510346.623	117147.180	1.575
S49			47.550	1350	510321.771	117125.589	1.575
S50			47.350	1350	510315.443	117114.115	1.575
S51	0.147	5.00	46.725	1200	510312.259	117090.517	2.000
S52			46.500	1350	510266.261	117097.074	2.110
S53	0.230	5.00	46.100	1350	510262.007	117078.469	1.800
S54	0.072	5.00	46.375	1350	510343.342	117086.034	1.425
S55			46.700	1200	510323.878	117088.841	2.025
S56	0.200	5.00	46.375	1200	510321.970	117075.611	1.835
S57			43.750	1350	510292.373	117007.555	2.045
S58	0.108	5.00	44.150	2100	510240.894	117028.789	2.555
S59	0.099	5.00	42.950	1350	510220.675	116981.457	2.070
S60	0.061	5.00	42.950	1350	510203.368	116988.697	2.325
S61			42.700		510188.721	116984.423	2.100
S62			42.200		510148.389	116980.172	1.800
S63			42.200	2700	510134.728	116981.088	1.830
S64			42.000	1200	510132.248	116980.238	1.645

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S3	10.967	0.600	49.225	48.710	0.515	21.3	225	5.06	37.9
2.000	S2	S3	8.800	0.600	48.800	48.710	0.090	97.8	225	5.11	37.7
1.001	S3	S4	26.370	0.600	48.635	48.150	0.485	54.4	300	5.32	37.1
1.002	S4	S5	29.169	0.600	48.075	47.675	0.400	73.0	375	5.55	36.4
1.003	S5	S6	25.317	0.600	47.675	47.335	0.340	74.5	375	5.75	35.8
1.004	S6	S7	33.703	0.600	47.335	46.875	0.460	73.3	375	6.01	35.0
1.005	S7	S8	26.373	0.600	46.875	45.925	0.950	27.8	375	6.14	34.6
1.006	S8	S9	19.132	0.600	45.850	45.450	0.400	47.8	450	6.25	34.4
1.007	S9	S10	20.175	0.600	45.450	45.250	0.200	100.9	450	6.41	33.9
1.008	S10	S20	33.860	0.600	45.250	45.135	0.115	294.4	450	6.89	32.7
3.000	S11	S12	17.641	0.600	48.325	47.725	0.600	29.4	225	5.12	37.7
3.001	S12	S15	23.437	0.600	47.725	46.900	0.825	28.4	225	5.28	37.2
4.000	S13	S14	11.359	0.600	47.125	47.000	0.125	90.9	225	5.14	37.7

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	2.848	113.2	14.0	1.200	1.715	0.102	0.0	53	1.953
2.000	1.322	52.6	9.8	1.550	1.715	0.072	0.0	65	1.016
1.001	2.136	151.0	26.6	1.715	1.200	0.198	0.0	85	1.621
1.002	2.122	234.4	32.6	1.200	1.450	0.248	0.0	94	1.513
1.003	2.101	232.1	44.9	1.450	1.340	0.347	0.0	111	1.638
1.004	2.119	234.0	46.4	1.340	1.200	0.367	0.0	112	1.663
1.005	3.450	381.0	57.2	1.200	1.200	0.457	0.0	98	2.514
1.006	2.945	468.4	60.0	1.200	1.200	0.483	0.0	108	2.050
1.007	2.024	321.9	65.1	1.200	1.200	0.531	0.0	137	1.601
1.008	1.179	187.6	69.1	1.200	1.565	0.584	0.0	189	1.093
3.000	2.422	96.3	10.5	1.200	1.200	0.077	0.0	50	1.597
3.001	2.464	98.0	18.4	1.200	1.200	0.137	0.0	65	1.896
4.000	1.372	54.5	8.8	1.200	1.200	0.065	0.0	61	1.015

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Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
4.001	S14	S15	12.846	0.600	47.000	46.900	0.100	128.5	225	5.32	37.1
3.002	S15	S16	33.075	0.600	46.750	46.275	0.475	69.6	375	5.58	36.3
3.003	S16	S17	22.405	0.600	46.275	45.925	0.350	64.0	375	5.74	35.8
3.004	S17	S18	17.660	0.600	45.925	45.650	0.275	64.2	375	5.87	35.4
3.005	S18	S19	24.153	0.600	45.650	45.355	0.295	81.9	375	6.07	34.8
3.006	S19	S20	11.493	0.600	45.355	45.210	0.145	79.3	375	6.17	34.6
1.009	S20	S21	23.334	0.600	45.135	44.500	0.635	36.7	450	7.01	32.4
1.009a	S21	S22	31.730	0.600	44.500	44.400	0.100	317.3	450	7.47	31.4
1.010	S22	S23	14.865	0.600	44.400	44.300	0.100	148.6	450	7.62	31.1
1.011	S23	S24	63.111	0.600	44.300	43.850	0.450	140.2	300	8.42	29.6
5.000a	S24a	S24	20.238	0.600	44.205	44.000	0.205	98.7	150	5.33	37.1
1.012	S24	S25	39.370	0.600	43.850	43.000	0.850	46.3	300	8.70	29.1
1.013	S25	S26	19.071	0.600	43.000	42.870	0.130	146.7	300	8.94	28.6
1.014	S26	S27	25.053	0.600	42.870	42.700	0.170	147.4	300	9.27	28.1
1.015	S27	S39	77.353	0.600	42.700	42.180	0.520	148.8	300	10.27	26.6
5.000	S28	S29	26.377	0.600	45.700	45.525	0.175	150.7	225	5.41	36.8
5.001	S29	S33	17.515	0.600	45.525	44.255	1.270	13.8	225	5.50	36.6
6.000	S30	S31	15.033	0.600	44.700	44.550	0.150	100.0	300	5.16	37.6
6.001	S31	S32	24.649	0.600	44.550	44.305	0.245	100.6	300	5.42	36.8
6.002	S32	S33	12.208	0.600	44.305	44.180	0.125	97.7	300	5.55	36.4
5.002	S33	S34	8.503	0.600	44.180	44.135	0.045	189.0	300	5.67	36.0
5.003	S34	S37	46.635	0.600	44.135	42.895	1.240	37.6	300	5.98	35.1
7.000	S35	S36	63.384	0.600	43.600	42.965	0.635	99.8	300	5.67	36.0
7.001	S36	S37	6.829	0.600	42.965	42.895	0.070	97.6	300	5.74	35.8
5.004	S37	S38	16.200	0.600	42.745	42.680	0.065	250.0	450	6.19	34.5
5.005	S38	S39	44.360	0.600	42.680	42.030	0.650	68.2	450	6.49	33.8
1.016	S39	S40	13.429	0.600	42.030	41.100	0.930	14.4	450	10.31	26.5
1.016a	S40	S62	22.706	0.600	41.100	40.625	0.475	47.8	450	10.44	26.4

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
4.001	1.152	45.8	8.7	1.200	1.200	0.065	0.0	66	0.891
3.002	2.173	240.1	42.2	1.200	1.200	0.322	0.0	106	1.652
3.003	2.267	250.4	47.0	1.200	1.200	0.363	0.0	109	1.755
3.004	2.264	250.0	46.4	1.200	1.200	0.363	0.0	109	1.746
3.005	2.003	221.3	56.6	1.200	1.570	0.450	0.0	129	1.685
3.006	2.036	224.9	65.1	1.570	1.565	0.521	0.0	137	1.770
1.009	3.362	534.7	129.5	1.565	0.950	1.105	0.0	150	2.790
1.009a	1.136	180.6	125.6	0.950	1.050	1.105	0.0	277	1.224
1.010	1.665	264.8	124.3	1.050	1.150	1.105	0.0	217	1.639
1.011	1.325	93.7	118.1	1.300	1.200	1.105	0.0	300	1.342
5.000a	1.011	17.9	6.3	1.120	1.200	0.047	0.0	61	0.923
1.012	2.316	163.7	135.6	1.200	1.200	1.291	0.0	209	2.576
1.013	1.296	91.6	133.5	1.200	1.330	1.291	0.0	300	1.312
1.014	1.293	91.4	131.1	1.330	1.350	1.291	0.0	300	1.309
1.015	1.287	90.9	136.7	1.350	1.320	1.422	0.0	300	1.303
5.000	1.062	42.2	14.5	1.200	1.550	0.109	0.0	91	0.966
5.001	3.542	140.8	14.4	1.550	2.520	0.109	0.0	48	2.289
6.000	1.572	111.1	11.4	1.200	1.750	0.084	0.0	65	1.026
6.001	1.567	110.8	14.0	1.750	2.520	0.105	0.0	71	1.079
6.002	1.591	112.4	13.8	2.520	2.520	0.105	0.0	71	1.091
5.002	1.140	80.6	41.9	2.520	2.315	0.322	0.0	154	1.152
5.003	2.571	181.8	55.3	2.315	2.055	0.436	0.0	113	2.268
7.000	1.573	111.2	22.6	1.200	1.985	0.174	0.0	91	1.241
7.001	1.592	112.5	22.5	1.985	2.055	0.174	0.0	91	1.251
5.004	1.281	203.7	78.5	2.055	1.570	0.629	0.0	194	1.202
5.005	2.463	391.8	84.8	1.570	1.320	0.695	0.0	141	1.981
1.016	5.371	854.2	203.0	1.320	1.450	2.117	0.0	148	4.431
1.016a	2.946	468.5	201.7	1.450	1.125	2.117	0.0	206	2.840

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Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
8.000	S41	S42	68.920	0.600	49.475	47.000	2.475	27.8	300	5.38	36.9
8.001	S42	S43	27.643	0.600	46.925	46.675	0.250	110.6	375	5.65	36.1
8.002	S43	S44	26.771	0.600	46.675	46.400	0.275	97.4	375	5.89	35.3
8.003	S44	S45	54.096	0.600	46.325	45.350	0.975	55.5	450	6.22	34.4
8.004	S45	S46	12.906	0.600	45.350	45.080	0.270	47.8	450	6.30	34.2
8.005	S46	S52	19.268	0.600	45.080	44.540	0.540	35.7	450	6.39	34.0
9.000	S47	S48	42.620	0.600	47.025	46.850	0.175	243.5	300	5.71	35.9
9.001	S48	S49	32.921	0.600	46.775	45.975	0.800	41.2	375	5.90	35.3
9.002	S49	S50	13.103	0.600	45.975	45.775	0.200	65.5	375	6.00	35.0
9.003	S50	S51	23.812	0.600	45.775	44.800	0.975	24.4	375	6.11	34.7
9.004	S51	S52	46.463	0.600	44.725	44.540	0.185	251.2	450	6.71	33.2
8.006	S52	S53	19.085	0.600	44.390	44.300	0.090	212.1	600	6.90	32.7
8.007	S53	S58	53.980	0.600	44.300	41.670	2.630	20.5	600	7.07	32.3
10.000	S54	S55	19.665	0.600	44.950	44.750	0.200	98.3	225	5.25	37.3
10.001	S55	S56	13.367	0.600	44.675	44.540	0.135	99.0	300	5.39	36.9
10.002	S56	S57	74.213	0.600	44.540	42.005	2.535	29.3	300	5.81	35.6
10.003	S57	S58	55.686	0.600	41.705	41.670	0.035	1591.0	600	7.36	31.7
8.008	S58	S59	51.470	0.600	41.595	40.880	0.715	72.0	675	7.63	31.1
8.009	S59	S60	18.760	0.600	40.880	40.625	0.255	73.6	675	7.74	30.9
8.010	S60	S61	15.258	0.600	40.625	40.600	0.025	610.3	675	7.98	30.4
8.011	S61	S62	40.555	0.600	40.600	40.400	0.200	202.8	675	8.35	29.7
1.017	S62	S63	13.692	0.600	40.400	40.370	0.030	456.4	675	10.63	26.1
1.018	S63	S64	2.622	0.600	40.370	40.355	0.015	174.8	375	10.66	26.1

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
8.000	2.990	211.4	32.5	1.200	1.200	0.244	0.0	79	2.183
8.001	1.722	190.2	43.7	1.200	1.200	0.335	0.0	122	1.409
8.002	1.836	202.8	53.6	1.200	1.200	0.420	0.0	131	1.557
8.003	2.733	434.7	66.8	1.200	1.200	0.537	0.0	118	2.002
8.004	2.946	468.5	78.1	1.200	1.245	0.631	0.0	123	2.209
8.005	3.412	542.6	83.4	1.245	1.510	0.679	0.0	118	2.500
9.000	1.003	70.9	28.9	1.200	1.200	0.223	0.0	133	0.953
9.001	2.831	312.7	47.2	1.200	1.200	0.370	0.0	98	2.062
9.002	2.241	247.5	46.8	1.200	1.200	0.370	0.0	109	1.734
9.003	3.679	406.3	46.4	1.200	1.550	0.370	0.0	85	2.474
9.004	1.278	203.3	62.0	1.550	1.510	0.517	0.0	170	1.128
8.006	1.668	471.6	141.3	1.510	1.200	1.196	0.0	224	1.466
8.007	5.390	1524.1	166.5	1.200	1.880	1.426	0.0	132	3.596
10.000	1.318	52.4	9.7	1.200	1.725	0.072	0.0	65	1.013
10.001	1.580	111.7	9.6	1.725	1.535	0.072	0.0	59	0.975
10.002	2.916	206.1	35.0	1.535	1.445	0.272	0.0	83	2.188
10.003	0.601	170.0	31.2	1.445	1.880	0.272	0.0	173	0.462
8.008	3.091	1106.0	203.0	1.880	1.395	1.806	0.0	194	2.383
8.009	3.057	1094.1	212.6	1.395	1.650	1.905	0.0	200	2.395
8.010	1.053	376.9	215.8	1.650	1.425	1.966	0.0	367	1.087
8.011	1.837	657.2	211.0	1.425	1.125	1.966	0.0	262	1.644
1.017	1.220	436.6	385.2	1.125	1.155	4.083	0.0	495	1.368
1.018	1.367	151.0	384.6	1.455	1.270	4.083	0.0	375	1.385

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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	10.967	21.3	225	Circular	50.650	49.225	1.200	50.650	48.710	1.715
2.000	8.800	97.8	225	Circular	50.575	48.800	1.550	50.650	48.710	1.715
1.001	26.370	54.4	300	Circular	50.650	48.635	1.715	49.650	48.150	1.200
1.002	29.169	73.0	375	Circular	49.650	48.075	1.200	49.500	47.675	1.450
1.003	25.317	74.5	375	Circular	49.500	47.675	1.450	49.050	47.335	1.340
1.004	33.703	73.3	375	Circular	49.050	47.335	1.340	48.450	46.875	1.200
1.005	26.373	27.8	375	Circular	48.450	46.875	1.200	47.500	45.925	1.200
1.006	19.132	47.8	450	Circular	47.500	45.850	1.200	47.100	45.450	1.200
1.007	20.175	100.9	450	Circular	47.100	45.450	1.200	46.900	45.250	1.200
1.008	33.860	294.4	450	Circular	46.900	45.250	1.200	47.150	45.135	1.565
3.000	17.641	29.4	225	Circular	49.750	48.325	1.200	49.150	47.725	1.200
3.001	23.437	28.4	225	Circular	49.150	47.725	1.200	48.325	46.900	1.200
4.000	11.359	90.9	225	Circular	48.550	47.125	1.200	48.425	47.000	1.200
4.001	12.846	128.5	225	Circular	48.425	47.000	1.200	48.325	46.900	1.200
3.002	33.075	69.6	375	Circular	48.325	46.750	1.200	47.850	46.275	1.200
3.003	22.405	64.0	375	Circular	47.850	46.275	1.200	47.500	45.925	1.200
3.004	17.660	64.2	375	Circular	47.500	45.925	1.200	47.225	45.650	1.200
3.005	24.153	81.9	375	Circular	47.225	45.650	1.200	47.300	45.355	1.570
3.006	11.493	79.3	375	Circular	47.300	45.355	1.570	47.150	45.210	1.565
1.009	23.334	36.7	450	Circular	47.150	45.135	1.565	45.900	44.500	0.950
1.009a	31.730	317.3	450	Circular	45.900	44.500	0.950	45.900	44.400	1.050
1.010	14.865	148.6	450	Circular	45.900	44.400	1.050	45.900	44.300	1.150
1.011	63.111	140.2	300	Circular	45.900	44.300	1.300	45.350	43.850	1.200
5.000a	20.238	98.7	150	Circular	45.475	44.205	1.120	45.350	44.000	1.200
1.012	39.370	46.3	300	Circular	45.350	43.850	1.200	44.500	43.000	1.200
1.013	19.071	146.7	300	Circular	44.500	43.000	1.200	44.500	42.870	1.330
1.014	25.053	147.4	300	Circular	44.500	42.870	1.330	44.350	42.700	1.350
1.015	77.353	148.8	300	Circular	44.350	42.700	1.350	43.800	42.180	1.320

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	1350	Manhole	Adoptable	S3	1200	Manhole	Adoptable
2.000	S2	1200	Manhole	Adoptable	S3	1200	Manhole	Adoptable
1.001	S3	1200	Manhole	Adoptable	S4	1350	Manhole	Adoptable
1.002	S4	1350	Manhole	Adoptable	S5	1350	Manhole	Adoptable
1.003	S5	1350	Manhole	Adoptable	S6	1350	Manhole	Adoptable
1.004	S6	1350	Manhole	Adoptable	S7	1350	Manhole	Adoptable
1.005	S7	1350	Manhole	Adoptable	S8	1350	Manhole	Adoptable
1.006	S8	1350	Manhole	Adoptable	S9	1350	Manhole	Adoptable
1.007	S9	1350	Manhole	Adoptable	S10	1350	Manhole	Adoptable
1.008	S10	1350	Manhole	Adoptable	S20	1350	Manhole	Adoptable
3.000	S11	1350	Manhole	Adoptable	S12	1350	Manhole	Adoptable
3.001	S12	1350	Manhole	Adoptable	S15	1350	Manhole	Adoptable
4.000	S13	1350	Manhole	Adoptable	S14	1350	Manhole	Adoptable
4.001	S14	1350	Manhole	Adoptable	S15	1350	Manhole	Adoptable
3.002	S15	1350	Manhole	Adoptable	S16	1350	Manhole	Adoptable
3.003	S16	1350	Manhole	Adoptable	S17	1350	Manhole	Adoptable
3.004	S17	1350	Manhole	Adoptable	S18	1350	Manhole	Adoptable
3.005	S18	1350	Manhole	Adoptable	S19	1200	Manhole	Adoptable
3.006	S19	1200	Manhole	Adoptable	S20	1350	Manhole	Adoptable
1.009	S20	1350	Manhole	Adoptable	S21		Junction	
1.009a	S21		Junction		S22		Junction	
1.010	S22		Junction		S23	2100	Manhole	Adoptable
1.011	S23	2100	Manhole	Adoptable	S24	1350	Manhole	Adoptable
5.000a	S24a	1200	Manhole	Adoptable	S24	1350	Manhole	Adoptable
1.012	S24	1350	Manhole	Adoptable	S25	1350	Manhole	Adoptable
1.013	S25	1350	Manhole	Adoptable	S26	1350	Manhole	Adoptable
1.014	S26	1350	Manhole	Adoptable	S27	1350	Manhole	Adoptable
1.015	S27	1350	Manhole	Adoptable	S39	1350	Manhole	Adoptable

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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)
5.000	26.377	150.7	225	Circular	47.125	45.700	1.200	47.300	45.525	1.550
5.001	17.515	13.8	225	Circular	47.300	45.525	1.550	47.000	44.255	2.520
6.000	15.033	100.0	300	Circular	46.200	44.700	1.200	46.600	44.550	1.750
6.001	24.649	100.6	300	Circular	46.600	44.550	1.750	47.125	44.305	2.520
6.002	12.208	97.7	300	Circular	47.125	44.305	2.520	47.000	44.180	2.520
5.002	8.503	189.0	300	Circular	47.000	44.180	2.520	46.750	44.135	2.315
5.003	46.635	37.6	300	Circular	46.750	44.135	2.315	45.250	42.895	2.055
7.000	63.384	99.8	300	Circular	45.100	43.600	1.200	45.250	42.965	1.985
7.001	6.829	97.6	300	Circular	45.250	42.965	1.985	45.250	42.895	2.055
5.004	16.200	250.0	450	Circular	45.250	42.745	2.055	44.700	42.680	1.570
5.005	44.360	68.2	450	Circular	44.700	42.680	1.570	43.800	42.030	1.320
1.016	13.429	14.4	450	Circular	43.800	42.030	1.320	43.000	41.100	1.450
1.016a	22.706	47.8	450	Circular	43.000	41.100	1.450	42.200	40.625	1.125
8.000	68.920	27.8	300	Circular	50.975	49.475	1.200	48.500	47.000	1.200
8.001	27.643	110.6	375	Circular	48.500	46.925	1.200	48.250	46.675	1.200
8.002	26.771	97.4	375	Circular	48.250	46.675	1.200	47.975	46.400	1.200
8.003	54.096	55.5	450	Circular	47.975	46.325	1.200	47.000	45.350	1.200
8.004	12.906	47.8	450	Circular	47.000	45.350	1.200	46.775	45.080	1.245
8.005	19.268	35.7	450	Circular	46.775	45.080	1.245	46.500	44.540	1.510
9.000	42.620	243.5	300	Circular	48.525	47.025	1.200	48.350	46.850	1.200
9.001	32.921	41.2	375	Circular	48.350	46.775	1.200	47.550	45.975	1.200
9.002	13.103	65.5	375	Circular	47.550	45.975	1.200	47.350	45.775	1.200
9.003	23.812	24.4	375	Circular	47.350	45.775	1.200	46.725	44.800	1.550
9.004	46.463	251.2	450	Circular	46.725	44.725	1.550	46.500	44.540	1.510
8.006	19.085	212.1	600	Circular	46.500	44.390	1.510	46.100	44.300	1.200
8.007	53.980	20.5	600	Circular	46.100	44.300	1.200	44.150	41.670	1.880
10.000	19.665	98.3	225	Circular	46.375	44.950	1.200	46.700	44.750	1.725
10.001	13.367	99.0	300	Circular	46.700	44.675	1.725	46.375	44.540	1.535

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
5.000	S28	1350	Manhole	Adoptable	S29	1200	Manhole	Adoptable
5.001	S29	1200	Manhole	Adoptable	S33	1200	Manhole	Adoptable
6.000	S30	1200	Manhole	Adoptable	S31	1200	Manhole	Adoptable
6.001	S31	1200	Manhole	Adoptable	S32	1200	Manhole	Adoptable
6.002	S32	1200	Manhole	Adoptable	S33	1200	Manhole	Adoptable
5.002	S33	1200	Manhole	Adoptable	S34	1200	Manhole	Adoptable
5.003	S34	1200	Manhole	Adoptable	S37	1350	Manhole	Adoptable
7.000	S35	1350	Manhole	Adoptable	S36	1200	Manhole	Adoptable
7.001	S36	1200	Manhole	Adoptable	S37	1350	Manhole	Adoptable
5.004	S37	1350	Manhole	Adoptable	S38	1350	Manhole	Adoptable
5.005	S38	1350	Manhole	Adoptable	S39	1350	Manhole	Adoptable
1.016	S39	1350	Manhole	Adoptable	S40		Junction	
1.016a	S40		Junction		S62		Junction	
8.000	S41	1350	Manhole	Adoptable	S42	1200	Manhole	Adoptable
8.001	S42	1200	Manhole	Adoptable	S43	1200	Manhole	Adoptable
8.002	S43	1200	Manhole	Adoptable	S44	1200	Manhole	Adoptable
8.003	S44	1200	Manhole	Adoptable	S45	1350	Manhole	Adoptable
8.004	S45	1350	Manhole	Adoptable	S46	1350	Manhole	Adoptable
8.005	S46	1350	Manhole	Adoptable	S52	1350	Manhole	Adoptable
9.000	S47	1200	Manhole	Adoptable	S48	1350	Manhole	Adoptable
9.001	S48	1350	Manhole	Adoptable	S49	1350	Manhole	Adoptable
9.002	S49	1350	Manhole	Adoptable	S50	1350	Manhole	Adoptable
9.003	S50	1350	Manhole	Adoptable	S51	1200	Manhole	Adoptable
9.004	S51	1200	Manhole	Adoptable	S52	1350	Manhole	Adoptable
8.006	S52	1350	Manhole	Adoptable	S53	1350	Manhole	Adoptable
8.007	S53	1350	Manhole	Adoptable	S58	2100	Manhole	Adoptable
10.000	S54	1350	Manhole	Adoptable	S55	1200	Manhole	Adoptable
10.001	S55	1200	Manhole	Adoptable	S56	1200	Manhole	Adoptable

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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)
10.002	74.213	29.3	300	Circular	46.375	44.540	1.535	43.750	42.005	1.445
10.003	55.686	1591.0	600	Circular	43.750	41.705	1.445	44.150	41.670	1.880
8.008	51.470	72.0	675	Circular	44.150	41.595	1.880	42.950	40.880	1.395
8.009	18.760	73.6	675	Circular	42.950	40.880	1.395	42.950	40.625	1.650
8.010	15.258	610.3	675	Circular	42.950	40.625	1.650	42.700	40.600	1.425
8.011	40.555	202.8	675	Circular	42.700	40.600	1.425	42.200	40.400	1.125
1.017	13.692	456.4	675	Circular	42.200	40.400	1.125	42.200	40.370	1.155
1.018	2.622	174.8	375	Circular	42.200	40.370	1.455	42.000	40.355	1.270

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
10.002	S56	1200	Manhole	Adoptable	S57	1350	Manhole	Adoptable
10.003	S57	1350	Manhole	Adoptable	S58	2100	Manhole	Adoptable
8.008	S58	2100	Manhole	Adoptable	S59	1350	Manhole	Adoptable
8.009	S59	1350	Manhole	Adoptable	S60	1350	Manhole	Adoptable
8.010	S60	1350	Manhole	Adoptable	S61		Junction	
8.011	S61		Junction		S62		Junction	
1.017	S62		Junction		S63	2700	Manhole	Adoptable
1.018	S63	2700	Manhole	Adoptable	S64	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	510217.869	117309.804	50.650	1.425	1350	0	1.000	49.225	225
S2	510199.990	117317.737	50.575	1.775	1200	0	2.000	48.800	225
S3	510207.354	117312.920	50.650	2.015	1200	1 2 0	2.000 1.000 1.001	48.710 48.710 48.635	225 225 300
S4	510198.830	117287.966	49.650	1.575	1350	1 0	1.001 1.002	48.150 48.075	300 375
S5	510192.742	117259.439	49.500	1.825	1350	1 0	1.002 1.003	47.675 47.675	375 375
S6	510168.011	117264.856	49.050	1.715	1350	1 0	1.003 1.004	47.335 47.335	375 375
S7	510136.486	117276.775	48.450	1.575	1350	1 0	1.004 1.005	46.875 46.875	375 375
S8	510125.725	117252.697	47.500	1.650	1350	1 0	1.005 1.006	45.925 45.850	375 450
S9	510126.450	117233.579	47.100	1.650	1350	1 0	1.006 1.007	45.450 45.450	450 450

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S10	510137.466	117216.677	46.900	1.650	1350	1	1.007	45.250	450
						0	1.008	45.250	450
S11	510222.928	117247.914	49.750	1.425	1350	0	3.000	48.325	225
S12	510238.181	117239.052	49.150	1.425	1350	1	3.000	47.725	225
						0	3.001	47.725	225
S13	510275.499	117224.126	48.550	1.425	1350	0	4.000	47.125	225
S14	510264.141	117224.263	48.425	1.425	1350	1	4.000	47.000	225
						0	4.001	47.000	225
S15	510251.984	117220.111	48.325	1.575	1350	1	4.001	46.900	225
						2	3.001	46.900	225
						0	3.002	46.750	375
S16	510229.514	117195.840	47.850	1.575	1350	1	3.002	46.275	375
						0	3.003	46.275	375
S17	510210.055	117184.735	47.500	1.575	1350	1	3.003	45.925	375
						0	3.004	45.925	375
S18	510193.715	117178.036	47.225	1.575	1350	1	3.004	45.650	375
						0	3.005	45.650	375
S19	510178.040	117196.411	47.300	1.945	1200	1	3.005	45.355	375
						0	3.006	45.355	375
S20	510167.758	117201.547	47.150	2.015	1350	1	3.006	45.210	375
						2	1.008	45.135	450
						0	1.009	45.135	450
S21	510157.332	117180.672	45.900	1.400		1	1.009	44.500	450
						0	1.009a	44.500	450
S22	510126.179	117174.651	45.900	1.500		1	1.009a	44.400	450
						0	1.010	44.400	450
S23	510113.478	117166.928	45.900	1.600	2100	1	1.010	44.300	450
						0	1.011	44.300	300
S24a	510070.819	117116.256	45.475	1.270	1200	0	5.000a	44.205	150

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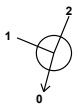
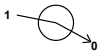
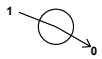
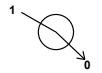
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
S24	510089.528	117108.538	45.350	1.500	1350		1	5.000a	44.000	150
							2	1.011	43.850	300
							0	1.012	43.850	300
S25	510079.463	117070.476	44.500	1.500	1350		1	1.012	43.000	300
							0	1.013	43.000	300
S26	510075.631	117051.794	44.500	1.630	1350		1	1.013	42.870	300
							0	1.014	42.870	300
S27	510100.203	117046.907	44.350	1.650	1350		1	1.014	42.700	300
							0	1.015	42.700	300
S28	510203.209	117149.545	47.125	1.425	1350		0	5.000	45.700	225
S29	510218.193	117127.837	47.300	1.775	1200		1	5.000	45.525	225
							0	5.001	45.525	225
S30	510160.812	117142.303	46.200	1.500	1200		0	6.000	44.700	300
S31	510174.809	117136.819	46.600	2.050	1200		1	6.000	44.550	300
							0	6.001	44.550	300
S32	510196.228	117124.621	47.125	2.820	1200		1	6.001	44.305	300
							0	6.002	44.305	300
S33	510205.085	117116.220	47.000	2.820	1200		1	5.001	44.255	225
							2	6.002	44.180	300
							0	5.002	44.180	300
S34	510199.300	117109.988	46.750	2.615	1200		1	5.002	44.135	300
							0	5.003	44.135	300
S35	510119.407	117096.317	45.100	1.500	1350		0	7.000	43.600	300
S36	510177.986	117072.109	45.250	2.285	1200		1	7.000	42.965	300
							0	7.001	42.965	300
S37	510182.085	117066.647	45.250	2.505	1350		1	7.001	42.895	300
							2	5.003	42.895	300
							0	5.004	42.745	450
S38	510185.475	117050.806	44.700	2.020	1350		1	5.004	42.680	450
							0	5.005	42.680	450

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S39	510168.164	117009.963	43.800	1.770	1350	1 2 0	5.005 1.015 1.016	42.030 42.180 42.030	450 300 450
S40	510162.966	116997.581	43.000	1.900		1 0	1.016 1.016a	41.100 41.100	450 450
S41	510327.972	117263.441	50.975	1.500	1350	0	8.000	49.475	300
S42	510299.910	117200.493	48.500	1.575	1200	1 0	8.000 8.001	47.000 46.925	300 375
S43	510287.138	117175.978	48.250	1.575	1200	1 0	8.001 8.002	46.675 46.675	375 375
S44	510268.634	117156.631	47.975	1.650	1200	1 0	8.002 8.003	46.400 46.325	375 450
S45	510238.052	117112.009	47.000	1.650	1350	1 0	8.003 8.004	45.350 45.350	450 450
S46	510248.394	117104.288	46.775	1.695	1350	1 0	8.004 8.005	45.080 45.080	450 450
S47	510364.633	117185.808	48.525	1.500	1200	0	9.000	47.025	300
S48	510346.623	117147.180	48.350	1.575	1350	1 0	9.000 9.001	46.850 46.775	300 375
S49	510321.771	117125.589	47.550	1.575	1350	1 0	9.001 9.002	45.975 45.975	375 375
S50	510315.443	117114.115	47.350	1.575	1350	1 0	9.002 9.003	45.775 45.775	375 375
S51	510312.259	117090.517	46.725	2.000	1200	1 0	9.003 9.004	44.800 44.725	375 450
S52	510266.261	117097.074	46.500	2.110	1350	1 2 0	9.004 8.005 8.006	44.540 44.540 44.390	450 450 600
S53	510262.007	117078.469	46.100	1.800	1350	1 0	8.006 8.007	44.300 44.300	600 600

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S54	510343.342	117086.034	46.375	1.425	1350		0	10.000	44.950	225
S55	510323.878	117088.841	46.700	2.025	1200		1	10.000	44.750	225
							0	10.001	44.675	300
S56	510321.970	117075.611	46.375	1.835	1200		1	10.001	44.540	300
							0	10.002	44.540	300
S57	510292.373	117007.555	43.750	2.045	1350		1	10.002	42.005	300
							0	10.003	41.705	600
S58	510240.894	117028.789	44.150	2.555	2100		1	10.003	41.670	600
							2	8.007	41.670	600
							0	8.008	41.595	675
S59	510220.675	116981.457	42.950	2.070	1350		1	8.008	40.880	675
							0	8.009	40.880	675
S60	510203.368	116988.697	42.950	2.325	1350		1	8.009	40.625	675
							0	8.010	40.625	675
S61	510188.721	116984.423	42.700	2.100			1	8.010	40.600	675
							0	8.011	40.600	675
S62	510148.389	116980.172	42.200	1.800			1	8.011	40.400	675
							2	1.016a	40.625	450
							0	1.017	40.400	675
S63	510134.728	116981.088	42.200	1.830	2700		1	1.017	40.370	675
							0	1.018	40.370	375
S64	510132.248	116980.238	42.000	1.645	1200		1	1.018	40.355	375

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	0.750	Drain Down Time (mins)	10080	Check Discharge Volume	x
Winter CV	0.840	Additional Storage (m³/ha)	20.0		

Storm Durations

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

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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	30	40	0	0
2	0	0	0	100	45	0	0

Node S23 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	44.300	Product Number	CTL-SHE-0060-1800-1300-1800
Design Depth (m)	1.300	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.8	Min Node Diameter (mm)	1200

Node S63 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	40.370	Product Number	CTL-SHE-0190-1980-1530-1980
Design Depth (m)	1.530	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	19.8	Min Node Diameter (mm)	1800

Node S63 Online Hydro-Brake® Control

Flap Valve	x	Objective	(CU) Linear Discharge
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	41.000	Product Number	CTL-SCU-0216-4360-0900-4360
Design Depth (m)	0.900	Min Outlet Diameter (m)	0.300
Design Flow (l/s)	43.6	Min Node Diameter (mm)	1200

Node S22 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.0	Invert Level (m)	44.400
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	7980

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	706.8	706.8	1.200	1491.0	1503.2	1.500	1723.0	1739.0

Node S62 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.0	Invert Level (m)	40.400
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	344

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	748.0	748.0	1.500	1830.0	1845.9	1.800	2089.0	2109.2

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Results for 1 year Critical Storm Duration. Lowest mass balance: 99.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S1	33	49.263	0.038	6.5	0.1082	0.0000	OK
60 minute summer	S2	33	48.847	0.047	4.6	0.0912	0.0000	OK
60 minute summer	S3	33	48.695	0.060	12.6	0.0817	0.0000	OK
60 minute summer	S4	33	48.140	0.065	15.8	0.1346	0.0000	OK
60 minute summer	S5	33	47.754	0.079	22.1	0.1994	0.0000	OK
60 minute summer	S6	33	47.417	0.082	23.2	0.1370	0.0000	OK
60 minute summer	S7	34	46.946	0.071	28.7	0.1833	0.0000	OK
60 minute summer	S8	34	45.927	0.077	30.3	0.1349	0.0000	OK
60 minute summer	S9	34	45.551	0.101	33.3	0.2034	0.0000	OK
60 minute summer	S10	34	45.386	0.136	36.5	0.2830	0.0000	OK
60 minute summer	S11	33	48.359	0.034	4.9	0.0865	0.0000	OK
60 minute summer	S12	33	47.771	0.046	8.7	0.1048	0.0000	OK
60 minute summer	S13	33	47.168	0.043	4.1	0.0997	0.0000	OK
60 minute summer	S14	33	47.047	0.047	4.1	0.0669	0.0000	OK
60 minute summer	S15	33	46.824	0.074	20.4	0.2190	0.0000	OK
60 minute summer	S16	33	46.354	0.079	22.9	0.1535	0.0000	OK
60 minute summer	S17	33	46.003	0.078	22.8	0.1112	0.0000	OK
60 minute summer	S18	34	45.742	0.092	28.2	0.2328	0.0000	OK
60 minute summer	S19	34	45.459	0.104	32.5	0.1942	0.0000	OK
60 minute summer	S20	34	45.243	0.108	69.1	0.1541	0.0000	OK
60 minute summer	S21	34	44.684	0.184	69.0	0.0000	0.0000	OK
960 minute winter	S22	930	44.657	0.257	16.1	203.6344	0.0000	OK
960 minute winter	S23	885	44.664	0.364	7.7	1.2606	0.0000	SURCHARGED
60 minute summer	S24a	33	44.247	0.042	3.0	0.0791	0.0000	OK
60 minute summer	S24	34	43.906	0.056	12.6	0.1828	0.0000	OK
60 minute summer	S25	34	43.077	0.077	12.5	0.1106	0.0000	OK
60 minute summer	S26	34	42.945	0.075	12.5	0.1074	0.0000	OK
60 minute summer	S27	35	42.796	0.096	20.3	0.2887	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)
60 minute summer	S1	1.000	S3	6.5	1.521	0.057	0.0469	
60 minute summer	S2	2.000	S3	4.6	0.795	0.087	0.0509	
60 minute summer	S3	1.001	S4	12.6	1.292	0.083	0.2569	
60 minute summer	S4	1.002	S5	15.8	1.063	0.067	0.4332	
60 minute summer	S5	1.003	S6	21.9	1.261	0.095	0.4404	
60 minute summer	S6	1.004	S7	23.1	1.432	0.099	0.5455	
60 minute summer	S7	1.005	S8	28.7	2.022	0.075	0.3744	
60 minute summer	S8	1.006	S9	30.4	1.369	0.065	0.4266	
60 minute summer	S9	1.007	S10	33.3	0.999	0.104	0.6768	
60 minute summer	S10	1.008	S20	36.5	1.053	0.195	1.1784	
60 minute summer	S11	3.000	S12	4.9	1.022	0.051	0.0852	
60 minute summer	S12	3.001	S15	8.7	1.512	0.089	0.1346	
60 minute summer	S13	4.000	S14	4.1	0.738	0.075	0.0633	
60 minute summer	S14	4.001	S15	4.1	0.704	0.089	0.0745	
60 minute summer	S15	3.002	S16	20.3	1.268	0.085	0.5310	
60 minute summer	S16	3.003	S17	22.8	1.376	0.091	0.3720	
60 minute summer	S17	3.004	S18	22.8	1.225	0.091	0.3295	
60 minute summer	S18	3.005	S19	28.2	1.231	0.127	0.5536	
60 minute summer	S19	3.006	S20	32.6	1.389	0.145	0.2700	
60 minute summer	S20	1.009	S21	69.0	1.551	0.129	1.0513	
60 minute summer	S21	1.009a	S22	66.7	2.236	0.369	1.1061	
960 minute winter	S22	1.010	S23	7.7	0.246	0.029	1.7141	
960 minute winter	S23	1.011	S24	1.5	0.568	0.016	0.2094	
60 minute summer	S24a	5.000a	S24	3.0	0.745	0.167	0.0811	
60 minute summer	S24	1.012	S25	12.5	1.084	0.076	0.4590	
60 minute summer	S25	1.013	S26	12.5	0.889	0.136	0.2679	
60 minute summer	S26	1.014	S27	12.4	0.756	0.136	0.4130	
60 minute summer	S27	1.015	S39	19.8	1.038	0.218	1.4775	

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Results for 1 year Critical Storm Duration. Lowest mass balance: 99.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S28	33	45.767	0.067	6.9	0.1969	0.0000	OK
60 minute summer	S29	33	45.559	0.034	6.9	0.0390	0.0000	OK
60 minute summer	S30	33	44.745	0.045	5.3	0.1012	0.0000	OK
60 minute summer	S31	33	44.600	0.050	6.6	0.0674	0.0000	OK
60 minute summer	S32	33	44.354	0.049	6.6	0.0553	0.0000	OK
60 minute summer	S33	33	44.286	0.106	20.4	0.2018	0.0000	OK
60 minute summer	S34	33	44.215	0.080	27.5	0.1598	0.0000	OK
60 minute summer	S35	33	43.663	0.063	11.0	0.2369	0.0000	OK
60 minute summer	S36	34	43.033	0.068	11.0	0.0768	0.0000	OK
60 minute summer	S37	33	42.882	0.137	39.3	0.2162	0.0000	OK
60 minute summer	S38	34	42.786	0.106	43.4	0.2217	0.0000	OK
60 minute summer	S39	34	42.112	0.082	63.0	0.1169	0.0000	OK
60 minute summer	S40	34	41.210	0.110	63.0	0.0000	0.0000	OK
60 minute summer	S41	33	49.530	0.055	15.5	0.2579	0.0000	OK
60 minute summer	S42	33	47.011	0.086	21.2	0.1957	0.0000	OK
60 minute summer	S43	33	46.769	0.094	26.6	0.2079	0.0000	OK
60 minute summer	S44	34	46.408	0.083	33.7	0.2124	0.0000	OK
60 minute summer	S45	34	45.444	0.094	39.4	0.2421	0.0000	OK
60 minute summer	S46	34	45.169	0.089	42.3	0.1774	0.0000	OK
60 minute summer	S47	33	47.117	0.092	14.2	0.3763	0.0000	OK
60 minute summer	S48	33	46.843	0.068	23.3	0.2256	0.0000	OK
60 minute summer	S49	33	46.059	0.084	23.2	0.1197	0.0000	OK
60 minute summer	S50	34	45.837	0.062	23.1	0.0888	0.0000	OK
60 minute summer	S51	34	44.848	0.123	32.1	0.3192	0.0000	OK
60 minute summer	S52	34	44.556	0.166	74.5	0.2370	0.0000	OK
60 minute summer	S53	34	44.399	0.099	88.4	0.3939	0.0000	OK
60 minute summer	S54	33	44.996	0.046	4.6	0.1119	0.0000	OK
60 minute summer	S55	33	44.716	0.041	4.6	0.0466	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)
60 minute summer	S28	5.000	S29	6.9	1.039	0.163	0.1797	
60 minute summer	S29	5.001	S33	6.9	1.823	0.049	0.0661	
60 minute summer	S30	6.000	S31	5.3	0.737	0.048	0.1082	
60 minute summer	S31	6.001	S32	6.6	0.866	0.060	0.1879	
60 minute summer	S32	6.002	S33	6.6	0.460	0.058	0.1819	
60 minute summer	S33	5.002	S34	20.3	1.092	0.252	0.1588	
60 minute summer	S34	5.003	S37	27.3	1.850	0.150	0.6884	
60 minute summer	S35	7.000	S36	11.0	0.971	0.099	0.7193	
60 minute summer	S36	7.001	S37	10.9	0.966	0.097	0.0769	
60 minute summer	S37	5.004	S38	39.3	1.143	0.193	0.5590	
60 minute summer	S38	5.005	S39	43.6	1.819	0.111	1.0672	
60 minute summer	S39	1.016	S40	63.0	2.560	0.074	0.3322	
60 minute summer	S40	1.016a	S62	62.8	2.105	0.134	0.6782	
60 minute summer	S41	8.000	S42	15.4	1.756	0.073	0.6050	
60 minute summer	S42	8.001	S43	21.2	1.047	0.111	0.5595	
60 minute summer	S43	8.002	S44	26.3	1.259	0.130	0.5608	
60 minute summer	S44	8.003	S45	33.5	1.520	0.077	1.1951	
60 minute summer	S45	8.004	S46	39.4	1.711	0.084	0.2974	
60 minute summer	S46	8.005	S52	42.4	1.998	0.078	0.4091	
60 minute summer	S47	9.000	S48	14.0	0.783	0.197	0.7618	
60 minute summer	S48	9.001	S49	23.2	1.453	0.074	0.5264	
60 minute summer	S49	9.002	S50	23.1	1.541	0.093	0.1976	
60 minute summer	S50	9.003	S51	23.2	1.988	0.057	0.2775	
60 minute summer	S51	9.004	S52	32.1	0.939	0.158	1.5878	
60 minute summer	S52	8.006	S53	74.5	1.623	0.158	0.8918	
60 minute summer	S53	8.007	S58	88.3	2.975	0.058	1.6017	
60 minute summer	S54	10.000	S55	4.6	0.807	0.088	0.1118	
60 minute summer	S55	10.001	S56	4.6	0.597	0.041	0.1034	

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Results for 1 year Critical Storm Duration. Lowest mass balance: 99.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S56	33	44.599	0.059	17.3	0.1940	0.0000	OK
60 minute summer	S57	35	41.831	0.126	17.1	0.1804	0.0000	OK
60 minute summer	S58	34	41.739	0.144	110.9	0.6204	0.0000	OK
60 minute summer	S59	34	41.042	0.162	116.7	0.3880	0.0000	OK
60 minute summer	S60	34	40.851	0.226	119.6	0.4416	0.0000	OK
480 minute winter	S61	352	40.801	0.201	36.1	0.0000	0.0000	OK
480 minute winter	S62	352	40.801	0.401	56.1	357.7882	0.0000	OK
480 minute winter	S63	352	40.801	0.431	19.4	2.4663	0.0000	SURCHARGED
480 minute winter	S64	352	40.445	0.090	19.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	S56	10.002	S57	17.1	1.778	0.083	0.7120	
60 minute summer	S57	10.003	S58	16.4	0.509	0.096	1.8161	
60 minute summer	S58	8.008	S59	110.7	1.823	0.100	3.1267	
60 minute summer	S59	8.009	S60	116.1	1.374	0.106	1.5987	
60 minute summer	S60	8.010	S61	120.1	1.286	0.319	1.4271	
480 minute winter	S61	8.011	S62	36.1	1.037	0.055	6.2762	
480 minute winter	S62	1.017	S63	19.4	0.181	0.045	3.1569	
480 minute winter	S63	1.018	S64	19.4	0.874	0.128	0.0582	855.4

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S1	33	49.273	0.048	10.2	0.1362	0.0000	OK
60 minute summer	S2	33	48.859	0.059	7.2	0.1154	0.0000	OK
60 minute summer	S3	33	48.710	0.075	19.8	0.1031	0.0000	OK
60 minute summer	S4	33	48.157	0.082	24.8	0.1688	0.0000	OK
60 minute summer	S5	33	47.776	0.101	34.7	0.2533	0.0000	OK
60 minute summer	S6	33	47.439	0.104	36.6	0.1735	0.0000	OK
60 minute summer	S7	34	46.965	0.090	45.4	0.2319	0.0000	OK
60 minute summer	S8	34	45.948	0.098	47.7	0.1710	0.0000	OK
60 minute summer	S9	34	45.581	0.131	52.4	0.2645	0.0000	OK
60 minute summer	S10	34	45.423	0.173	57.6	0.3593	0.0000	OK
60 minute summer	S11	33	48.368	0.043	7.7	0.1078	0.0000	OK
60 minute summer	S12	33	47.783	0.058	13.7	0.1324	0.0000	OK
60 minute summer	S13	33	47.179	0.054	6.5	0.1269	0.0000	OK
60 minute summer	S14	33	47.059	0.059	6.5	0.0850	0.0000	OK
60 minute summer	S15	33	46.844	0.094	32.2	0.2771	0.0000	OK
60 minute summer	S16	33	46.375	0.100	36.3	0.1951	0.0000	OK
60 minute summer	S17	33	46.025	0.100	36.2	0.1427	0.0000	OK
60 minute summer	S18	33	45.768	0.118	44.8	0.2994	0.0000	OK
60 minute summer	S19	34	45.490	0.135	51.6	0.2508	0.0000	OK
60 minute summer	S20	34	45.271	0.136	109.4	0.1947	0.0000	OK
960 minute winter	S21	945	44.744	0.244	15.8	0.0000	0.0000	OK
960 minute winter	S22	945	44.744	0.344	19.7	281.4792	0.0000	OK
960 minute winter	S23	915	44.749	0.449	8.1	1.5543	0.0000	SURCHARGED
60 minute summer	S24a	33	44.259	0.054	4.7	0.1006	0.0000	OK
60 minute summer	S24	33	43.920	0.070	19.9	0.2300	0.0000	OK
60 minute summer	S25	33	43.099	0.099	19.8	0.1412	0.0000	OK
60 minute summer	S26	34	42.966	0.096	19.7	0.1379	0.0000	OK
60 minute summer	S27	34	42.824	0.124	32.5	0.3739	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)
60 minute summer	S1	1.000	S3	10.2	1.725	0.090	0.0648	
60 minute summer	S2	2.000	S3	7.2	0.898	0.137	0.0706	
60 minute summer	S3	1.001	S4	19.8	1.466	0.131	0.3561	
60 minute summer	S4	1.002	S5	24.8	1.201	0.106	0.6042	
60 minute summer	S5	1.003	S6	34.6	1.422	0.149	0.6165	
60 minute summer	S6	1.004	S7	36.4	1.614	0.156	0.7626	
60 minute summer	S7	1.005	S8	45.2	2.295	0.119	0.5199	
60 minute summer	S8	1.006	S9	47.8	1.506	0.102	0.6107	
60 minute summer	S9	1.007	S10	52.6	1.115	0.164	0.9551	
60 minute summer	S10	1.008	S20	57.8	1.200	0.308	1.6350	
60 minute summer	S11	3.000	S12	7.7	1.158	0.080	0.1181	
60 minute summer	S12	3.001	S15	13.7	1.718	0.140	0.1868	
60 minute summer	S13	4.000	S14	6.5	0.830	0.119	0.0891	
60 minute summer	S14	4.001	S15	6.5	0.800	0.142	0.1042	
60 minute summer	S15	3.002	S16	32.2	1.430	0.134	0.7444	
60 minute summer	S16	3.003	S17	36.2	1.542	0.145	0.5261	
60 minute summer	S17	3.004	S18	36.1	1.364	0.144	0.4691	
60 minute summer	S18	3.005	S19	44.6	1.370	0.201	0.7879	
60 minute summer	S19	3.006	S20	51.5	1.560	0.229	0.3799	
60 minute summer	S20	1.009	S21	109.4	1.763	0.205	1.4626	
960 minute winter	S21	1.009a	S22	15.7	0.776	0.087	3.4505	
960 minute winter	S22	1.010	S23	8.1	0.253	0.031	2.1412	
960 minute winter	S23	1.011	S24	1.5	0.568	0.016	0.2255	
60 minute summer	S24a	5.000a	S24	4.7	0.843	0.263	0.1127	
60 minute summer	S24	1.012	S25	19.8	1.223	0.121	0.6424	
60 minute summer	S25	1.013	S26	19.7	0.995	0.215	0.3780	
60 minute summer	S26	1.014	S27	19.8	0.846	0.217	0.5880	
60 minute summer	S27	1.015	S39	31.8	1.179	0.349	2.0893	

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S28	33	45.784	0.084	10.9	0.2499	0.0000	OK
60 minute summer	S29	33	45.567	0.042	10.9	0.0478	0.0000	OK
60 minute summer	S30	33	44.757	0.057	8.4	0.1281	0.0000	OK
60 minute summer	S31	33	44.614	0.064	10.5	0.0852	0.0000	OK
60 minute summer	S32	33	44.366	0.061	10.5	0.0694	0.0000	OK
60 minute summer	S33	33	44.316	0.136	32.2	0.2584	0.0000	OK
60 minute summer	S34	33	44.237	0.102	43.5	0.2039	0.0000	OK
60 minute summer	S35	33	43.680	0.080	17.4	0.2985	0.0000	OK
60 minute summer	S36	33	43.052	0.087	17.4	0.0986	0.0000	OK
60 minute summer	S37	33	42.919	0.174	62.4	0.2754	0.0000	OK
60 minute summer	S38	33	42.815	0.135	68.8	0.2811	0.0000	OK
60 minute summer	S39	34	42.134	0.104	100.7	0.1483	0.0000	OK
60 minute summer	S40	34	41.240	0.140	100.7	0.0000	0.0000	OK
60 minute summer	S41	33	49.544	0.069	24.4	0.3239	0.0000	OK
60 minute summer	S42	33	47.034	0.109	33.4	0.2494	0.0000	OK
60 minute summer	S43	33	46.795	0.120	41.9	0.2657	0.0000	OK
60 minute summer	S44	33	46.430	0.105	53.3	0.2675	0.0000	OK
60 minute summer	S45	33	45.471	0.121	62.5	0.3104	0.0000	OK
60 minute summer	S46	34	45.193	0.113	66.8	0.2263	0.0000	OK
60 minute summer	S47	33	47.142	0.117	22.3	0.4822	0.0000	OK
60 minute summer	S48	33	46.861	0.086	36.8	0.2829	0.0000	OK
60 minute summer	S49	33	46.082	0.107	36.7	0.1529	0.0000	OK
60 minute summer	S50	33	45.852	0.077	36.5	0.1105	0.0000	OK
60 minute summer	S51	34	44.882	0.157	51.2	0.4079	0.0000	OK
60 minute summer	S52	34	44.599	0.209	118.0	0.2993	0.0000	OK
60 minute summer	S53	34	44.425	0.125	140.0	0.4975	0.0000	OK
60 minute summer	S54	33	45.008	0.058	7.2	0.1410	0.0000	OK
60 minute summer	S55	33	44.727	0.052	7.2	0.0587	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)
60 minute summer	S28	5.000	S29	10.9	1.193	0.258	0.2470	
60 minute summer	S29	5.001	S33	10.9	1.842	0.077	0.1214	
60 minute summer	S30	6.000	S31	8.4	0.833	0.076	0.1517	
60 minute summer	S31	6.001	S32	10.5	0.989	0.095	0.2618	
60 minute summer	S32	6.002	S33	10.5	0.520	0.093	0.2529	
60 minute summer	S33	5.002	S34	32.1	1.235	0.398	0.2217	
60 minute summer	S34	5.003	S37	43.3	2.098	0.238	0.9620	
60 minute summer	S35	7.000	S36	17.4	1.092	0.157	1.0117	
60 minute summer	S36	7.001	S37	17.2	1.089	0.153	0.1081	
60 minute summer	S37	5.004	S38	62.2	1.298	0.305	0.7807	
60 minute summer	S38	5.005	S39	68.9	2.055	0.176	1.4934	
60 minute summer	S39	1.016	S40	100.7	2.919	0.118	0.4656	
60 minute summer	S40	1.016a	S62	100.7	2.409	0.215	0.9493	
60 minute summer	S41	8.000	S42	24.3	2.004	0.115	0.8363	
60 minute summer	S42	8.001	S43	33.4	1.172	0.176	0.7879	
60 minute summer	S43	8.002	S44	41.6	1.423	0.205	0.7844	
60 minute summer	S44	8.003	S45	53.1	1.710	0.122	1.6820	
60 minute summer	S45	8.004	S46	62.2	1.904	0.133	0.4217	
60 minute summer	S46	8.005	S52	67.0	2.259	0.124	0.5723	
60 minute summer	S47	9.000	S48	22.1	0.887	0.311	1.0624	
60 minute summer	S48	9.001	S49	36.7	1.644	0.117	0.7369	
60 minute summer	S49	9.002	S50	36.5	1.748	0.148	0.2760	
60 minute summer	S50	9.003	S51	36.5	2.187	0.090	0.4039	
60 minute summer	S51	9.004	S52	50.9	1.065	0.250	2.2210	
60 minute summer	S52	8.006	S53	118.1	1.848	0.250	1.2373	
60 minute summer	S53	8.007	S58	140.2	3.394	0.092	2.2298	
60 minute summer	S54	10.000	S55	7.2	0.915	0.137	0.1546	
60 minute summer	S55	10.001	S56	7.2	0.672	0.064	0.1440	

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S56	33	44.614	0.074	27.2	0.2443	0.0000	OK
60 minute summer	S57	34	41.862	0.157	27.0	0.2242	0.0000	OK
60 minute summer	S58	34	41.779	0.184	177.3	0.7920	0.0000	OK
60 minute summer	S59	34	41.097	0.217	186.7	0.5185	0.0000	OK
360 minute winter	S60	288	40.934	0.309	58.4	0.6052	0.0000	OK
360 minute winter	S61	288	40.934	0.334	58.4	0.0000	0.0000	OK
360 minute winter	S62	288	40.935	0.535	89.9	502.9849	0.0000	OK
360 minute winter	S63	288	40.935	0.565	20.1	3.2325	0.0000	SURCHARGED
480 minute winter	S64	376	40.445	0.090	19.8	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)
60 minute summer	S56	10.002	S57	27.0	2.028	0.131	0.9872	
60 minute summer	S57	10.003	S58	26.8	0.581	0.158	2.5955	
60 minute summer	S58	8.008	S59	177.3	2.001	0.160	4.5695	
60 minute summer	S59	8.009	S60	186.0	1.537	0.170	2.2765	
360 minute winter	S60	8.010	S61	58.4	1.031	0.155	2.5603	
360 minute winter	S61	8.011	S62	58.3	1.200	0.089	9.7205	
360 minute winter	S62	1.017	S63	20.1	0.225	0.046	4.2589	
360 minute winter	S63	1.018	S64	19.8	0.879	0.131	0.0590	1046.0

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Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S1	33	49.325	0.100	38.6	0.2852	0.0000	OK
60 minute summer	S2	33	48.928	0.128	27.3	0.2484	0.0000	OK
60 minute summer	S3	33	48.795	0.160	75.0	0.2185	0.0000	OK
60 minute summer	S4	33	48.248	0.173	93.9	0.3571	0.0000	OK
60 minute summer	S5	33	47.896	0.221	131.5	0.5556	0.0000	OK
60 minute summer	S6	33	47.559	0.224	139.1	0.3734	0.0000	OK
60 minute summer	S7	33	47.068	0.193	173.0	0.4963	0.0000	OK
60 minute summer	S8	33	46.073	0.223	182.2	0.3901	0.0000	OK
60 minute summer	S9	35	45.906	0.456	202.4	0.9187	0.0000	SURCHARGED
60 minute summer	S10	35	45.803	0.553	214.9	1.1479	0.0000	SURCHARGED
60 minute summer	S11	33	48.410	0.085	29.2	0.2124	0.0000	OK
60 minute summer	S12	33	47.849	0.124	51.9	0.2812	0.0000	OK
60 minute summer	S13	33	47.242	0.117	24.6	0.2748	0.0000	OK
60 minute summer	S14	33	47.127	0.127	24.6	0.1812	0.0000	OK
60 minute summer	S15	33	46.950	0.200	121.9	0.5900	0.0000	OK
60 minute summer	S16	33	46.494	0.219	137.4	0.4275	0.0000	OK
60 minute summer	S17	33	46.159	0.234	137.4	0.3343	0.0000	OK
60 minute summer	S18	34	45.945	0.295	170.1	0.7477	0.0000	OK
60 minute summer	S19	35	45.788	0.433	196.6	0.8060	0.0000	SURCHARGED
60 minute summer	S20	35	45.621	0.486	403.6	0.6950	0.0000	SURCHARGED
10080 minute winter	S21	7740	45.356	0.856	7.5	0.0000	0.0000	SURCHARGED
10080 minute winter	S22	7740	45.356	0.956	9.0	974.7222	0.0000	SURCHARGED
10080 minute winter	S23	7740	45.356	1.056	7.2	3.6590	0.0000	SURCHARGED
60 minute summer	S24a	33	44.338	0.133	17.8	0.2488	0.0000	OK
60 minute summer	S24	33	43.987	0.137	71.7	0.4515	0.0000	OK
60 minute summer	S25	35	43.360	0.360	71.6	0.5148	0.0000	SURCHARGED
60 minute summer	S26	35	43.270	0.400	67.8	0.5726	0.0000	SURCHARGED
60 minute summer	S27	35	43.158	0.458	112.1	1.3825	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	S1	1.000	S3	38.6	2.430	0.341	0.1743	
60 minute summer	S2	2.000	S3	27.3	1.256	0.519	0.1913	
60 minute summer	S3	1.001	S4	75.0	2.065	0.497	0.9582	
60 minute summer	S4	1.002	S5	94.0	1.605	0.401	1.7073	
60 minute summer	S5	1.003	S6	131.5	1.931	0.567	1.7246	
60 minute summer	S6	1.004	S7	138.9	2.209	0.594	2.1202	
60 minute summer	S7	1.005	S8	172.4	3.216	0.452	1.4140	
60 minute summer	S8	1.006	S9	185.2	1.820	0.395	2.1997	
60 minute summer	S9	1.007	S10	194.8	1.392	0.605	3.1966	
60 minute summer	S10	1.008	S20	212.0	1.458	1.130	5.3649	
60 minute summer	S11	3.000	S12	29.2	1.629	0.303	0.3173	
60 minute summer	S12	3.001	S15	51.9	2.419	0.530	0.5029	
60 minute summer	S13	4.000	S14	24.6	1.122	0.451	0.2494	
60 minute summer	S14	4.001	S15	24.6	1.126	0.537	0.2806	
60 minute summer	S15	3.002	S16	121.9	1.929	0.508	2.0907	
60 minute summer	S16	3.003	S17	137.4	1.978	0.549	1.5569	
60 minute summer	S17	3.004	S18	137.2	1.675	0.549	1.4509	
60 minute summer	S18	3.005	S19	169.7	1.722	0.767	2.4546	
60 minute summer	S19	3.006	S20	191.6	2.033	0.852	1.2676	
60 minute summer	S20	1.009	S21	394.8	2.495	0.738	3.6971	
10080 minute winter	S21	1.009a	S22	7.5	0.543	0.041	5.0274	
10080 minute winter	S22	1.010	S23	7.2	0.194	0.027	2.3553	
10080 minute winter	S23	1.011	S24	1.6	0.582	0.017	0.1892	
60 minute summer	S24a	5.000a	S24	17.7	1.119	0.989	0.3229	
60 minute summer	S24	1.012	S25	71.6	1.628	0.437	1.9933	
60 minute summer	S25	1.013	S26	67.8	1.264	0.741	1.3430	
60 minute summer	S26	1.014	S27	65.5	1.031	0.717	1.7642	
60 minute summer	S27	1.015	S39	107.9	1.544	1.186	5.1787	

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Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S28	33	45.889	0.189	41.3	0.5610	0.0000	OK
60 minute summer	S29	33	45.608	0.083	41.3	0.0939	0.0000	OK
60 minute summer	S30	33	44.818	0.118	31.8	0.2660	0.0000	OK
60 minute summer	S31	33	44.673	0.123	39.8	0.1643	0.0000	OK
60 minute summer	S32	33	44.594	0.289	39.8	0.3273	0.0000	OK
60 minute summer	S33	33	44.571	0.391	121.3	0.7424	0.0000	SURCHARGED
60 minute summer	S34	33	44.372	0.237	164.1	0.4739	0.0000	OK
60 minute summer	S35	33	43.765	0.165	65.9	0.6192	0.0000	OK
60 minute summer	S36	33	43.188	0.223	66.1	0.2518	0.0000	OK
60 minute summer	S37	33	43.134	0.389	235.7	0.6152	0.0000	OK
60 minute summer	S38	34	42.972	0.292	259.3	0.6096	0.0000	OK
60 minute summer	S39	34	42.251	0.221	366.1	0.3155	0.0000	OK
240 minute winter	S40	232	41.656	0.556	120.0	0.0000	0.0000	SURCHARGED
60 minute summer	S41	33	49.612	0.137	92.4	0.6440	0.0000	OK
60 minute summer	S42	33	47.175	0.250	126.9	0.5724	0.0000	OK
60 minute summer	S43	33	46.950	0.275	159.0	0.6084	0.0000	OK
60 minute summer	S44	33	46.543	0.218	202.8	0.5564	0.0000	OK
60 minute summer	S45	33	45.624	0.274	238.1	0.7041	0.0000	OK
60 minute summer	S46	33	45.326	0.246	255.2	0.4906	0.0000	OK
60 minute summer	S47	33	47.351	0.326	84.5	1.3386	0.0000	SURCHARGED
60 minute summer	S48	33	46.954	0.179	138.9	0.5908	0.0000	OK
60 minute summer	S49	33	46.207	0.232	138.6	0.3322	0.0000	OK
60 minute summer	S50	33	45.923	0.148	138.0	0.2125	0.0000	OK
60 minute summer	S51	34	45.090	0.365	193.3	0.9499	0.0000	OK
60 minute summer	S52	34	44.831	0.441	446.1	0.6304	0.0000	OK
60 minute summer	S53	33	44.540	0.240	529.1	0.9563	0.0000	OK
60 minute summer	S54	33	45.072	0.122	27.3	0.2983	0.0000	OK
60 minute summer	S55	33	44.785	0.110	27.3	0.1240	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)
60 minute summer	S28	5.000	S29	41.3	1.643	0.978	0.6461	
60 minute summer	S29	5.001	S33	41.3	1.843	0.293	0.4647	
60 minute summer	S30	6.000	S31	31.8	1.202	0.286	0.3978	
60 minute summer	S31	6.001	S32	39.8	1.232	0.359	1.1933	
60 minute summer	S32	6.002	S33	39.9	0.661	0.355	0.8550	
60 minute summer	S33	5.002	S34	120.9	1.755	1.500	0.5528	
60 minute summer	S34	5.003	S37	163.6	2.760	0.900	2.7912	
60 minute summer	S35	7.000	S36	66.1	1.406	0.594	3.0356	
60 minute summer	S36	7.001	S37	65.0	1.310	0.578	0.3967	
60 minute summer	S37	5.004	S38	235.3	1.830	1.155	2.0607	
60 minute summer	S38	5.005	S39	260.3	2.791	0.664	4.1301	
60 minute summer	S39	1.016	S40	366.3	3.911	0.429	1.2552	
240 minute winter	S40	1.016a	S62	120.0	2.019	0.256	3.5976	
60 minute summer	S41	8.000	S42	92.4	2.595	0.437	2.5572	
60 minute summer	S42	8.001	S43	126.8	1.537	0.667	2.2784	
60 minute summer	S43	8.002	S44	158.5	1.947	0.782	2.1789	
60 minute summer	S44	8.003	S45	202.5	2.284	0.466	4.7925	
60 minute summer	S45	8.004	S46	237.0	2.509	0.506	1.2223	
60 minute summer	S46	8.005	S52	254.7	2.671	0.469	1.8875	
60 minute summer	S47	9.000	S48	83.2	1.228	1.174	2.7099	
60 minute summer	S48	9.001	S49	138.6	2.242	0.443	2.0339	
60 minute summer	S49	9.002	S50	138.0	2.459	0.558	0.7350	
60 minute summer	S50	9.003	S51	137.7	2.183	0.339	1.5714	
60 minute summer	S51	9.004	S52	192.4	1.510	0.947	5.8997	
60 minute summer	S52	8.006	S53	446.1	2.712	0.946	3.1128	
60 minute summer	S53	8.007	S58	530.5	3.919	0.348	7.4528	
60 minute summer	S54	10.000	S55	27.3	1.293	0.521	0.4153	
60 minute summer	S55	10.001	S56	27.3	0.921	0.245	0.3972	

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Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S56	33	44.693	0.153	103.0	0.5067	0.0000	OK
60 minute summer	S57	34	42.056	0.351	102.8	0.5021	0.0000	OK
60 minute summer	S58	34	42.022	0.427	669.8	1.8390	0.0000	OK
240 minute winter	S59	228	41.657	0.777	223.8	1.8548	0.0000	SURCHARGED
240 minute winter	S60	228	41.656	1.031	226.1	2.0171	0.0000	SURCHARGED
240 minute winter	S61	232	41.656	1.056	224.6	0.0000	0.0000	SURCHARGED
240 minute winter	S62	232	41.656	1.256	348.4	1507.8850	0.0000	SURCHARGED
240 minute winter	S63	232	41.655	1.285	54.4	7.3574	0.0000	SURCHARGED
240 minute winter	S64	232	40.508	0.153	54.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	S56	10.002	S57	102.8	2.903	0.499	2.6288	
60 minute summer	S57	10.003	S58	100.5	0.632	0.591	9.5458	
60 minute summer	S58	8.008	S59	670.2	2.374	0.606	14.7937	
240 minute winter	S59	8.009	S60	218.9	1.417	0.200	6.6969	
240 minute winter	S60	8.010	S61	224.6	1.321	0.596	5.4468	
240 minute winter	S61	8.011	S62	233.9	1.795	0.356	14.4772	
240 minute winter	S62	1.017	S63	54.4	0.359	0.125	4.8877	
240 minute winter	S63	1.018	S64	54.4	1.157	0.360	0.1233	2746.6

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S1	32	49.342	0.117	51.0	0.3343	0.0000	OK
60 minute summer	S2	33	48.954	0.154	36.0	0.2994	0.0000	OK
60 minute summer	S3	33	48.827	0.192	99.0	0.2632	0.0000	OK
60 minute summer	S4	33	48.284	0.209	124.0	0.4312	0.0000	OK
60 minute summer	S5	33	47.947	0.272	173.6	0.6845	0.0000	OK
60 minute summer	S6	33	47.608	0.273	183.7	0.4553	0.0000	OK
60 minute summer	S7	34	47.168	0.293	228.4	0.7534	0.0000	OK
60 minute summer	S8	35	46.820	0.970	232.3	1.6947	0.0000	SURCHARGED
60 minute summer	S9	35	46.675	1.225	250.5	2.4656	0.0000	SURCHARGED
60 minute summer	S10	35	46.494	1.244	272.9	2.5808	0.0000	SURCHARGED
60 minute summer	S11	33	48.424	0.099	38.5	0.2481	0.0000	OK
60 minute summer	S12	33	47.875	0.150	68.5	0.3402	0.0000	OK
60 minute summer	S13	35	47.349	0.224	32.5	0.5242	0.0000	OK
60 minute summer	S14	35	47.308	0.308	32.5	0.4414	0.0000	SURCHARGED
60 minute summer	S15	35	47.260	0.510	161.1	1.5084	0.0000	SURCHARGED
60 minute summer	S16	35	47.067	0.792	177.8	1.5452	0.0000	SURCHARGED
60 minute summer	S17	35	46.882	0.957	161.9	1.3700	0.0000	SURCHARGED
60 minute summer	S18	35	46.726	1.076	198.8	2.7288	0.0000	SURCHARGED
60 minute summer	S19	35	46.426	1.071	221.0	1.9939	0.0000	SURCHARGED
60 minute summer	S20	35	46.182	1.047	490.6	1.4980	0.0000	SURCHARGED
10080 minute winter	S21	7860	45.552	1.052	8.9	0.0000	0.0000	SURCHARGED
10080 minute winter	S22	7860	45.552	1.152	9.4	1248.0210	0.0000	SURCHARGED
10080 minute winter	S23	7860	45.552	1.252	7.6	4.3373	0.0000	SURCHARGED
60 minute summer	S24a	34	44.504	0.299	23.5	0.5592	0.0000	SURCHARGED
60 minute summer	S24	35	44.098	0.248	93.7	0.8151	0.0000	OK
60 minute summer	S25	35	43.920	0.920	87.2	1.3165	0.0000	SURCHARGED
60 minute summer	S26	35	43.792	0.922	82.2	1.3189	0.0000	SURCHARGED
60 minute summer	S27	35	43.631	0.931	138.0	2.8121	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	S1	1.000	S3	51.0	2.480	0.450	0.2286	
60 minute summer	S2	2.000	S3	36.0	1.334	0.685	0.2373	
60 minute summer	S3	1.001	S4	99.0	2.190	0.656	1.1918	
60 minute summer	S4	1.002	S5	124.1	1.664	0.529	2.1677	
60 minute summer	S5	1.003	S6	173.7	2.023	0.748	2.1740	
60 minute summer	S6	1.004	S7	183.5	2.358	0.784	2.9861	
60 minute summer	S7	1.005	S8	219.5	3.300	0.576	2.6716	
60 minute summer	S8	1.006	S9	227.7	1.820	0.486	3.0313	
60 minute summer	S9	1.007	S10	247.7	1.564	0.770	3.1966	
60 minute summer	S10	1.008	S20	270.3	1.706	1.441	5.3649	
60 minute summer	S11	3.000	S12	38.5	1.767	0.400	0.3952	
60 minute summer	S12	3.001	S15	68.5	2.550	0.700	0.7634	
60 minute summer	S13	4.000	S14	32.5	1.180	0.596	0.4515	
60 minute summer	S14	4.001	S15	32.5	1.192	0.709	0.5109	
60 minute summer	S15	3.002	S16	157.3	1.977	0.655	3.6481	
60 minute summer	S16	3.003	S17	161.9	2.012	0.646	2.4712	
60 minute summer	S17	3.004	S18	157.5	1.658	0.630	1.9478	
60 minute summer	S18	3.005	S19	190.5	1.729	0.861	2.6640	
60 minute summer	S19	3.006	S20	220.6	2.023	0.981	1.2676	
60 minute summer	S20	1.009	S21	490.7	3.097	0.918	3.6971	
10080 minute winter	S21	1.009a	S22	9.4	0.531	0.052	5.0274	
10080 minute winter	S22	1.010	S23	7.6	0.223	0.029	2.3553	
10080 minute winter	S23	1.011	S24	1.8	0.598	0.019	0.2023	
60 minute summer	S24a	5.000a	S24	22.8	1.294	1.274	0.3472	
60 minute summer	S24	1.012	S25	87.2	1.668	0.532	2.6128	
60 minute summer	S25	1.013	S26	82.2	1.266	0.898	1.3430	
60 minute summer	S26	1.014	S27	83.9	1.192	0.919	1.7642	
60 minute summer	S27	1.015	S39	134.1	1.906	1.475	5.3314	

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S28	33	46.054	0.354	54.6	1.0473	0.0000	SURCHARGED
60 minute summer	S29	35	45.642	0.117	53.5	0.1321	0.0000	OK
60 minute summer	S30	35	45.289	0.589	42.0	1.3250	0.0000	SURCHARGED
60 minute summer	S31	35	45.265	0.715	54.7	0.9551	0.0000	SURCHARGED
60 minute summer	S32	35	45.210	0.905	58.2	1.0236	0.0000	SURCHARGED
60 minute summer	S33	35	45.176	0.996	144.5	1.8903	0.0000	SURCHARGED
60 minute summer	S34	35	44.920	0.785	193.7	1.5730	0.0000	SURCHARGED
60 minute summer	S35	33	43.797	0.197	87.1	0.7386	0.0000	OK
60 minute summer	S36	34	43.339	0.374	87.1	0.4230	0.0000	SURCHARGED
60 minute summer	S37	34	43.262	0.517	284.3	0.8186	0.0000	SURCHARGED
60 minute summer	S38	34	43.018	0.338	315.5	0.7044	0.0000	OK
60 minute summer	S39	34	42.284	0.254	448.3	0.3628	0.0000	OK
240 minute winter	S40	232	41.920	0.820	152.7	0.0000	0.0000	SURCHARGED
60 minute summer	S41	33	49.637	0.162	122.1	0.7588	0.0000	OK
60 minute summer	S42	34	47.290	0.365	167.6	0.8340	0.0000	OK
60 minute summer	S43	33	47.074	0.399	205.9	0.8815	0.0000	SURCHARGED
60 minute summer	S44	33	46.581	0.256	260.7	0.6529	0.0000	OK
60 minute summer	S45	33	45.683	0.333	306.7	0.8568	0.0000	OK
60 minute summer	S46	33	45.381	0.301	330.9	0.6022	0.0000	OK
60 minute summer	S47	33	47.559	0.534	111.6	2.1921	0.0000	SURCHARGED
60 minute summer	S48	33	46.990	0.215	183.4	0.7105	0.0000	OK
60 minute summer	S49	33	46.256	0.281	183.1	0.4022	0.0000	OK
60 minute summer	S50	33	45.956	0.181	182.6	0.2590	0.0000	OK
60 minute summer	S51	33	45.255	0.530	255.5	1.3797	0.0000	SURCHARGED
60 minute summer	S52	33	44.919	0.529	584.9	0.7569	0.0000	OK
60 minute summer	S53	33	44.578	0.278	699.7	1.1099	0.0000	OK
60 minute summer	S54	33	45.097	0.147	36.0	0.3587	0.0000	OK
60 minute summer	S55	33	44.805	0.130	36.0	0.1468	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)
60 minute summer	S28	5.000	S29	53.5	1.629	1.267	0.7988	
60 minute summer	S29	5.001	S33	52.8	1.849	0.375	0.5304	
60 minute summer	S30	6.000	S31	44.2	1.232	0.398	1.0586	
60 minute summer	S31	6.001	S32	58.2	1.241	0.526	1.7358	
60 minute summer	S32	6.002	S33	64.6	0.917	0.574	0.8597	
60 minute summer	S33	5.002	S34	144.0	2.046	1.787	0.5988	
60 minute summer	S34	5.003	S37	193.4	2.771	1.064	3.2840	
60 minute summer	S35	7.000	S36	87.1	1.432	0.783	3.7852	
60 minute summer	S36	7.001	S37	85.9	1.288	0.764	0.4809	
60 minute summer	S37	5.004	S38	284.2	1.864	1.395	2.3175	
60 minute summer	S38	5.005	S39	315.4	2.857	0.805	4.8720	
60 minute summer	S39	1.016	S40	447.7	3.961	0.524	1.6671	
240 minute winter	S40	1.016a	S62	149.7	1.938	0.320	3.5976	
60 minute summer	S41	8.000	S42	122.1	2.590	0.578	3.6951	
60 minute summer	S42	8.001	S43	163.4	1.580	0.859	3.0368	
60 minute summer	S43	8.002	S44	202.1	2.012	0.996	2.8375	
60 minute summer	S44	8.003	S45	259.7	2.375	0.597	5.9243	
60 minute summer	S45	8.004	S46	306.9	2.578	0.655	1.5405	
60 minute summer	S46	8.005	S52	331.3	2.653	0.611	2.4595	
60 minute summer	S47	9.000	S48	109.8	1.570	1.549	2.8614	
60 minute summer	S48	9.001	S49	183.1	2.365	0.586	2.5366	
60 minute summer	S49	9.002	S50	182.6	2.579	0.738	0.9254	
60 minute summer	S50	9.003	S51	181.9	2.176	0.448	1.9398	
60 minute summer	S51	9.004	S52	254.3	1.619	1.251	6.9901	
60 minute summer	S52	8.006	S53	584.6	2.909	1.240	3.7306	
60 minute summer	S53	8.007	S58	698.5	3.928	0.458	11.0389	
60 minute summer	S54	10.000	S55	36.0	1.373	0.687	0.5157	
60 minute summer	S55	10.001	S56	35.9	0.993	0.322	0.4916	

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S56	33	44.721	0.181	136.0	0.5987	0.0000	OK
60 minute summer	S57	35	42.604	0.899	140.1	1.2864	0.0000	SURCHARGED
60 minute summer	S58	35	42.594	0.999	859.6	4.3031	0.0000	SURCHARGED
60 minute summer	S59	35	42.059	1.179	877.7	2.8148	0.0000	SURCHARGED
240 minute winter	S60	232	41.919	1.294	288.8	2.5320	0.0000	SURCHARGED
240 minute winter	S61	232	41.919	1.319	288.3	0.0000	0.0000	SURCHARGED
240 minute winter	S62	232	41.919	1.519	437.7	1967.6070	0.0000	FLOOD RISK
240 minute winter	S63	232	41.918	1.548	62.7	8.8614	0.0000	FLOOD RISK
240 minute winter	S64	232	40.521	0.166	62.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	S56	10.002	S57	140.1	3.068	0.680	4.1642	
60 minute summer	S57	10.003	S58	121.2	0.717	0.713	15.6855	
60 minute summer	S58	8.008	S59	835.7	2.374	0.756	18.3737	
60 minute summer	S59	8.009	S60	877.6	2.459	0.802	6.6969	
240 minute winter	S60	8.010	S61	288.3	1.321	0.765	5.4468	
240 minute winter	S61	8.011	S62	288.0	1.898	0.438	14.4772	
240 minute winter	S62	1.017	S63	62.7	0.330	0.144	4.8877	
240 minute winter	S63	1.018	S64	62.7	1.202	0.415	0.1368	3402.0

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Appendix H2

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	1.000
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	x
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Circular Link Type

Shape	Circular	Barrels	1	Auto Increment (mm)	75	Follow Ground	x

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.102	5.00	50.650	1350	510217.869	117309.804	1.425
S2	0.072	5.00	50.575	1200	510199.990	117317.737	1.775
S3	0.024	5.00	50.650	1200	510207.354	117312.920	2.015
S4	0.050	5.00	49.650	1350	510198.830	117287.966	1.575
S5	0.099	5.00	49.500	1350	510192.742	117259.439	1.825
S6	0.020	5.00	49.050	1350	510168.011	117264.856	1.715
S7	0.090	5.00	48.450	1350	510136.486	117276.775	1.575
S8	0.026	5.00	47.500	1350	510125.725	117252.697	1.650
S9	0.048	5.00	47.100	1350	510126.450	117233.579	1.650
S10	0.053	5.00	46.900	1350	510137.466	117216.677	1.650
S11	0.077	5.00	49.750	1350	510222.928	117247.914	1.425
S12	0.060	5.00	49.150	1350	510238.181	117239.052	1.425
S13	0.065	5.00	48.550	1350	510275.499	117224.126	1.425
S14			48.425	1350	510264.141	117224.263	1.425
S15	0.120	5.00	48.325	1350	510251.984	117220.111	1.575
S16	0.041	5.00	47.850	1350	510229.514	117195.840	1.575
S17			47.500	1350	510210.055	117184.735	1.575
S18	0.087	5.00	47.225	1350	510193.715	117178.036	1.575
S19	0.071	5.00	47.300	1200	510178.040	117196.411	1.945
S20			47.150	1350	510167.758	117201.547	2.015
S21			45.900		510157.332	117180.672	1.400
S22			45.900		510126.179	117174.651	1.500
S23			45.900	2100	510113.478	117166.928	1.600
S24a	0.047	5.00	45.475	1200	510070.819	117116.256	1.270
S24	0.139	5.00	45.350	1350	510089.528	117108.538	1.500
S25			44.500	1350	510079.463	117070.476	1.500
S26			44.500	1350	510075.631	117051.794	1.630
S27	0.131	5.00	44.350	1350	510100.203	117046.907	1.650
S28	0.109	5.00	47.125	1350	510203.209	117149.545	1.425
S29			47.300	1200	510218.193	117127.837	1.775
S30	0.084	5.00	46.200	1200	510160.812	117142.303	1.500
S31	0.021	5.00	46.600	1200	510174.809	117136.819	2.050
S32			47.125	1200	510196.228	117124.621	2.820
S33	0.108	5.00	47.000	1200	510205.085	117116.220	2.820
S34	0.114	5.00	46.750	1200	510199.300	117109.988	2.615
S35	0.174	5.00	45.100	1350	510119.407	117096.317	1.500
S36			45.250	1200	510177.986	117072.109	2.285
S37	0.019	5.00	45.250	1350	510182.085	117066.647	2.505
S38	0.066	5.00	44.700	1350	510185.475	117050.806	2.020
S39			43.800	1350	510168.164	117009.963	1.770
S40			43.000		510162.966	116997.581	1.900
S41	0.244	5.00	50.975	1350	510327.972	117263.441	1.500

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Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S42	0.091	5.00	48.500	1200	510299.910	117200.493	1.575
S43	0.085	5.00	48.250	1200	510287.138	117175.978	1.575
S44	0.117	5.00	47.975	1200	510268.634	117156.631	1.650
S45	0.094	5.00	47.000	1350	510238.052	117112.009	1.650
S46	0.048	5.00	46.775	1350	510248.394	117104.288	1.695
S47	0.223	5.00	48.525	1200	510364.633	117185.808	1.500
S48	0.147	5.00	48.350	1350	510346.623	117147.180	1.575
S49			47.550	1350	510321.771	117125.589	1.575
S50			47.350	1350	510315.443	117114.115	1.575
S51	0.147	5.00	46.725	1200	510312.259	117090.517	2.000
S52			46.500	1350	510266.261	117097.074	2.110
S53	0.230	5.00	46.100	1350	510262.007	117078.469	1.800
S54	0.072	5.00	46.375	1350	510343.342	117086.034	1.425
S55			46.700	1200	510323.878	117088.841	2.025
S56	0.200	5.00	46.375	1200	510321.970	117075.611	1.835
S57			43.750	1350	510292.373	117007.555	2.045
S58	0.108	5.00	44.150	2100	510240.894	117028.789	2.555
S59	0.099	5.00	42.950	1350	510220.675	116981.457	2.070
S60	0.061	5.00	42.950	1350	510203.368	116988.697	2.325
S61			42.700		510188.721	116984.423	2.100
S62			42.200		510148.389	116980.172	1.800
S63			42.200	2700	510134.728	116981.088	1.830
S64			42.000	1200	510132.248	116980.238	1.645

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S3	10.967	0.600	49.225	48.710	0.515	21.3	225	5.06	37.9
2.000	S2	S3	8.800	0.600	48.800	48.710	0.090	97.8	225	5.11	37.7
1.001	S3	S4	26.370	0.600	48.635	48.150	0.485	54.4	300	5.32	37.1
1.002	S4	S5	29.169	0.600	48.075	47.675	0.400	73.0	375	5.55	36.4
1.003	S5	S6	25.317	0.600	47.675	47.335	0.340	74.5	375	5.75	35.8
1.004	S6	S7	33.703	0.600	47.335	46.875	0.460	73.3	375	6.01	35.0
1.005	S7	S8	26.373	0.600	46.875	45.925	0.950	27.8	375	6.14	34.6
1.006	S8	S9	19.132	0.600	45.850	45.450	0.400	47.8	450	6.25	34.4
1.007	S9	S10	20.175	0.600	45.450	45.250	0.200	100.9	450	6.41	33.9
1.008	S10	S20	33.860	0.600	45.250	45.135	0.115	294.4	450	6.89	32.7
3.000	S11	S12	17.641	0.600	48.325	47.725	0.600	29.4	225	5.12	37.7
3.001	S12	S15	23.437	0.600	47.725	46.900	0.825	28.4	225	5.28	37.2
4.000	S13	S14	11.359	0.600	47.125	47.000	0.125	90.9	225	5.14	37.7

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	2.848	113.2	14.0	1.200	1.715	0.102	0.0	53	1.953
2.000	1.322	52.6	9.8	1.550	1.715	0.072	0.0	65	1.016
1.001	2.136	151.0	26.6	1.715	1.200	0.198	0.0	85	1.621
1.002	2.122	234.4	32.6	1.200	1.450	0.248	0.0	94	1.513
1.003	2.101	232.1	44.9	1.450	1.340	0.347	0.0	111	1.638
1.004	2.119	234.0	46.4	1.340	1.200	0.367	0.0	112	1.663
1.005	3.450	381.0	57.2	1.200	1.200	0.457	0.0	98	2.514
1.006	2.945	468.4	60.0	1.200	1.200	0.483	0.0	108	2.050
1.007	2.024	321.9	65.1	1.200	1.200	0.531	0.0	137	1.601
1.008	1.179	187.6	69.1	1.200	1.565	0.584	0.0	189	1.093
3.000	2.422	96.3	10.5	1.200	1.200	0.077	0.0	50	1.597
3.001	2.464	98.0	18.4	1.200	1.200	0.137	0.0	65	1.896
4.000	1.372	54.5	8.8	1.200	1.200	0.065	0.0	61	1.015

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Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
4.001	S14	S15	12.846	0.600	47.000	46.900	0.100	128.5	225	5.32	37.1
3.002	S15	S16	33.075	0.600	46.750	46.275	0.475	69.6	375	5.58	36.3
3.003	S16	S17	22.405	0.600	46.275	45.925	0.350	64.0	375	5.74	35.8
3.004	S17	S18	17.660	0.600	45.925	45.650	0.275	64.2	375	5.87	35.4
3.005	S18	S19	24.153	0.600	45.650	45.355	0.295	81.9	375	6.07	34.8
3.006	S19	S20	11.493	0.600	45.355	45.210	0.145	79.3	375	6.17	34.6
1.009	S20	S21	23.334	0.600	45.135	44.500	0.635	36.7	450	7.01	32.4
1.009a	S21	S22	31.730	0.600	44.500	44.400	0.100	317.3	450	7.47	31.4
1.010	S22	S23	14.865	0.600	44.400	44.300	0.100	148.6	450	7.62	31.1
1.011	S23	S24	63.111	0.600	44.300	43.850	0.450	140.2	300	8.42	29.6
5.000a	S24a	S24	20.238	0.600	44.205	44.000	0.205	98.7	150	5.33	37.1
1.012	S24	S25	39.370	0.600	43.850	43.000	0.850	46.3	300	8.70	29.1
1.013	S25	S26	19.071	0.600	43.000	42.870	0.130	146.7	300	8.94	28.6
1.014	S26	S27	25.053	0.600	42.870	42.700	0.170	147.4	300	9.27	28.1
1.015	S27	S39	77.353	0.600	42.700	42.180	0.520	148.8	300	10.27	26.6
5.000	S28	S29	26.377	0.600	45.700	45.525	0.175	150.7	225	5.41	36.8
5.001	S29	S33	17.515	0.600	45.525	44.255	1.270	13.8	225	5.50	36.6
6.000	S30	S31	15.033	0.600	44.700	44.550	0.150	100.0	300	5.16	37.6
6.001	S31	S32	24.649	0.600	44.550	44.305	0.245	100.6	300	5.42	36.8
6.002	S32	S33	12.208	0.600	44.305	44.180	0.125	97.7	300	5.55	36.4
5.002	S33	S34	8.503	0.600	44.180	44.135	0.045	189.0	300	5.67	36.0
5.003	S34	S37	46.635	0.600	44.135	42.895	1.240	37.6	300	5.98	35.1
7.000	S35	S36	63.384	0.600	43.600	42.965	0.635	99.8	300	5.67	36.0
7.001	S36	S37	6.829	0.600	42.965	42.895	0.070	97.6	300	5.74	35.8
5.004	S37	S38	16.200	0.600	42.745	42.680	0.065	250.0	450	6.19	34.5
5.005	S38	S39	44.360	0.600	42.680	42.030	0.650	68.2	450	6.49	33.8
1.016	S39	S40	13.429	0.600	42.030	41.100	0.930	14.4	450	10.31	26.5
1.016a	S40	S62	22.706	0.600	41.100	40.625	0.475	47.8	450	10.44	26.4

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
4.001	1.152	45.8	8.7	1.200	1.200	0.065	0.0	66	0.891
3.002	2.173	240.1	42.2	1.200	1.200	0.322	0.0	106	1.652
3.003	2.267	250.4	47.0	1.200	1.200	0.363	0.0	109	1.755
3.004	2.264	250.0	46.4	1.200	1.200	0.363	0.0	109	1.746
3.005	2.003	221.3	56.6	1.200	1.570	0.450	0.0	129	1.685
3.006	2.036	224.9	65.1	1.570	1.565	0.521	0.0	137	1.770
1.009	3.362	534.7	129.5	1.565	0.950	1.105	0.0	150	2.790
1.009a	1.136	180.6	125.6	0.950	1.050	1.105	0.0	277	1.224
1.010	1.665	264.8	124.3	1.050	1.150	1.105	0.0	217	1.639
1.011	1.325	93.7	118.1	1.300	1.200	1.105	0.0	300	1.342
5.000a	1.011	17.9	6.3	1.120	1.200	0.047	0.0	61	0.923
1.012	2.316	163.7	135.6	1.200	1.200	1.291	0.0	209	2.576
1.013	1.296	91.6	133.5	1.200	1.330	1.291	0.0	300	1.312
1.014	1.293	91.4	131.1	1.330	1.350	1.291	0.0	300	1.309
1.015	1.287	90.9	136.7	1.350	1.320	1.422	0.0	300	1.303
5.000	1.062	42.2	14.5	1.200	1.550	0.109	0.0	91	0.966
5.001	3.542	140.8	14.4	1.550	2.520	0.109	0.0	48	2.289
6.000	1.572	111.1	11.4	1.200	1.750	0.084	0.0	65	1.026
6.001	1.567	110.8	14.0	1.750	2.520	0.105	0.0	71	1.079
6.002	1.591	112.4	13.8	2.520	2.520	0.105	0.0	71	1.091
5.002	1.140	80.6	41.9	2.520	2.315	0.322	0.0	154	1.152
5.003	2.571	181.8	55.3	2.315	2.055	0.436	0.0	113	2.268
7.000	1.573	111.2	22.6	1.200	1.985	0.174	0.0	91	1.241
7.001	1.592	112.5	22.5	1.985	2.055	0.174	0.0	91	1.251
5.004	1.281	203.7	78.5	2.055	1.570	0.629	0.0	194	1.202
5.005	2.463	391.8	84.8	1.570	1.320	0.695	0.0	141	1.981
1.016	5.371	854.2	203.0	1.320	1.450	2.117	0.0	148	4.431
1.016a	2.946	468.5	201.7	1.450	1.125	2.117	0.0	206	2.840

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Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
8.000	S41	S42	68.920	0.600	49.475	47.000	2.475	27.8	300	5.38	36.9
8.001	S42	S43	27.643	0.600	46.925	46.675	0.250	110.6	375	5.65	36.1
8.002	S43	S44	26.771	0.600	46.675	46.400	0.275	97.4	375	5.89	35.3
8.003	S44	S45	54.096	0.600	46.325	45.350	0.975	55.5	450	6.22	34.4
8.004	S45	S46	12.906	0.600	45.350	45.080	0.270	47.8	450	6.30	34.2
8.005	S46	S52	19.268	0.600	45.080	44.540	0.540	35.7	450	6.39	34.0
9.000	S47	S48	42.620	0.600	47.025	46.850	0.175	243.5	300	5.71	35.9
9.001	S48	S49	32.921	0.600	46.775	45.975	0.800	41.2	375	5.90	35.3
9.002	S49	S50	13.103	0.600	45.975	45.775	0.200	65.5	375	6.00	35.0
9.003	S50	S51	23.812	0.600	45.775	44.800	0.975	24.4	375	6.11	34.7
9.004	S51	S52	46.463	0.600	44.725	44.540	0.185	251.2	450	6.71	33.2
8.006	S52	S53	19.085	0.600	44.390	44.300	0.090	212.1	600	6.90	32.7
8.007	S53	S58	53.980	0.600	44.300	41.670	2.630	20.5	600	7.07	32.3
10.000	S54	S55	19.665	0.600	44.950	44.750	0.200	98.3	225	5.25	37.3
10.001	S55	S56	13.367	0.600	44.675	44.540	0.135	99.0	300	5.39	36.9
10.002	S56	S57	74.213	0.600	44.540	42.005	2.535	29.3	300	5.81	35.6
10.003	S57	S58	55.686	0.600	41.705	41.670	0.035	1591.0	600	7.36	31.7
8.008	S58	S59	51.470	0.600	41.595	40.880	0.715	72.0	675	7.63	31.1
8.009	S59	S60	18.760	0.600	40.880	40.625	0.255	73.6	675	7.74	30.9
8.010	S60	S61	15.258	0.600	40.625	40.600	0.025	610.3	675	7.98	30.4
8.011	S61	S62	40.555	0.600	40.600	40.400	0.200	202.8	675	8.35	29.7
1.017	S62	S63	13.692	0.600	40.400	40.370	0.030	456.4	675	10.63	26.1
1.018	S63	S64	2.622	0.600	40.370	40.355	0.015	174.8	375	10.66	26.1

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
8.000	2.990	211.4	32.5	1.200	1.200	0.244	0.0	79	2.183
8.001	1.722	190.2	43.7	1.200	1.200	0.335	0.0	122	1.409
8.002	1.836	202.8	53.6	1.200	1.200	0.420	0.0	131	1.557
8.003	2.733	434.7	66.8	1.200	1.200	0.537	0.0	118	2.002
8.004	2.946	468.5	78.1	1.200	1.245	0.631	0.0	123	2.209
8.005	3.412	542.6	83.4	1.245	1.510	0.679	0.0	118	2.500
9.000	1.003	70.9	28.9	1.200	1.200	0.223	0.0	133	0.953
9.001	2.831	312.7	47.2	1.200	1.200	0.370	0.0	98	2.062
9.002	2.241	247.5	46.8	1.200	1.200	0.370	0.0	109	1.734
9.003	3.679	406.3	46.4	1.200	1.550	0.370	0.0	85	2.474
9.004	1.278	203.3	62.0	1.550	1.510	0.517	0.0	170	1.128
8.006	1.668	471.6	141.3	1.510	1.200	1.196	0.0	224	1.466
8.007	5.390	1524.1	166.5	1.200	1.880	1.426	0.0	132	3.596
10.000	1.318	52.4	9.7	1.200	1.725	0.072	0.0	65	1.013
10.001	1.580	111.7	9.6	1.725	1.535	0.072	0.0	59	0.975
10.002	2.916	206.1	35.0	1.535	1.445	0.272	0.0	83	2.188
10.003	0.601	170.0	31.2	1.445	1.880	0.272	0.0	173	0.462
8.008	3.091	1106.0	203.0	1.880	1.395	1.806	0.0	194	2.383
8.009	3.057	1094.1	212.6	1.395	1.650	1.905	0.0	200	2.395
8.010	1.053	376.9	215.8	1.650	1.425	1.966	0.0	367	1.087
8.011	1.837	657.2	211.0	1.425	1.125	1.966	0.0	262	1.644
1.017	1.220	436.6	385.2	1.125	1.155	4.083	0.0	495	1.368
1.018	1.367	151.0	384.6	1.455	1.270	4.083	0.0	375	1.385

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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	10.967	21.3	225	Circular	50.650	49.225	1.200	50.650	48.710	1.715
2.000	8.800	97.8	225	Circular	50.575	48.800	1.550	50.650	48.710	1.715
1.001	26.370	54.4	300	Circular	50.650	48.635	1.715	49.650	48.150	1.200
1.002	29.169	73.0	375	Circular	49.650	48.075	1.200	49.500	47.675	1.450
1.003	25.317	74.5	375	Circular	49.500	47.675	1.450	49.050	47.335	1.340
1.004	33.703	73.3	375	Circular	49.050	47.335	1.340	48.450	46.875	1.200
1.005	26.373	27.8	375	Circular	48.450	46.875	1.200	47.500	45.925	1.200
1.006	19.132	47.8	450	Circular	47.500	45.850	1.200	47.100	45.450	1.200
1.007	20.175	100.9	450	Circular	47.100	45.450	1.200	46.900	45.250	1.200
1.008	33.860	294.4	450	Circular	46.900	45.250	1.200	47.150	45.135	1.565
3.000	17.641	29.4	225	Circular	49.750	48.325	1.200	49.150	47.725	1.200
3.001	23.437	28.4	225	Circular	49.150	47.725	1.200	48.325	46.900	1.200
4.000	11.359	90.9	225	Circular	48.550	47.125	1.200	48.425	47.000	1.200
4.001	12.846	128.5	225	Circular	48.425	47.000	1.200	48.325	46.900	1.200
3.002	33.075	69.6	375	Circular	48.325	46.750	1.200	47.850	46.275	1.200
3.003	22.405	64.0	375	Circular	47.850	46.275	1.200	47.500	45.925	1.200
3.004	17.660	64.2	375	Circular	47.500	45.925	1.200	47.225	45.650	1.200
3.005	24.153	81.9	375	Circular	47.225	45.650	1.200	47.300	45.355	1.570
3.006	11.493	79.3	375	Circular	47.300	45.355	1.570	47.150	45.210	1.565
1.009	23.334	36.7	450	Circular	47.150	45.135	1.565	45.900	44.500	0.950
1.009a	31.730	317.3	450	Circular	45.900	44.500	0.950	45.900	44.400	1.050
1.010	14.865	148.6	450	Circular	45.900	44.400	1.050	45.900	44.300	1.150
1.011	63.111	140.2	300	Circular	45.900	44.300	1.300	45.350	43.850	1.200
5.000a	20.238	98.7	150	Circular	45.475	44.205	1.120	45.350	44.000	1.200
1.012	39.370	46.3	300	Circular	45.350	43.850	1.200	44.500	43.000	1.200
1.013	19.071	146.7	300	Circular	44.500	43.000	1.200	44.500	42.870	1.330
1.014	25.053	147.4	300	Circular	44.500	42.870	1.330	44.350	42.700	1.350
1.015	77.353	148.8	300	Circular	44.350	42.700	1.350	43.800	42.180	1.320

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	1350	Manhole	Adoptable	S3	1200	Manhole	Adoptable
2.000	S2	1200	Manhole	Adoptable	S3	1200	Manhole	Adoptable
1.001	S3	1200	Manhole	Adoptable	S4	1350	Manhole	Adoptable
1.002	S4	1350	Manhole	Adoptable	S5	1350	Manhole	Adoptable
1.003	S5	1350	Manhole	Adoptable	S6	1350	Manhole	Adoptable
1.004	S6	1350	Manhole	Adoptable	S7	1350	Manhole	Adoptable
1.005	S7	1350	Manhole	Adoptable	S8	1350	Manhole	Adoptable
1.006	S8	1350	Manhole	Adoptable	S9	1350	Manhole	Adoptable
1.007	S9	1350	Manhole	Adoptable	S10	1350	Manhole	Adoptable
1.008	S10	1350	Manhole	Adoptable	S20	1350	Manhole	Adoptable
3.000	S11	1350	Manhole	Adoptable	S12	1350	Manhole	Adoptable
3.001	S12	1350	Manhole	Adoptable	S15	1350	Manhole	Adoptable
4.000	S13	1350	Manhole	Adoptable	S14	1350	Manhole	Adoptable
4.001	S14	1350	Manhole	Adoptable	S15	1350	Manhole	Adoptable
3.002	S15	1350	Manhole	Adoptable	S16	1350	Manhole	Adoptable
3.003	S16	1350	Manhole	Adoptable	S17	1350	Manhole	Adoptable
3.004	S17	1350	Manhole	Adoptable	S18	1350	Manhole	Adoptable
3.005	S18	1350	Manhole	Adoptable	S19	1200	Manhole	Adoptable
3.006	S19	1200	Manhole	Adoptable	S20	1350	Manhole	Adoptable
1.009	S20	1350	Manhole	Adoptable	S21		Junction	
1.009a	S21		Junction		S22		Junction	
1.010	S22		Junction		S23	2100	Manhole	Adoptable
1.011	S23	2100	Manhole	Adoptable	S24	1350	Manhole	Adoptable
5.000a	S24a	1200	Manhole	Adoptable	S24	1350	Manhole	Adoptable
1.012	S24	1350	Manhole	Adoptable	S25	1350	Manhole	Adoptable
1.013	S25	1350	Manhole	Adoptable	S26	1350	Manhole	Adoptable
1.014	S26	1350	Manhole	Adoptable	S27	1350	Manhole	Adoptable
1.015	S27	1350	Manhole	Adoptable	S39	1350	Manhole	Adoptable

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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)
5.000	26.377	150.7	225	Circular	47.125	45.700	1.200	47.300	45.525	1.550
5.001	17.515	13.8	225	Circular	47.300	45.525	1.550	47.000	44.255	2.520
6.000	15.033	100.0	300	Circular	46.200	44.700	1.200	46.600	44.550	1.750
6.001	24.649	100.6	300	Circular	46.600	44.550	1.750	47.125	44.305	2.520
6.002	12.208	97.7	300	Circular	47.125	44.305	2.520	47.000	44.180	2.520
5.002	8.503	189.0	300	Circular	47.000	44.180	2.520	46.750	44.135	2.315
5.003	46.635	37.6	300	Circular	46.750	44.135	2.315	45.250	42.895	2.055
7.000	63.384	99.8	300	Circular	45.100	43.600	1.200	45.250	42.965	1.985
7.001	6.829	97.6	300	Circular	45.250	42.965	1.985	45.250	42.895	2.055
5.004	16.200	250.0	450	Circular	45.250	42.745	2.055	44.700	42.680	1.570
5.005	44.360	68.2	450	Circular	44.700	42.680	1.570	43.800	42.030	1.320
1.016	13.429	14.4	450	Circular	43.800	42.030	1.320	43.000	41.100	1.450
1.016a	22.706	47.8	450	Circular	43.000	41.100	1.450	42.200	40.625	1.125
8.000	68.920	27.8	300	Circular	50.975	49.475	1.200	48.500	47.000	1.200
8.001	27.643	110.6	375	Circular	48.500	46.925	1.200	48.250	46.675	1.200
8.002	26.771	97.4	375	Circular	48.250	46.675	1.200	47.975	46.400	1.200
8.003	54.096	55.5	450	Circular	47.975	46.325	1.200	47.000	45.350	1.200
8.004	12.906	47.8	450	Circular	47.000	45.350	1.200	46.775	45.080	1.245
8.005	19.268	35.7	450	Circular	46.775	45.080	1.245	46.500	44.540	1.510
9.000	42.620	243.5	300	Circular	48.525	47.025	1.200	48.350	46.850	1.200
9.001	32.921	41.2	375	Circular	48.350	46.775	1.200	47.550	45.975	1.200
9.002	13.103	65.5	375	Circular	47.550	45.975	1.200	47.350	45.775	1.200
9.003	23.812	24.4	375	Circular	47.350	45.775	1.200	46.725	44.800	1.550
9.004	46.463	251.2	450	Circular	46.725	44.725	1.550	46.500	44.540	1.510
8.006	19.085	212.1	600	Circular	46.500	44.390	1.510	46.100	44.300	1.200
8.007	53.980	20.5	600	Circular	46.100	44.300	1.200	44.150	41.670	1.880
10.000	19.665	98.3	225	Circular	46.375	44.950	1.200	46.700	44.750	1.725
10.001	13.367	99.0	300	Circular	46.700	44.675	1.725	46.375	44.540	1.535

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
5.000	S28	1350	Manhole	Adoptable	S29	1200	Manhole	Adoptable
5.001	S29	1200	Manhole	Adoptable	S33	1200	Manhole	Adoptable
6.000	S30	1200	Manhole	Adoptable	S31	1200	Manhole	Adoptable
6.001	S31	1200	Manhole	Adoptable	S32	1200	Manhole	Adoptable
6.002	S32	1200	Manhole	Adoptable	S33	1200	Manhole	Adoptable
5.002	S33	1200	Manhole	Adoptable	S34	1200	Manhole	Adoptable
5.003	S34	1200	Manhole	Adoptable	S37	1350	Manhole	Adoptable
7.000	S35	1350	Manhole	Adoptable	S36	1200	Manhole	Adoptable
7.001	S36	1200	Manhole	Adoptable	S37	1350	Manhole	Adoptable
5.004	S37	1350	Manhole	Adoptable	S38	1350	Manhole	Adoptable
5.005	S38	1350	Manhole	Adoptable	S39	1350	Manhole	Adoptable
1.016	S39	1350	Manhole	Adoptable	S40		Junction	
1.016a	S40		Junction		S62		Junction	
8.000	S41	1350	Manhole	Adoptable	S42	1200	Manhole	Adoptable
8.001	S42	1200	Manhole	Adoptable	S43	1200	Manhole	Adoptable
8.002	S43	1200	Manhole	Adoptable	S44	1200	Manhole	Adoptable
8.003	S44	1200	Manhole	Adoptable	S45	1350	Manhole	Adoptable
8.004	S45	1350	Manhole	Adoptable	S46	1350	Manhole	Adoptable
8.005	S46	1350	Manhole	Adoptable	S52	1350	Manhole	Adoptable
9.000	S47	1200	Manhole	Adoptable	S48	1350	Manhole	Adoptable
9.001	S48	1350	Manhole	Adoptable	S49	1350	Manhole	Adoptable
9.002	S49	1350	Manhole	Adoptable	S50	1350	Manhole	Adoptable
9.003	S50	1350	Manhole	Adoptable	S51	1200	Manhole	Adoptable
9.004	S51	1200	Manhole	Adoptable	S52	1350	Manhole	Adoptable
8.006	S52	1350	Manhole	Adoptable	S53	1350	Manhole	Adoptable
8.007	S53	1350	Manhole	Adoptable	S58	2100	Manhole	Adoptable
10.000	S54	1350	Manhole	Adoptable	S55	1200	Manhole	Adoptable
10.001	S55	1200	Manhole	Adoptable	S56	1200	Manhole	Adoptable

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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)
10.002	74.213	29.3	300	Circular	46.375	44.540	1.535	43.750	42.005	1.445
10.003	55.686	1591.0	600	Circular	43.750	41.705	1.445	44.150	41.670	1.880
8.008	51.470	72.0	675	Circular	44.150	41.595	1.880	42.950	40.880	1.395
8.009	18.760	73.6	675	Circular	42.950	40.880	1.395	42.950	40.625	1.650
8.010	15.258	610.3	675	Circular	42.950	40.625	1.650	42.700	40.600	1.425
8.011	40.555	202.8	675	Circular	42.700	40.600	1.425	42.200	40.400	1.125
1.017	13.692	456.4	675	Circular	42.200	40.400	1.125	42.200	40.370	1.155
1.018	2.622	174.8	375	Circular	42.200	40.370	1.455	42.000	40.355	1.270

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
10.002	S56	1200	Manhole	Adoptable	S57	1350	Manhole	Adoptable
10.003	S57	1350	Manhole	Adoptable	S58	2100	Manhole	Adoptable
8.008	S58	2100	Manhole	Adoptable	S59	1350	Manhole	Adoptable
8.009	S59	1350	Manhole	Adoptable	S60	1350	Manhole	Adoptable
8.010	S60	1350	Manhole	Adoptable	S61		Junction	
8.011	S61		Junction		S62		Junction	
1.017	S62		Junction		S63	2700	Manhole	Adoptable
1.018	S63	2700	Manhole	Adoptable	S64	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	510217.869	117309.804	50.650	1.425	1350	0	1.000	49.225	225
S2	510199.990	117317.737	50.575	1.775	1200	0	2.000	48.800	225
S3	510207.354	117312.920	50.650	2.015	1200	1 2 0	2.000 1.000 1.001	48.710 48.710 48.635	225 225 300
S4	510198.830	117287.966	49.650	1.575	1350	1 0	1.001 1.002	48.150 48.075	300 375
S5	510192.742	117259.439	49.500	1.825	1350	1 0	1.002 1.003	47.675 47.675	375 375
S6	510168.011	117264.856	49.050	1.715	1350	1 0	1.003 1.004	47.335 47.335	375 375
S7	510136.486	117276.775	48.450	1.575	1350	1 0	1.004 1.005	46.875 46.875	375 375
S8	510125.725	117252.697	47.500	1.650	1350	1 0	1.005 1.006	45.925 45.850	375 450
S9	510126.450	117233.579	47.100	1.650	1350	1 0	1.006 1.007	45.450 45.450	450 450

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S10	510137.466	117216.677	46.900	1.650	1350	1	1.007	45.250	450
						0	1.008	45.250	450
S11	510222.928	117247.914	49.750	1.425	1350	0	3.000	48.325	225
S12	510238.181	117239.052	49.150	1.425	1350	1	3.000	47.725	225
						0	3.001	47.725	225
S13	510275.499	117224.126	48.550	1.425	1350	0	4.000	47.125	225
S14	510264.141	117224.263	48.425	1.425	1350	1	4.000	47.000	225
						0	4.001	47.000	225
S15	510251.984	117220.111	48.325	1.575	1350	1	4.001	46.900	225
						2	3.001	46.900	225
						0	3.002	46.750	375
S16	510229.514	117195.840	47.850	1.575	1350	1	3.002	46.275	375
						0	3.003	46.275	375
S17	510210.055	117184.735	47.500	1.575	1350	1	3.003	45.925	375
						0	3.004	45.925	375
S18	510193.715	117178.036	47.225	1.575	1350	1	3.004	45.650	375
						0	3.005	45.650	375
S19	510178.040	117196.411	47.300	1.945	1200	1	3.005	45.355	375
						0	3.006	45.355	375
S20	510167.758	117201.547	47.150	2.015	1350	1	3.006	45.210	375
						2	1.008	45.135	450
						0	1.009	45.135	450
S21	510157.332	117180.672	45.900	1.400		1	1.009	44.500	450
						0	1.009a	44.500	450
S22	510126.179	117174.651	45.900	1.500		1	1.009a	44.400	450
						0	1.010	44.400	450
S23	510113.478	117166.928	45.900	1.600	2100	1	1.010	44.300	450
						0	1.011	44.300	300
S24a	510070.819	117116.256	45.475	1.270	1200	0	5.000a	44.205	150

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S24	510089.528	117108.538	45.350	1.500	1350	1 2 0	5.000a 1.011 1.012	44.000 43.850 43.850	150 300 300
S25	510079.463	117070.476	44.500	1.500	1350	1 0	1.012 1.013	43.000 43.000	300 300
S26	510075.631	117051.794	44.500	1.630	1350	1 0	1.013 1.014	42.870 42.870	300 300
S27	510100.203	117046.907	44.350	1.650	1350	1 0	1.014 1.015	42.700 42.700	300 300
S28	510203.209	117149.545	47.125	1.425	1350	0	5.000	45.700	225
S29	510218.193	117127.837	47.300	1.775	1200	1 0	5.000 5.001	45.525 45.525	225 225
S30	510160.812	117142.303	46.200	1.500	1200	0	6.000	44.700	300
S31	510174.809	117136.819	46.600	2.050	1200	1 0	6.000 6.001	44.550 44.550	300 300
S32	510196.228	117124.621	47.125	2.820	1200	1 0	6.001 6.002	44.305 44.305	300 300
S33	510205.085	117116.220	47.000	2.820	1200	1 2 0	5.001 6.002 5.002	44.255 44.180 44.180	225 300 300
S34	510199.300	117109.988	46.750	2.615	1200	1 0	5.002 5.003	44.135 44.135	300 300
S35	510119.407	117096.317	45.100	1.500	1350	0	7.000	43.600	300
S36	510177.986	117072.109	45.250	2.285	1200	1 0	7.000 7.001	42.965 42.965	300 300
S37	510182.085	117066.647	45.250	2.505	1350	1 2 0	7.001 5.003 5.004	42.895 42.895 42.745	300 300 450
S38	510185.475	117050.806	44.700	2.020	1350	1 0	5.004 5.005	42.680 42.680	450 450

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S39	510168.164	117009.963	43.800	1.770	1350	1 2 0	5.005 1.015 1.016	42.030 42.180 42.030	450 300 450
S40	510162.966	116997.581	43.000	1.900		1 0	1.016 1.016a	41.100 41.100	450 450
S41	510327.972	117263.441	50.975	1.500	1350	0	8.000	49.475	300
S42	510299.910	117200.493	48.500	1.575	1200	1 0	8.000 8.001	47.000 46.925	300 375
S43	510287.138	117175.978	48.250	1.575	1200	1 0	8.001 8.002	46.675 46.675	375 375
S44	510268.634	117156.631	47.975	1.650	1200	1 0	8.002 8.003	46.400 46.325	375 450
S45	510238.052	117112.009	47.000	1.650	1350	1 0	8.003 8.004	45.350 45.350	450 450
S46	510248.394	117104.288	46.775	1.695	1350	1 0	8.004 8.005	45.080 45.080	450 450
S47	510364.633	117185.808	48.525	1.500	1200	0	9.000	47.025	300
S48	510346.623	117147.180	48.350	1.575	1350	1 0	9.000 9.001	46.850 46.775	300 375
S49	510321.771	117125.589	47.550	1.575	1350	1 0	9.001 9.002	45.975 45.975	375 375
S50	510315.443	117114.115	47.350	1.575	1350	1 0	9.002 9.003	45.775 45.775	375 375
S51	510312.259	117090.517	46.725	2.000	1200	1 0	9.003 9.004	44.800 44.725	375 450
S52	510266.261	117097.074	46.500	2.110	1350	1 2 0	9.004 8.005 8.006	44.540 44.540 44.390	450 450 600
S53	510262.007	117078.469	46.100	1.800	1350	1 0	8.006 8.007	44.300 44.300	600 600

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S54	510343.342	117086.034	46.375	1.425	1350	0	10.000	44.950	225
S55	510323.878	117088.841	46.700	2.025	1200	1	10.000	44.750	225
						0	10.001	44.675	300
S56	510321.970	117075.611	46.375	1.835	1200	1	10.001	44.540	300
						0	10.002	44.540	300
S57	510292.373	117007.555	43.750	2.045	1350	1	10.002	42.005	300
						0	10.003	41.705	600
S58	510240.894	117028.789	44.150	2.555	2100	1	10.003	41.670	600
						2	8.007	41.670	600
						0	8.008	41.595	675
S59	510220.675	116981.457	42.950	2.070	1350	1	8.008	40.880	675
						0	8.009	40.880	675
S60	510203.368	116988.697	42.950	2.325	1350	1	8.009	40.625	675
						0	8.010	40.625	675
S61	510188.721	116984.423	42.700	2.100		1	8.010	40.600	675
						0	8.011	40.600	675
S62	510148.389	116980.172	42.200	1.800		1	8.011	40.400	675
						2	1.016a	40.625	450
						0	1.017	40.400	675
S63	510134.728	116981.088	42.200	1.830	2700	1	1.017	40.370	675
						0	1.018	40.370	375
S64	510132.248	116980.238	42.000	1.645	1200	1	1.018	40.355	375

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)	10080	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

Storm Durations

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

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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	30	40	0	0
2	0	0	0	100	45	0	0

Node S23 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	44.300	Product Number	CTL-SHE-0060-1800-1300-1800
Design Depth (m)	1.300	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.8	Min Node Diameter (mm)	1200

Node S63 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	40.370	Product Number	CTL-SHE-0190-1980-1530-1980
Design Depth (m)	1.530	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	19.8	Min Node Diameter (mm)	1800

Node S63 Online Hydro-Brake® Control

Flap Valve	x	Objective	(CU) Linear Discharge
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	41.000	Product Number	CTL-SCU-0216-4360-0900-4360
Design Depth (m)	0.900	Min Outlet Diameter (m)	0.300
Design Flow (l/s)	43.6	Min Node Diameter (mm)	1200

Node S22 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.0	Invert Level (m)	44.400
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	10800

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	706.8	706.8	1.200	1491.0	1503.2	1.500	1723.0	1739.0

Node S62 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.0	Invert Level (m)	40.400
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	456

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	748.0	748.0	1.500	1830.0	1845.9	1.800	2089.0	2109.2

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Results for 1 year Critical Storm Duration. Lowest mass balance: 99.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S1	33	49.269	0.044	8.6	0.1247	0.0000	OK
60 minute summer	S2	33	48.854	0.054	6.1	0.1057	0.0000	OK
60 minute summer	S3	33	48.704	0.069	16.7	0.0944	0.0000	OK
60 minute summer	S4	33	48.150	0.075	20.9	0.1544	0.0000	OK
60 minute summer	S5	33	47.767	0.092	29.3	0.2315	0.0000	OK
60 minute summer	S6	33	47.430	0.095	30.9	0.1589	0.0000	OK
60 minute summer	S7	34	46.957	0.082	38.3	0.2121	0.0000	OK
60 minute summer	S8	34	45.939	0.089	40.3	0.1562	0.0000	OK
60 minute summer	S9	34	45.569	0.119	44.2	0.2395	0.0000	OK
60 minute summer	S10	34	45.409	0.159	48.7	0.3289	0.0000	OK
60 minute summer	S11	33	48.365	0.040	6.5	0.0993	0.0000	OK
60 minute summer	S12	33	47.778	0.053	11.6	0.1215	0.0000	OK
60 minute summer	S13	33	47.175	0.050	5.5	0.1161	0.0000	OK
60 minute summer	S14	33	47.054	0.054	5.5	0.0779	0.0000	OK
60 minute summer	S15	33	46.836	0.086	27.3	0.2542	0.0000	OK
60 minute summer	S16	33	46.367	0.092	30.8	0.1788	0.0000	OK
60 minute summer	S17	33	46.016	0.091	30.7	0.1303	0.0000	OK
60 minute summer	S18	33	45.758	0.108	37.9	0.2731	0.0000	OK
60 minute summer	S19	34	45.478	0.123	43.7	0.2285	0.0000	OK
60 minute summer	S20	34	45.260	0.125	92.6	0.1787	0.0000	OK
10080 minute summer	S21	6540	44.765	0.265	5.2	0.0000	0.0000	OK
10080 minute summer	S22	6540	44.765	0.365	8.9	301.1819	0.0000	OK
10080 minute summer	S23	6540	44.766	0.466	7.7	1.6152	0.0000	SURCHARGED
60 minute summer	S24a	33	44.254	0.049	4.0	0.0922	0.0000	OK
60 minute summer	S24	33	43.915	0.065	17.1	0.2125	0.0000	OK
60 minute summer	S25	34	43.091	0.091	16.9	0.1296	0.0000	OK
60 minute summer	S26	34	42.959	0.089	16.9	0.1268	0.0000	OK
60 minute summer	S27	34	42.813	0.113	27.5	0.3404	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)
60 minute summer	S1	1.000	S3	8.6	1.645	0.076	0.0573	
60 minute summer	S2	2.000	S3	6.1	0.859	0.116	0.0625	
60 minute summer	S3	1.001	S4	16.7	1.399	0.111	0.3147	
60 minute summer	S4	1.002	S5	20.9	1.148	0.089	0.5322	
60 minute summer	S5	1.003	S6	29.2	1.360	0.126	0.5439	
60 minute summer	S6	1.004	S7	30.7	1.544	0.131	0.6727	
60 minute summer	S7	1.005	S8	38.2	2.192	0.100	0.4592	
60 minute summer	S8	1.006	S9	40.3	1.454	0.086	0.5333	
60 minute summer	S9	1.007	S10	44.4	1.071	0.138	0.8405	
60 minute summer	S10	1.008	S20	48.9	1.144	0.260	1.4504	
60 minute summer	S11	3.000	S12	6.5	1.103	0.068	0.1047	
60 minute summer	S12	3.001	S15	11.6	1.640	0.118	0.1657	
60 minute summer	S13	4.000	S14	5.5	0.796	0.101	0.0786	
60 minute summer	S14	4.001	S15	5.5	0.764	0.120	0.0922	
60 minute summer	S15	3.002	S16	27.3	1.369	0.114	0.6586	
60 minute summer	S16	3.003	S17	30.7	1.481	0.122	0.4640	
60 minute summer	S17	3.004	S18	30.5	1.313	0.122	0.4126	
60 minute summer	S18	3.005	S19	37.8	1.319	0.171	0.6922	
60 minute summer	S19	3.006	S20	43.7	1.498	0.194	0.3358	
60 minute summer	S20	1.009	S21	92.6	1.684	0.173	1.2947	
10080 minute summer	S21	1.009a	S22	5.1	0.396	0.029	3.7210	
10080 minute summer	S22	1.010	S23	7.7	0.227	0.029	2.2004	
10080 minute summer	S23	1.011	S24	1.5	0.564	0.016	0.1842	
60 minute summer	S24a	5.000a	S24	4.0	0.806	0.223	0.1001	
60 minute summer	S24	1.012	S25	16.9	1.175	0.103	0.5708	
60 minute summer	S25	1.013	S26	16.9	0.957	0.184	0.3363	
60 minute summer	S26	1.014	S27	16.9	0.817	0.185	0.5205	
60 minute summer	S27	1.015	S39	26.9	1.129	0.295	1.8433	

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Results for 1 year Critical Storm Duration. Lowest mass balance: 99.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S28	33	45.777	0.077	9.2	0.2287	0.0000	OK
60 minute summer	S29	33	45.564	0.039	9.2	0.0440	0.0000	OK
60 minute summer	S30	33	44.752	0.052	7.1	0.1175	0.0000	OK
60 minute summer	S31	33	44.609	0.059	8.9	0.0783	0.0000	OK
60 minute summer	S32	33	44.362	0.057	8.9	0.0639	0.0000	OK
60 minute summer	S33	33	44.304	0.124	27.2	0.2354	0.0000	OK
60 minute summer	S34	33	44.228	0.093	36.8	0.1862	0.0000	OK
60 minute summer	S35	33	43.673	0.073	14.7	0.2741	0.0000	OK
60 minute summer	S36	33	43.044	0.079	14.7	0.0899	0.0000	OK
60 minute summer	S37	33	42.904	0.159	52.6	0.2516	0.0000	OK
60 minute summer	S38	34	42.803	0.123	58.1	0.2574	0.0000	OK
60 minute summer	S39	34	42.125	0.095	85.0	0.1354	0.0000	OK
60 minute summer	S40	34	41.228	0.128	85.0	0.0000	0.0000	OK
60 minute summer	S41	33	49.539	0.064	20.7	0.2979	0.0000	OK
60 minute summer	S42	33	47.025	0.100	28.3	0.2280	0.0000	OK
60 minute summer	S43	33	46.785	0.110	35.5	0.2426	0.0000	OK
60 minute summer	S44	33	46.421	0.096	45.1	0.2455	0.0000	OK
60 minute summer	S45	33	45.460	0.110	52.9	0.2830	0.0000	OK
60 minute summer	S46	34	45.184	0.104	56.5	0.2068	0.0000	OK
60 minute summer	S47	33	47.132	0.107	18.9	0.4396	0.0000	OK
60 minute summer	S48	33	46.854	0.079	31.1	0.2601	0.0000	OK
60 minute summer	S49	33	46.072	0.097	31.0	0.1395	0.0000	OK
60 minute summer	S50	34	45.847	0.072	30.8	0.1027	0.0000	OK
60 minute summer	S51	34	44.868	0.143	43.0	0.3723	0.0000	OK
60 minute summer	S52	34	44.582	0.192	99.7	0.2746	0.0000	OK
60 minute summer	S53	34	44.414	0.114	118.3	0.4565	0.0000	OK
60 minute summer	S54	33	45.003	0.053	6.1	0.1294	0.0000	OK
60 minute summer	S55	33	44.722	0.047	6.1	0.0537	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)
60 minute summer	S28	5.000	S29	9.2	1.136	0.218	0.2190	
60 minute summer	S29	5.001	S33	9.2	1.832	0.065	0.0959	
60 minute summer	S30	6.000	S31	7.1	0.796	0.064	0.1342	
60 minute summer	S31	6.001	S32	8.9	0.944	0.080	0.2325	
60 minute summer	S32	6.002	S33	8.9	0.497	0.079	0.2240	
60 minute summer	S33	5.002	S34	27.1	1.179	0.336	0.1959	
60 minute summer	S34	5.003	S37	36.5	2.005	0.201	0.8497	
60 minute summer	S35	7.000	S36	14.7	1.046	0.132	0.8922	
60 minute summer	S36	7.001	S37	14.5	1.042	0.129	0.0954	
60 minute summer	S37	5.004	S38	52.6	1.240	0.258	0.6904	
60 minute summer	S38	5.005	S39	58.2	1.969	0.149	1.3182	
60 minute summer	S39	1.016	S40	85.0	2.793	0.100	0.4110	
60 minute summer	S40	1.016a	S62	84.9	2.295	0.181	0.8402	
60 minute summer	S41	8.000	S42	20.6	1.912	0.098	0.7431	
60 minute summer	S42	8.001	S43	28.3	1.126	0.149	0.6947	
60 minute summer	S43	8.002	S44	35.2	1.361	0.173	0.6934	
60 minute summer	S44	8.003	S45	44.9	1.639	0.103	1.4819	
60 minute summer	S45	8.004	S46	52.6	1.832	0.112	0.3708	
60 minute summer	S46	8.005	S52	56.7	2.162	0.105	0.5058	
60 minute summer	S47	9.000	S48	18.7	0.847	0.263	0.9413	
60 minute summer	S48	9.001	S49	31.0	1.573	0.099	0.6505	
60 minute summer	S49	9.002	S50	30.8	1.661	0.125	0.2447	
60 minute summer	S50	9.003	S51	30.9	2.157	0.076	0.3411	
60 minute summer	S51	9.004	S52	43.0	1.018	0.211	1.9616	
60 minute summer	S52	8.006	S53	99.8	1.762	0.212	1.0973	
60 minute summer	S53	8.007	S58	118.4	3.235	0.078	1.9760	
60 minute summer	S54	10.000	S55	6.1	0.874	0.116	0.1371	
60 minute summer	S55	10.001	S56	6.1	0.645	0.055	0.1272	

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Results for 1 year Critical Storm Duration. Lowest mass balance: 99.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S56	33	44.608	0.068	23.0	0.2242	0.0000	OK
60 minute summer	S57	34	41.850	0.145	22.8	0.2073	0.0000	OK
60 minute summer	S58	34	41.763	0.168	149.5	0.7245	0.0000	OK
60 minute summer	S59	34	41.075	0.195	157.4	0.4652	0.0000	OK
480 minute summer	S60	336	40.891	0.266	64.4	0.5196	0.0000	OK
480 minute summer	S61	336	40.890	0.290	64.4	0.0000	0.0000	OK
480 minute summer	S62	336	40.891	0.491	99.1	453.7367	0.0000	OK
480 minute summer	S63	336	40.890	0.520	20.0	2.9803	0.0000	SURCHARGED
480 minute summer	S64	336	40.445	0.090	19.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	S56	10.002	S57	22.8	1.934	0.111	0.8747	
60 minute summer	S57	10.003	S58	22.4	0.569	0.132	2.2297	
60 minute summer	S58	8.008	S59	149.4	1.937	0.135	3.9740	
60 minute summer	S59	8.009	S60	156.2	1.476	0.143	1.9942	
480 minute summer	S60	8.010	S61	64.4	1.063	0.171	2.1141	
480 minute summer	S61	8.011	S62	64.4	1.115	0.098	8.6110	
480 minute summer	S62	1.017	S63	20.0	0.190	0.046	3.9243	
480 minute summer	S63	1.018	S64	19.7	0.878	0.131	0.0590	1016.9

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S1	33	49.280	0.055	13.6	0.1586	0.0000	OK
60 minute summer	S2	33	48.869	0.069	9.6	0.1348	0.0000	OK
60 minute summer	S3	33	48.723	0.088	26.4	0.1200	0.0000	OK
60 minute summer	S4	33	48.170	0.095	33.1	0.1965	0.0000	OK
60 minute summer	S5	33	47.793	0.118	46.3	0.2963	0.0000	OK
60 minute summer	S6	33	47.457	0.122	48.9	0.2025	0.0000	OK
60 minute summer	S7	33	46.980	0.105	60.7	0.2706	0.0000	OK
60 minute summer	S8	33	45.965	0.115	63.8	0.2006	0.0000	OK
60 minute summer	S9	34	45.606	0.156	70.1	0.3149	0.0000	OK
60 minute summer	S10	34	45.453	0.203	76.9	0.4205	0.0000	OK
60 minute summer	S11	33	48.375	0.050	10.3	0.1244	0.0000	OK
60 minute summer	S12	33	47.793	0.068	18.3	0.1542	0.0000	OK
60 minute summer	S13	33	47.188	0.063	8.7	0.1484	0.0000	OK
60 minute summer	S14	33	47.069	0.069	8.7	0.0993	0.0000	OK
60 minute summer	S15	33	46.859	0.109	43.0	0.3228	0.0000	OK
60 minute summer	S16	33	46.392	0.117	48.5	0.2281	0.0000	OK
60 minute summer	S17	33	46.042	0.117	48.4	0.1680	0.0000	OK
60 minute summer	S18	33	45.789	0.139	59.9	0.3535	0.0000	OK
60 minute summer	S19	33	45.515	0.160	69.1	0.2972	0.0000	OK
60 minute summer	S20	34	45.294	0.159	146.2	0.2279	0.0000	OK
10080 minute summer	S21	6960	44.871	0.371	6.2	0.0000	0.0000	OK
10080 minute summer	S22	6960	44.871	0.471	9.0	405.4681	0.0000	SURCHARGED
10080 minute summer	S23	6960	44.871	0.571	6.9	1.9782	0.0000	SURCHARGED
60 minute summer	S24a	33	44.268	0.063	6.3	0.1184	0.0000	OK
60 minute summer	S24	33	43.931	0.081	26.3	0.2645	0.0000	OK
60 minute summer	S25	33	43.115	0.115	26.2	0.1650	0.0000	OK
60 minute summer	S26	34	42.982	0.112	26.0	0.1607	0.0000	OK
60 minute summer	S27	34	42.846	0.146	43.2	0.4415	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)
60 minute summer	S1	1.000	S3	13.6	1.865	0.120	0.0800	
60 minute summer	S2	2.000	S3	9.6	0.969	0.183	0.0872	
60 minute summer	S3	1.001	S4	26.4	1.587	0.175	0.4389	
60 minute summer	S4	1.002	S5	33.1	1.289	0.141	0.7511	
60 minute summer	S5	1.003	S6	46.2	1.529	0.199	0.7658	
60 minute summer	S6	1.004	S7	48.7	1.737	0.208	0.9468	
60 minute summer	S7	1.005	S8	60.3	2.481	0.158	0.6423	
60 minute summer	S8	1.006	S9	63.7	1.589	0.136	0.7718	
60 minute summer	S9	1.007	S10	70.2	1.191	0.218	1.1924	
60 minute summer	S10	1.008	S20	77.3	1.298	0.412	2.0216	
60 minute summer	S11	3.000	S12	10.3	1.255	0.107	0.1458	
60 minute summer	S12	3.001	S15	18.3	1.860	0.187	0.2305	
60 minute summer	S13	4.000	S14	8.7	0.892	0.160	0.1110	
60 minute summer	S14	4.001	S15	8.7	0.866	0.190	0.1289	
60 minute summer	S15	3.002	S16	43.0	1.538	0.179	0.9243	
60 minute summer	S16	3.003	S17	48.4	1.649	0.193	0.6577	
60 minute summer	S17	3.004	S18	48.3	1.453	0.193	0.5890	
60 minute summer	S18	3.005	S19	59.6	1.458	0.269	0.9897	
60 minute summer	S19	3.006	S20	68.8	1.675	0.306	0.4725	
60 minute summer	S20	1.009	S21	146.4	1.908	0.274	1.7976	
10080 minute summer	S21	1.009a	S22	6.1	0.398	0.034	4.7320	
10080 minute summer	S22	1.010	S23	6.9	0.207	0.026	2.3553	
10080 minute summer	S23	1.011	S24	1.5	0.568	0.016	0.1878	
60 minute summer	S24a	5.000a	S24	6.3	0.910	0.352	0.1399	
60 minute summer	S24	1.012	S25	26.2	1.313	0.160	0.7899	
60 minute summer	S25	1.013	S26	26.0	1.063	0.284	0.4664	
60 minute summer	S26	1.014	S27	26.1	0.900	0.286	0.7284	
60 minute summer	S27	1.015	S39	42.4	1.268	0.467	2.5911	

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S28	33	45.799	0.099	14.6	0.2921	0.0000	OK
60 minute summer	S29	33	45.574	0.049	14.6	0.0552	0.0000	OK
60 minute summer	S30	33	44.766	0.066	11.2	0.1488	0.0000	OK
60 minute summer	S31	33	44.624	0.074	14.0	0.0988	0.0000	OK
60 minute summer	S32	33	44.376	0.071	14.0	0.0801	0.0000	OK
60 minute summer	S33	33	44.340	0.160	43.0	0.3043	0.0000	OK
60 minute summer	S34	33	44.254	0.119	58.1	0.2393	0.0000	OK
60 minute summer	S35	33	43.692	0.092	23.2	0.3463	0.0000	OK
60 minute summer	S36	33	43.067	0.102	23.2	0.1159	0.0000	OK
60 minute summer	S37	33	42.949	0.204	83.4	0.3223	0.0000	OK
60 minute summer	S38	33	42.837	0.157	92.0	0.3281	0.0000	OK
60 minute summer	S39	34	42.151	0.121	134.3	0.1736	0.0000	OK
60 minute summer	S40	34	41.262	0.162	134.4	0.0000	0.0000	OK
60 minute summer	S41	33	49.555	0.080	32.6	0.3758	0.0000	OK
60 minute summer	S42	33	47.053	0.128	44.7	0.2931	0.0000	OK
60 minute summer	S43	33	46.816	0.141	56.1	0.3126	0.0000	OK
60 minute summer	S44	33	46.447	0.122	71.4	0.3108	0.0000	OK
60 minute summer	S45	33	45.493	0.143	83.8	0.3664	0.0000	OK
60 minute summer	S46	34	45.213	0.133	89.6	0.2654	0.0000	OK
60 minute summer	S47	33	47.164	0.139	29.8	0.5696	0.0000	OK
60 minute summer	S48	33	46.874	0.099	49.2	0.3274	0.0000	OK
60 minute summer	S49	33	46.101	0.126	49.1	0.1796	0.0000	OK
60 minute summer	S50	33	45.862	0.087	48.9	0.1249	0.0000	OK
60 minute summer	S51	34	44.909	0.184	68.4	0.4790	0.0000	OK
60 minute summer	S52	34	44.633	0.243	157.8	0.3483	0.0000	OK
60 minute summer	S53	34	44.445	0.145	187.1	0.5780	0.0000	OK
60 minute summer	S54	33	45.017	0.067	9.6	0.1641	0.0000	OK
60 minute summer	S55	33	44.736	0.061	9.6	0.0687	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)
60 minute summer	S28	5.000	S29	14.6	1.293	0.346	0.3040	
60 minute summer	S29	5.001	S33	14.6	1.836	0.104	0.1762	
60 minute summer	S30	6.000	S31	11.2	0.898	0.101	0.1877	
60 minute summer	S31	6.001	S32	14.0	1.072	0.126	0.3224	
60 minute summer	S32	6.002	S33	14.0	0.560	0.124	0.3113	
60 minute summer	S33	5.002	S34	42.9	1.333	0.532	0.2741	
60 minute summer	S34	5.003	S37	57.8	2.266	0.318	1.1908	
60 minute summer	S35	7.000	S36	23.2	1.174	0.209	1.2556	
60 minute summer	S36	7.001	S37	23.0	1.172	0.205	0.1342	
60 minute summer	S37	5.004	S38	83.2	1.404	0.408	0.9637	
60 minute summer	S38	5.005	S39	91.9	2.207	0.234	1.8533	
60 minute summer	S39	1.016	S40	134.4	3.143	0.157	0.5768	
60 minute summer	S40	1.016a	S62	134.5	2.612	0.287	1.1695	
60 minute summer	S41	8.000	S42	32.5	2.176	0.154	1.0300	
60 minute summer	S42	8.001	S43	44.7	1.255	0.235	0.9845	
60 minute summer	S43	8.002	S44	55.8	1.534	0.275	0.9743	
60 minute summer	S44	8.003	S45	71.2	1.835	0.164	2.1016	
60 minute summer	S45	8.004	S46	83.2	2.032	0.178	0.5295	
60 minute summer	S46	8.005	S52	89.7	2.435	0.165	0.7099	
60 minute summer	S47	9.000	S48	29.6	0.960	0.417	1.3139	
60 minute summer	S48	9.001	S49	49.1	1.770	0.157	0.9151	
60 minute summer	S49	9.002	S50	48.9	1.904	0.198	0.3389	
60 minute summer	S50	9.003	S51	48.8	2.192	0.120	0.5465	
60 minute summer	S51	9.004	S52	68.1	1.151	0.335	2.7505	
60 minute summer	S52	8.006	S53	158.0	2.004	0.335	1.5227	
60 minute summer	S53	8.007	S58	187.6	3.664	0.123	2.7647	
60 minute summer	S54	10.000	S55	9.6	0.991	0.183	0.1905	
60 minute summer	S55	10.001	S56	9.6	0.723	0.086	0.1787	

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S56	33	44.626	0.086	36.3	0.2836	0.0000	OK
60 minute summer	S57	34	41.885	0.180	36.1	0.2573	0.0000	OK
60 minute summer	S58	34	41.810	0.215	237.1	0.9283	0.0000	OK
60 minute summer	S59	34	41.142	0.262	250.1	0.6265	0.0000	OK
480 minute summer	S60	368	41.096	0.471	93.5	0.9205	0.0000	OK
480 minute summer	S61	376	41.103	0.503	85.5	0.0000	0.0000	OK
480 minute summer	S62	352	41.041	0.641	126.5	628.0140	0.0000	OK
480 minute summer	S63	352	41.041	0.671	21.4	3.8434	0.0000	SURCHARGED
480 minute summer	S64	352	40.449	0.094	21.2	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)
60 minute summer	S56	10.002	S57	36.1	2.202	0.175	1.2160	
60 minute summer	S57	10.003	S58	35.8	0.594	0.210	3.3679	
60 minute summer	S58	8.008	S59	237.6	2.105	0.215	5.8189	
60 minute summer	S59	8.009	S60	249.3	1.642	0.228	2.8515	
480 minute summer	S60	8.010	S61	84.5	1.096	0.224	4.1317	
480 minute summer	S61	8.011	S62	81.3	1.206	0.124	12.8745	
480 minute summer	S62	1.017	S63	21.4	0.201	0.049	4.8396	
480 minute summer	S63	1.018	S64	21.2	0.896	0.140	0.0621	1342.8

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Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S1	32	49.342	0.117	51.5	0.3362	0.0000	OK
60 minute summer	S2	33	48.955	0.155	36.4	0.3018	0.0000	OK
60 minute summer	S3	33	48.829	0.194	100.0	0.2651	0.0000	OK
60 minute summer	S4	33	48.285	0.210	125.2	0.4342	0.0000	OK
60 minute summer	S5	33	47.949	0.274	175.3	0.6901	0.0000	OK
60 minute summer	S6	33	47.611	0.276	185.4	0.4588	0.0000	OK
60 minute summer	S7	35	47.182	0.307	230.5	0.7909	0.0000	OK
60 minute summer	S8	35	46.849	0.999	234.9	1.7453	0.0000	SURCHARGED
60 minute summer	S9	35	46.701	1.251	252.4	2.5182	0.0000	SURCHARGED
60 minute summer	S10	35	46.517	1.267	275.1	2.6288	0.0000	SURCHARGED
60 minute summer	S11	33	48.424	0.099	38.9	0.2497	0.0000	OK
60 minute summer	S12	33	47.875	0.150	69.2	0.3419	0.0000	OK
60 minute summer	S13	35	47.389	0.264	32.8	0.6186	0.0000	SURCHARGED
60 minute summer	S14	35	47.343	0.343	32.8	0.4912	0.0000	SURCHARGED
60 minute summer	S15	35	47.296	0.546	162.9	1.6135	0.0000	SURCHARGED
60 minute summer	S16	35	47.097	0.822	178.9	1.6036	0.0000	SURCHARGED
60 minute summer	S17	35	46.910	0.985	163.2	1.4090	0.0000	SURCHARGED
60 minute summer	S18	35	46.752	1.102	193.6	2.7941	0.0000	SURCHARGED
60 minute summer	S19	35	46.448	1.093	222.7	2.0343	0.0000	SURCHARGED
60 minute summer	S20	35	46.200	1.065	493.7	1.5247	0.0000	SURCHARGED
10080 minute winter	S21	7860	45.547	1.047	8.9	0.0000	0.0000	SURCHARGED
10080 minute winter	S22	7860	45.547	1.147	10.2	1240.3350	0.0000	SURCHARGED
10080 minute winter	S23	7860	45.547	1.247	7.5	4.3190	0.0000	SURCHARGED
60 minute summer	S24a	34	44.512	0.306	23.7	0.5735	0.0000	SURCHARGED
60 minute summer	S24	36	44.117	0.267	94.4	0.8775	0.0000	OK
60 minute summer	S25	35	43.926	0.926	87.3	1.3256	0.0000	SURCHARGED
60 minute summer	S26	35	43.800	0.930	83.3	1.3315	0.0000	SURCHARGED
60 minute summer	S27	35	43.642	0.942	138.6	2.8451	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	S1	1.000	S3	51.5	2.481	0.455	0.2311	
60 minute summer	S2	2.000	S3	36.4	1.337	0.692	0.2394	
60 minute summer	S3	1.001	S4	100.0	2.194	0.662	1.2015	
60 minute summer	S4	1.002	S5	125.3	1.665	0.535	2.1866	
60 minute summer	S5	1.003	S6	175.3	2.025	0.756	2.1923	
60 minute summer	S6	1.004	S7	185.1	2.354	0.791	3.0612	
60 minute summer	S7	1.005	S8	221.8	3.306	0.582	2.7291	
60 minute summer	S8	1.006	S9	229.4	1.819	0.490	3.0313	
60 minute summer	S9	1.007	S10	249.7	1.576	0.776	3.1966	
60 minute summer	S10	1.008	S20	272.2	1.718	1.451	5.3649	
60 minute summer	S11	3.000	S12	38.9	1.749	0.404	0.3978	
60 minute summer	S12	3.001	S15	70.0	2.554	0.714	0.7723	
60 minute summer	S13	4.000	S14	32.8	1.182	0.601	0.4518	
60 minute summer	S14	4.001	S15	35.1	1.190	0.766	0.5109	
60 minute summer	S15	3.002	S16	158.2	1.979	0.659	3.6481	
60 minute summer	S16	3.003	S17	163.2	2.002	0.652	2.4712	
60 minute summer	S17	3.004	S18	155.7	1.659	0.623	1.9478	
60 minute summer	S18	3.005	S19	191.7	1.739	0.867	2.6640	
60 minute summer	S19	3.006	S20	221.8	2.026	0.986	1.2676	
60 minute summer	S20	1.009	S21	493.7	3.116	0.923	3.6971	
10080 minute winter	S21	1.009a	S22	10.2	0.531	0.056	5.0274	
10080 minute winter	S22	1.010	S23	7.5	0.218	0.028	2.3553	
10080 minute winter	S23	1.011	S24	1.8	0.598	0.019	0.2021	
60 minute summer	S24a	5.000a	S24	23.0	1.305	1.285	0.3475	
60 minute summer	S24	1.012	S25	87.3	1.669	0.533	2.6903	
60 minute summer	S25	1.013	S26	83.3	1.267	0.909	1.3430	
60 minute summer	S26	1.014	S27	84.7	1.203	0.927	1.7642	
60 minute summer	S27	1.015	S39	134.7	1.913	1.481	5.3336	

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Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S28	33	46.060	0.360	55.0	1.0645	0.0000	SURCHARGED
60 minute summer	S29	35	45.646	0.121	54.0	0.1368	0.0000	OK
60 minute summer	S30	35	45.323	0.623	42.4	1.4013	0.0000	SURCHARGED
60 minute summer	S31	35	45.299	0.749	49.4	1.0001	0.0000	SURCHARGED
60 minute summer	S32	35	45.243	0.938	58.8	1.0608	0.0000	SURCHARGED
60 minute summer	S33	35	45.209	1.029	145.6	1.9517	0.0000	SURCHARGED
60 minute summer	S34	35	44.949	0.814	195.3	1.6305	0.0000	SURCHARGED
60 minute summer	S35	33	43.798	0.198	87.9	0.7434	0.0000	OK
60 minute summer	S36	34	43.345	0.380	87.9	0.4296	0.0000	SURCHARGED
60 minute summer	S37	34	43.267	0.522	286.4	0.8257	0.0000	SURCHARGED
60 minute summer	S38	34	43.020	0.340	318.0	0.7090	0.0000	OK
60 minute summer	S39	36	42.285	0.255	451.5	0.3652	0.0000	OK
240 minute winter	S40	232	41.841	0.741	142.8	0.0000	0.0000	SURCHARGED
60 minute summer	S41	33	49.638	0.163	123.2	0.7629	0.0000	OK
60 minute summer	S42	34	47.315	0.390	169.1	0.8922	0.0000	SURCHARGED
60 minute summer	S43	34	47.080	0.405	207.7	0.8941	0.0000	SURCHARGED
60 minute summer	S44	33	46.582	0.257	262.2	0.6562	0.0000	OK
60 minute summer	S45	33	45.685	0.335	309.4	0.8618	0.0000	OK
60 minute summer	S46	33	45.383	0.303	333.0	0.6053	0.0000	OK
60 minute summer	S47	33	47.568	0.543	112.6	2.2282	0.0000	SURCHARGED
60 minute summer	S48	33	46.992	0.217	184.9	0.7149	0.0000	OK
60 minute summer	S49	33	46.258	0.283	184.7	0.4048	0.0000	OK
60 minute summer	S50	33	45.958	0.183	184.1	0.2617	0.0000	OK
60 minute summer	S51	33	45.263	0.538	257.6	1.3993	0.0000	SURCHARGED
60 minute summer	S52	33	44.921	0.531	588.3	0.7600	0.0000	OK
60 minute summer	S53	33	44.579	0.279	703.5	1.1136	0.0000	OK
60 minute summer	S54	33	45.098	0.148	36.4	0.3615	0.0000	OK
60 minute summer	S55	33	44.806	0.131	36.4	0.1480	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)
60 minute summer	S28	5.000	S29	54.0	1.633	1.277	0.8112	
60 minute summer	S29	5.001	S33	53.1	1.848	0.377	0.5386	
60 minute summer	S30	6.000	S31	39.3	1.235	0.354	1.0586	
60 minute summer	S31	6.001	S32	58.8	1.239	0.531	1.7358	
60 minute summer	S32	6.002	S33	63.4	0.901	0.564	0.8597	
60 minute summer	S33	5.002	S34	145.1	2.060	1.800	0.5988	
60 minute summer	S34	5.003	S37	194.9	2.797	1.072	3.2840	
60 minute summer	S35	7.000	S36	87.9	1.432	0.790	3.7966	
60 minute summer	S36	7.001	S37	86.5	1.288	0.769	0.4809	
60 minute summer	S37	5.004	S38	286.4	1.871	1.406	2.3244	
60 minute summer	S38	5.005	S39	317.9	2.860	0.811	4.9044	
60 minute summer	S39	1.016	S40	450.9	3.959	0.528	1.6867	
240 minute winter	S40	1.016a	S62	140.0	1.972	0.299	3.5976	
60 minute summer	S41	8.000	S42	123.2	2.588	0.583	3.7292	
60 minute summer	S42	8.001	S43	164.8	1.582	0.867	3.0489	
60 minute summer	S43	8.002	S44	203.5	2.026	1.003	2.8408	
60 minute summer	S44	8.003	S45	261.9	2.380	0.602	5.9610	
60 minute summer	S45	8.004	S46	308.8	2.579	0.659	1.5497	
60 minute summer	S46	8.005	S52	332.6	2.651	0.613	2.4724	
60 minute summer	S47	9.000	S48	110.8	1.583	1.563	2.8656	
60 minute summer	S48	9.001	S49	184.7	2.369	0.591	2.5541	
60 minute summer	S49	9.002	S50	184.1	2.579	0.744	0.9338	
60 minute summer	S50	9.003	S51	183.4	2.178	0.451	1.9483	
60 minute summer	S51	9.004	S52	256.7	1.634	1.263	7.0062	
60 minute summer	S52	8.006	S53	587.4	2.911	1.245	3.7436	
60 minute summer	S53	8.007	S58	702.6	3.928	0.461	11.0541	
60 minute summer	S54	10.000	S55	36.4	1.376	0.694	0.5203	
60 minute summer	S55	10.001	S56	36.3	0.995	0.325	0.4927	

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Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S56	32	44.721	0.181	137.3	0.6003	0.0000	OK
60 minute summer	S57	35	42.645	0.940	141.3	1.3449	0.0000	SURCHARGED
60 minute summer	S58	35	42.625	1.030	858.7	4.4395	0.0000	SURCHARGED
60 minute summer	S59	35	42.080	1.200	885.9	2.8660	0.0000	SURCHARGED
240 minute winter	S60	232	41.841	1.216	267.9	2.3785	0.0000	SURCHARGED
240 minute winter	S61	232	41.841	1.241	268.1	0.0000	0.0000	SURCHARGED
240 minute winter	S62	232	41.840	1.440	412.7	1825.4100	0.0000	SURCHARGED
240 minute winter	S63	232	41.839	1.469	60.4	8.4133	0.0000	SURCHARGED
240 minute winter	S64	232	40.517	0.162	60.3	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)
60 minute summer	S56	10.002	S57	141.3	3.073	0.685	4.1748	
60 minute summer	S57	10.003	S58	120.5	0.705	0.709	15.6855	
60 minute summer	S58	8.008	S59	843.5	2.375	0.763	18.3737	
60 minute summer	S59	8.009	S60	886.7	2.484	0.810	6.6969	
240 minute winter	S60	8.010	S61	268.1	1.343	0.711	5.4468	
240 minute winter	S61	8.011	S62	272.7	1.862	0.415	14.4772	
240 minute winter	S62	1.017	S63	60.4	0.348	0.138	4.8877	
240 minute winter	S63	1.018	S64	60.3	1.190	0.400	0.1331	3224.1

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S1	35	49.550	0.325	68.1	0.9314	0.0000	SURCHARGED
60 minute summer	S2	35	49.434	0.634	48.0	1.2319	0.0000	SURCHARGED
60 minute summer	S3	35	49.347	0.712	131.2	0.9752	0.0000	SURCHARGED
60 minute summer	S4	35	48.986	0.911	163.3	1.8819	0.0000	SURCHARGED
60 minute summer	S5	35	48.787	1.112	212.2	2.7972	0.0000	SURCHARGED
60 minute summer	S6	35	48.439	1.104	217.7	1.8380	0.0000	SURCHARGED
60 minute summer	S7	34	47.952	1.077	266.8	2.7733	0.0000	SURCHARGED
60 minute summer	S8	34	47.329	1.479	281.4	2.5837	0.0000	FLOOD RISK
60 minute summer	S9	33	47.100	1.650	311.5	3.3215	11.0444	FLOOD
60 minute summer	S10	33	46.900	1.650	299.3	3.4221	0.2761	FLOOD
60 minute summer	S11	35	48.969	0.644	51.4	1.6173	0.0000	SURCHARGED
60 minute summer	S12	35	48.813	1.088	88.3	2.4725	0.0000	SURCHARGED
60 minute summer	S13	35	48.365	1.240	43.4	2.9062	0.0000	FLOOD RISK
60 minute summer	S14	35	48.281	1.281	37.4	1.8327	0.0000	FLOOD RISK
60 minute summer	S15	35	48.186	1.436	182.4	4.2426	0.0000	FLOOD RISK
60 minute summer	S16	35	47.833	1.558	206.2	3.0409	0.0000	FLOOD RISK
60 minute summer	S17	35	47.500	1.575	206.6	2.2538	0.1538	FLOOD
60 minute summer	S18	33	47.225	1.575	256.5	3.9942	9.4576	FLOOD
60 minute summer	S19	33	46.866	1.511	255.4	2.8116	0.0000	SURCHARGED
60 minute summer	S20	37	46.543	1.408	548.1	2.0151	0.0000	SURCHARGED
60 minute summer	S21	38	45.769	1.269	548.2	0.0000	0.0000	FLOOD RISK
10080 minute winter	S22	8220	45.762	1.362	14.9	1571.0860	0.0000	FLOOD RISK
10080 minute winter	S23	8220	45.762	1.462	7.5	5.0659	0.0000	FLOOD RISK
60 minute summer	S24a	36	45.345	1.140	31.4	2.1326	0.0000	FLOOD RISK
60 minute summer	S24	35	44.919	1.069	122.4	3.5122	0.0000	SURCHARGED
60 minute summer	S25	35	44.500	1.500	101.8	2.1465	1.7002	FLOOD
60 minute summer	S26	35	44.353	1.483	92.6	2.1223	0.0000	FLOOD RISK
60 minute summer	S27	35	44.168	1.468	159.6	4.4325	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	S1	1.000	S3	67.8	2.483	0.599	0.4362	
60 minute summer	S2	2.000	S3	47.5	1.396	0.903	0.3500	
60 minute summer	S3	1.001	S4	129.9	2.255	0.860	1.8570	
60 minute summer	S4	1.002	S5	149.5	1.664	0.638	3.2173	
60 minute summer	S5	1.003	S6	205.0	2.036	0.883	2.7924	
60 minute summer	S6	1.004	S7	213.8	2.342	0.914	3.7173	
60 minute summer	S7	1.005	S8	266.0	3.289	0.698	2.9089	
60 minute summer	S8	1.006	S9	281.1	1.824	0.600	3.0313	
60 minute summer	S9	1.007	S10	263.9	1.666	0.820	3.1966	
60 minute summer	S10	1.008	S20	292.6	1.847	1.560	5.3649	
60 minute summer	S11	3.000	S12	48.3	1.750	0.502	0.7016	
60 minute summer	S12	3.001	S15	79.0	2.583	0.807	0.9321	
60 minute summer	S13	4.000	S14	37.4	1.208	0.686	0.4518	
60 minute summer	S14	4.001	S15	38.2	1.287	0.834	0.5109	
60 minute summer	S15	3.002	S16	183.0	1.977	0.762	3.6481	
60 minute summer	S16	3.003	S17	206.6	2.002	0.825	2.4712	
60 minute summer	S17	3.004	S18	204.0	1.850	0.816	1.9478	
60 minute summer	S18	3.005	S19	214.8	1.948	0.971	2.6640	
60 minute summer	S19	3.006	S20	256.1	2.322	1.139	1.2676	
60 minute summer	S20	1.009	S21	548.2	3.460	1.025	3.6971	
60 minute summer	S21	1.009a	S22	548.2	3.501	3.035	5.0274	
10080 minute winter	S22	1.010	S23	7.5	0.187	0.028	2.3553	
10080 minute winter	S23	1.011	S24	1.9	0.613	0.020	0.2159	
60 minute summer	S24a	5.000a	S24	25.6	1.457	1.435	0.3563	
60 minute summer	S24	1.012	S25	101.8	1.669	0.622	2.7724	
60 minute summer	S25	1.013	S26	92.6	1.315	1.011	1.3430	
60 minute summer	S26	1.014	S27	95.5	1.356	1.045	1.7642	
60 minute summer	S27	1.015	S39	159.6	2.266	1.755	5.4471	

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S28	35	46.950	1.250	72.7	3.7007	0.0000	FLOOD RISK
60 minute summer	S29	35	46.474	0.949	63.3	1.0739	0.0000	SURCHARGED
60 minute summer	S30	34	46.200	1.500	56.1	3.3765	3.7824	FLOOD
60 minute summer	S31	34	46.197	1.647	58.1	2.2002	0.0000	SURCHARGED
60 minute summer	S32	34	46.177	1.872	62.3	2.1177	0.0000	SURCHARGED
60 minute summer	S33	34	46.165	1.985	168.1	3.7653	0.0000	SURCHARGED
60 minute summer	S34	34	45.851	1.716	234.7	3.4380	0.0000	SURCHARGED
60 minute summer	S35	34	44.295	0.695	116.1	2.6057	0.0000	SURCHARGED
60 minute summer	S36	35	43.607	0.642	109.4	0.7263	0.0000	SURCHARGED
60 minute summer	S37	35	43.484	0.739	349.5	1.1699	0.0000	SURCHARGED
60 minute summer	S38	34	43.173	0.493	389.0	1.0289	0.0000	SURCHARGED
60 minute summer	S39	37	42.498	0.468	545.6	0.6692	0.0000	SURCHARGED
360 minute summer	S40	344	42.174	1.074	200.5	0.0000	0.0000	SURCHARGED
60 minute summer	S41	33	49.682	0.207	162.8	0.9698	0.0000	OK
60 minute summer	S42	34	47.844	0.919	222.6	2.1013	0.0000	SURCHARGED
60 minute summer	S43	33	47.406	0.731	274.1	1.6165	0.0000	SURCHARGED
60 minute summer	S44	34	46.712	0.387	350.9	0.9854	0.0000	OK
60 minute summer	S45	34	46.117	0.767	404.8	1.9716	0.0000	SURCHARGED
60 minute summer	S46	34	45.754	0.674	430.5	1.3458	0.0000	SURCHARGED
60 minute summer	S47	33	47.979	0.954	148.8	3.9147	0.0000	SURCHARGED
60 minute summer	S48	34	47.071	0.296	244.5	0.9759	0.0000	OK
60 minute summer	S49	34	46.549	0.574	242.8	0.8211	0.0000	SURCHARGED
60 minute summer	S50	34	46.250	0.475	239.1	0.6792	0.0000	SURCHARGED
60 minute summer	S51	34	45.804	1.079	329.3	2.8062	0.0000	SURCHARGED
60 minute summer	S52	34	45.221	0.831	753.2	1.1892	0.0000	SURCHARGED
60 minute summer	S53	35	44.778	0.478	897.2	1.9046	0.0000	OK
60 minute summer	S54	35	45.503	0.553	48.0	1.3494	0.0000	SURCHARGED
60 minute summer	S55	35	45.355	0.680	47.1	0.7693	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	S28	5.000	S29	63.3	1.717	1.499	1.0490	
60 minute summer	S29	5.001	S33	64.5	1.852	0.458	0.6966	
60 minute summer	S30	6.000	S31	44.1	1.232	0.397	1.0586	
60 minute summer	S31	6.001	S32	62.3	1.248	0.562	1.7358	
60 minute summer	S32	6.002	S33	69.4	0.985	0.617	0.8597	
60 minute summer	S33	5.002	S34	170.7	2.424	2.118	0.5988	
60 minute summer	S34	5.003	S37	230.9	3.279	1.270	3.2840	
60 minute summer	S35	7.000	S36	109.4	1.553	0.983	4.4635	
60 minute summer	S36	7.001	S37	107.9	1.532	0.959	0.4809	
60 minute summer	S37	5.004	S38	346.9	2.190	1.703	2.5668	
60 minute summer	S38	5.005	S39	386.0	2.873	0.985	6.8982	
60 minute summer	S39	1.016	S40	544.9	3.952	0.638	2.1277	
360 minute summer	S40	1.016a	S62	199.6	1.649	0.426	3.5976	
60 minute summer	S41	8.000	S42	161.9	2.597	0.766	4.2134	
60 minute summer	S42	8.001	S43	219.1	1.986	1.152	3.0489	
60 minute summer	S43	8.002	S44	273.9	2.484	1.351	2.9203	
60 minute summer	S44	8.003	S45	343.1	2.390	0.789	8.2048	
60 minute summer	S45	8.004	S46	400.1	2.575	0.854	2.0449	
60 minute summer	S46	8.005	S52	429.2	2.709	0.791	3.0529	
60 minute summer	S47	9.000	S48	146.4	2.080	2.066	2.9575	
60 minute summer	S48	9.001	S49	242.8	2.423	0.777	3.3511	
60 minute summer	S49	9.002	S50	239.1	2.563	0.966	1.4452	
60 minute summer	S50	9.003	S51	234.2	2.174	0.576	2.6264	
60 minute summer	S51	9.004	S52	324.7	2.050	1.598	7.3618	
60 minute summer	S52	8.006	S53	751.6	2.887	1.594	4.9838	
60 minute summer	S53	8.007	S58	885.1	3.932	0.581	14.0962	
60 minute summer	S54	10.000	S55	47.1	1.431	0.899	0.7821	
60 minute summer	S55	10.001	S56	47.0	1.011	0.421	0.9413	

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S56	35	45.327	0.787	180.4	2.6068	0.0000	SURCHARGED
60 minute summer	S57	35	43.750	2.045	167.2	2.9264	1.8338	FLOOD
60 minute summer	S58	35	43.718	2.123	1099.6	9.1495	0.0000	SURCHARGED
60 minute summer	S59	36	42.832	1.952	1140.7	4.6603	0.0000	FLOOD RISK
60 minute summer	S60	36	42.331	1.706	1174.9	3.3367	0.0000	SURCHARGED
240 minute winter	S61	232	42.132	1.532	346.5	0.0000	0.0000	SURCHARGED
240 minute winter	S62	236	42.131	1.731	526.9	2379.9430	0.0000	FLOOD RISK
240 minute winter	S63	236	42.130	1.760	68.6	10.0786	0.0000	FLOOD RISK
240 minute winter	S64	236	40.529	0.174	68.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	S56	10.002	S57	167.2	3.105	0.811	5.2260	
60 minute summer	S57	10.003	S58	174.1	0.634	1.024	15.6855	
60 minute summer	S58	8.008	S59	1078.1	3.020	0.975	18.3737	
60 minute summer	S59	8.009	S60	1136.3	3.183	1.039	6.6969	
60 minute summer	S60	8.010	S61	1171.9	3.283	3.109	5.4468	
240 minute winter	S61	8.011	S62	346.2	1.983	0.527	14.4772	
240 minute winter	S62	1.017	S63	68.6	0.331	0.157	4.8877	
240 minute winter	S63	1.018	S64	68.6	1.231	0.454	0.1462	3912.2

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Appendix I

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Residential roofing				
Pollution Hazard Level	Very low				
Pollution Hazard Indices					
TSS	0.2				
Metals	0.2				
Hydrocarbons	0.05				
SuDS components proposed					
Component 1	Detention basin	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 2	None				
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.5				
Metals	0.5				
Hydrocarbons	0.6				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	0.5	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			
Metals	0.5				
Hydrocarbons	0.6				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Individual driveway				
Pollution Hazard Level	Low				
Pollution Hazard Indices					
TSS	0.5				
Metals	0.4				
Hydrocarbons	0.4				
SuDS components proposed					
Component 1	Pervious pavement (where the pavement is not designed as an infiltration component)	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 2	Detention basin	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.95				
Metals	0.85				
Hydrocarbons	>0.95				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	0.95	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			
Metals	0.85				
Hydrocarbons	>0.95				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Low traffic roads (e.g. residential roads and general access roads, < 300 traffic movements/day)				
Pollution Hazard Level	Low				
Pollution Hazard Indices					
TSS	0.5				
Metals	0.4				
Hydrocarbons	0.4				
SuDS components proposed					
Component 1	Detention basin	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 2	None				
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.5				
Metals	0.5				
Hydrocarbons	0.6				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	0.5	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			
Metals	0.5				
Hydrocarbons	0.6				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Roads (excluding low traffic roads, highly frequented lorry approaches to industrial estates, trunk roads/motorways)				
Pollution Hazard Level	Medium				
Pollution Hazard Indices					
TSS	0.7				
Metals	0.6				
Hydrocarbons	0.7				
SuDS components proposed					
Component 1	Bioretention system (where the system is not designed as an infiltration component)	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 2	Detention basin	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	>0.95				
Metals	>0.95				
Hydrocarbons	>0.95				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	>0.95	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			
Metals	>0.95				
Hydrocarbons	>0.95				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Roads (excluding low traffic roads, highly frequented lorry approaches to industrial estates, trunk roads/motorways)				
Pollution Hazard Level	Medium				
Pollution Hazard Indices					
TSS	0.7				
Metals	0.6				
Hydrocarbons	0.7				
SuDS components proposed					
Component 1	Pervious pavement (where the pavement is not designed as an infiltration component)	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 2	Detention basin	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.95				
Metals	0.85				
Hydrocarbons	>0.95				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	0.95	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			
Metals	0.85				
Hydrocarbons	>0.95				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Roads (excluding low traffic roads, highly frequented lorry approaches to industrial estates, trunk roads/motorways)				
Pollution Hazard Level	Medium				
Pollution Hazard Indices					
TSS	0.7				
Metals	0.6				
Hydrocarbons	0.7				
SuDS components proposed					
Component 1	Swale	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 2	Detention basin	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.75				
Metals	0.85				
Hydrocarbons	0.9				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	0.75	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			
Metals	0.85				
Hydrocarbons	0.9				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

Appendix J

OPERATION AND MAINTENANCE REQUIREMENTS BASED ON C753 THE SuDS MANUAL 2015

Inlets, Outlets, Controls and Inspection Chambers	
Regular Maintenance	**Typical Frequency**
Inlets, outlets and surface control structures Inspect surface structures, removing obstructions and silt as necessary. Check there is no physical damage.	Monthly
Inspection chambers and below-ground control chambers Remove cover and inspect, ensuring that water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt. Undertake inspection after leaf fall in autumn.	Annually
Occasional Maintenance	
Check topsoil levels are 20mm above edges of baskets and chambers to avoid mower damage.	As necessary
Remedial Work	**Frequency**
Repair physical damage if necessary	As Required

Operation and Maintenance Requirements for Pervious Pavements		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface).	Once a year, after autumn leaf fall, or reduce frequency as required, based on site-specific observations of clogging or manufacture's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is the most likely to collect the most sediment.
Occasional maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weeds or management using glyphosphate applied directly into the weeds by an applicator rather than a spray.	As required – once per a year on less frequently used pavements.
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required.
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing materials.	As required.
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection.	Monthly for three months after instillation.

Operation and Maintenance Requirements for Pervious Pavements		
Maintenance Schedule	**Required Action**	**Typical Frequency**
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action.	Three-monthly, 48 hours after large storms in first six months.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.
	Monitor inspection chambers.	Annually.

Operation and Maintenance Requirements for Attenuation Storage Tanks		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular Inspections	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risk to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface or filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays.	Annually, or as required
Remedial Action	Repair/rehabilitate inlets, outlets, overflows and vents.	As required
Monitoring	Inspect/ check all inlets, outlets vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment build-up and remove if necessary.	Every 5 years or as required

Operation and Maintenance Requirements for Filter Drains		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular Maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices.	Monthly or as required.
	Inspect filter drain surface, inlet/outlet pipework and control system for blockages, clogging, standing water and structural damage.	Monthly.
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies.	Six monthly.
	Remove sediment from pre-treatment devices.	Six monthly, or as required.
Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (e.g. NJUG, 2007 or BS 3998:2010).	As required.
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium.	Five yearly, or as required.
	Clear perforated pipework of blockages.	As required.

Operation and Maintenance Requirements for Bio-Retention Features		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular Inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time and assess water levels in underdrain (if appropriate) to determine any maintenance need.	Quarterly
	Check performance of underdrains by inspection of flows after rain.	Annually
	Assess plants for disease infection, poor growth, invasive species etc. and replace as necessary.	Quarterly
	Inspect inlets and outlets for blockage.	Quarterly
Regular Maintenance	Remove litter (including leaf litter), surface debris and weeds.	Quarterly or more frequently as required for aesthetic reasons.
	Replace any plants, to maintain planting density.	As required.
	Remove sediment, litter and debris build-up from around inlets or from forebays.	Quarterly to bi-annually.
Occasional Maintenance	Infill any holes or scour in the filter medium, improve erosion protection if necessary.	As required.
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch.	As required.
Remedial Actions	Remove and replace filter medium and vegetation above.	As required, but expectancy of >20 years.

Operation and Maintenance Requirements for Swales		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular Maintenance	Remove litter (including leaf litter) and debris.	Monthly or as required.
	Cut grass – to retain grass height within specified design range.	Monthly (during growing season) or as required.
	Manage other vegetation and remove nuisance plants.	Monthly at start, then as required.
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly.
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours.	Monthly or as required.
	Inspect vegetation coverage.	Monthly for six months, quarterly for two years, then half yearly.
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies.	Half yearly.
Occasional Maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required.	As required or if bare soil is exposed over 10% or more of the swale treatment area.
Remedial Actions	Repair erosion or other damage by re-turfing or reseeding.	As required.
	Relevel uneven surfaces and reinstate design levels.	As required.
	Scarify and spike topsoil layer to improve infiltration performance, break-up silt deposits and prevent compaction of the soil surface.	As required.
	Remove build-up of sediment on upstream gravel trench, flow spreader or top of soil surface.	As required.

Operation and Maintenance Requirements for Swales		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Remedial Actions	Remove and dispose of oil and fuel residues using safe standard practices.	As required.

Operation and Maintenance Requirements for Detention Basin		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular Maintenance	Remove litter (including leaf litter) and debris.	Monthly or as required.
	Cut grass – for spillways and access routes.	Monthly (during growing season) or as required.
	Cut grass – meadow grass in and around basin.	Half yearly (spring – before nesting season, and autumn).
	Manage other vegetation and remove nuisance plants.	Monthly at start, then as required.
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly.
	Inspect bankside, structures, pipework etc. for evidence of physical damage.	Monthly.
	Inspect inlets and facility surface for silt accumulation and establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required.
	Check any penstocks and other mechanical devices.	Annually.
	Tidy all dead growth before start of growing season.	Annually.
	Remove sediment from inlets, outlets and forebay.	Annually (or as required).
	Manage wetland plants in outlet pool – where provided.	Annually.
Occasional Maintenance	Reseed areas of poor vegetation growth.	As required.
	Prune and trim any trees, remove cuttings.	Every two years, or as required.
	Remove sediment from inlets, outlets, forebay and main basin when required.	Every five years, or as required.
Remedial Actions	Repair erosion or other damage by reseeding or re-turfing.	As required.
	Realignment of rip-rap.	As required.

Operation and Maintenance Requirements for Detention Basin		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Remedial Actions	Repair/rehabilitation of inlets, outlets and overflows.	As required.
	Relevel uneven surfaces and reinstate design levels.	As required.