

BDW Southern Counties

New Place Farm, Pulborough

Flood Risk Assessment

681387-R1(1)-FRA
July 2025

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RSK GENERAL NOTES

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Client: BDW Southern Counties

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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.

This work has been undertaken in accordance with the quality management system of RSK LDE Ltd.

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1 INTRODUCTION

RSK Land and Development Engineering Ltd were commissioned by BDW Southern Counties (the client) to provide a Flood Risk Assessment (FRA) to support the planning application at New Place Farm, Pulborough (the site). Development proposals include the potential development of a residential scheme of up to 170 dwellings.

The purpose of the FRA is to establish the risk associated with the proposed development and to propose suitable mitigation, if required, to reduce the flood risk to a more acceptable level. The FRA must demonstrate that the development will be safe for its lifetime (100 years for residential developments) taking account of the vulnerability of its users, without increasing flood risk elsewhere.

This document has been produced to assess the flood risk from tidal, fluvial, surface water, groundwater, sewers, reservoirs and artificial sources in line with the National Planning Policy Framework (NPPF)[1] and its corresponding Planning Practice Guidance (PPG)[2]. It includes a summary of the proposed surface water drainage strategy, showing how Sustainable Drainage Systems (SuDS) have been used to demonstrate surface water is appropriately managed on-site, with the aim that there is no increased risk of flooding on-site or elsewhere as a result of the development.

This assessment has been undertaken in consultation with the relevant authorities, and with reference to data, documents and guidance published by the Environment Agency (EA), the Lead Local Flood Authority (LLFA) (West Sussex County Council), the Local Planning Authority (LPA) (Horsham District Council), and the Water Authority (Southern Water).

The comments given in this report and opinions expressed are subject to RSK Group Service Constraints provided in **Appendix A**.

[1] Communities and Local Government, 'National Planning Policy Framework', published March 2012 and last updated December 2024.

[2] Communities and Local Government, 'Planning Practice Guidance - Flood Risk and Coastal Change, ID 7', published March 2014 and last updated August 2022.

2 SITE DESCRIPTION & PROPOSALS

2.1 Existing site

2.1.1 Site description

The site is located at New Place Farm, Pulborough in the county of West Sussex and can be located at National Grid Reference 505650 E, 119323 N and postcode RH20 2GN. A site location plan is included as **Figure 2.1**.

The site covers an area of approximately 16.29Ha and currently comprises of a mixture of hardstanding structures and areas of soft landscaping used to cultivate plants for New Place Nursery. The hardstanding areas are made up of the main farmhouse building, glasshouses and storage warehouses in the northwestern region of the site; whilst the rest of the site consists of soft landscaping for plant cultivation and grassland areas. The site also contains a section of woodland in the northwest corner, which separates the northern boundary from the railway line. To the north and east of the site is further areas of soft landscaping, whilst to the south and west are areas of existing residential development.

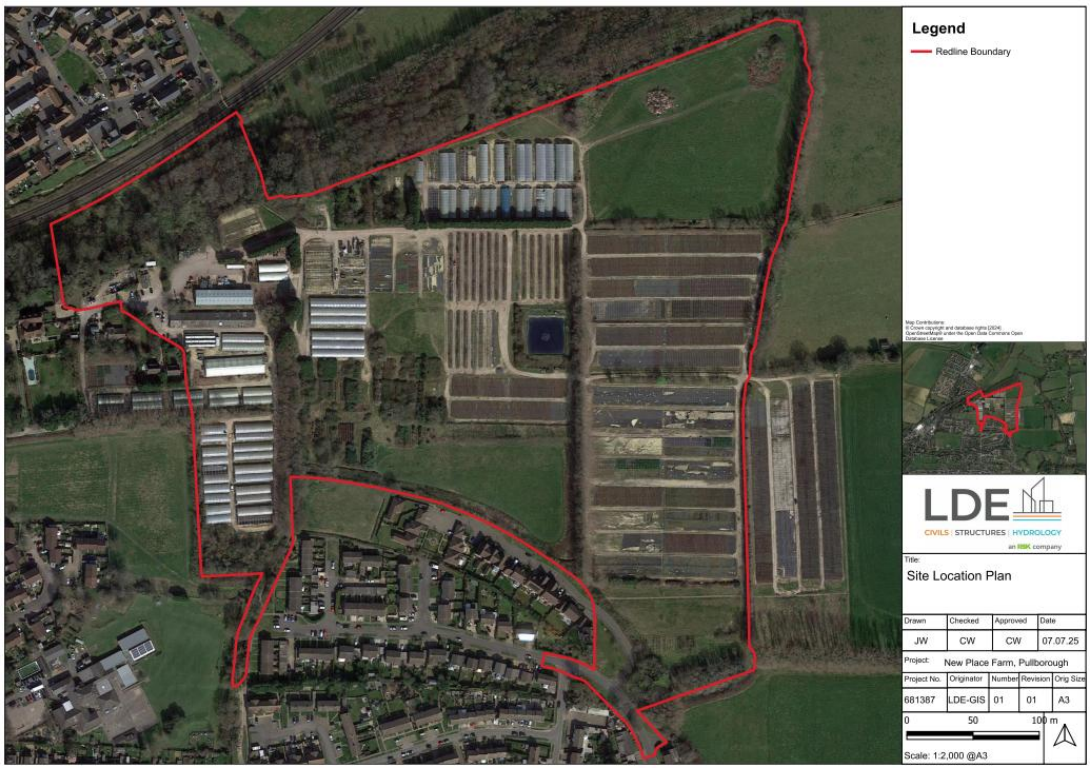


Figure 2.1: Site location plan

2.1.2 Topography

A site-specific topographic survey has been carried out by NJC Surveys Limited. The survey shows the existing site levels vary from approximately 59.87m above ordnance datum (mAOD) in the northeast corner, down to 27.13mAOD in the southwest corner. The topographic survey is included in **Appendix B**.

In order to better understand the topography of the surrounding area, high-level analysis of Defra's LiDAR data has been undertaken in QGIS and has been reproduced as **Figure 2.2.** This mapping indicates the land within the boundary generally slopes toward the southwest corner, with the soft landscaping areas having a gradient of approximately 1:20, whilst the area around the farmhouse in the northwest is relatively flat.

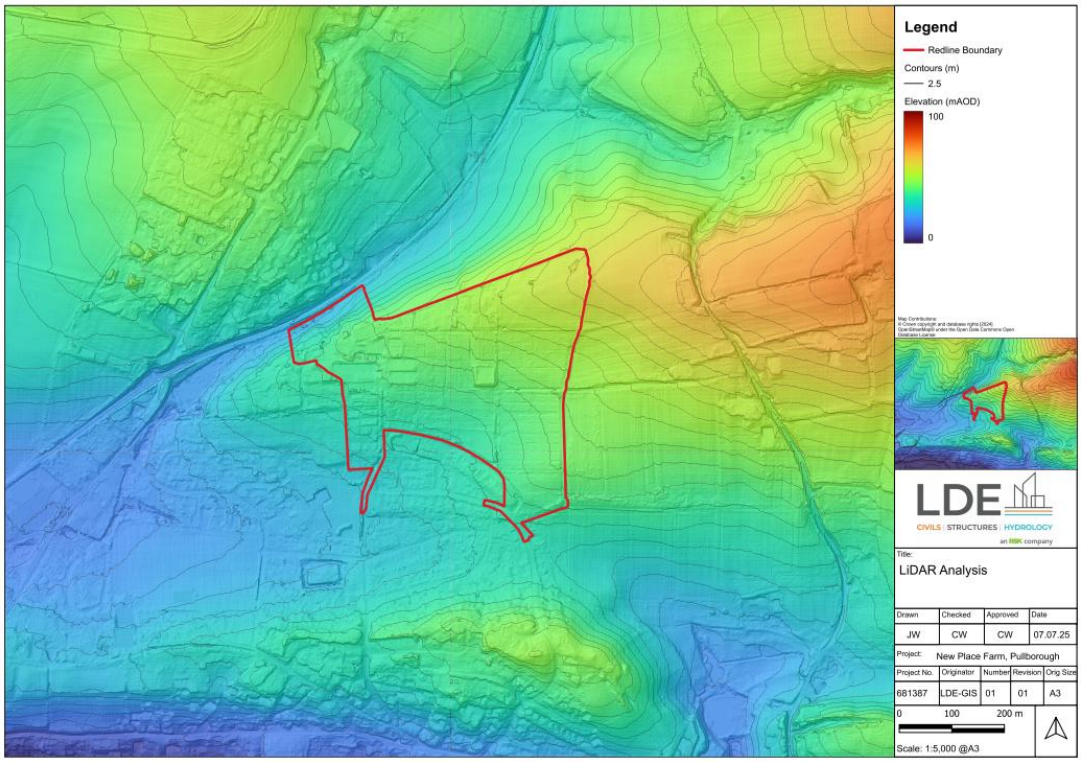


Figure 2.2: QGIS mapping of LIDAR

2.1.3 Existing drainage

2.1.3.1 Public

Southern Water sewer plans have been obtained for the site and are included in **Appendix C**. These plans indicate the following network of sewers in the vicinity of the site:

- A 150mm diameter foul sewer that begins its run to the west of the houses on Drovers Lane. This sewer flows south where it then inflows into a 150mm diameter sewer on Glebelands.

- A 150mm diameter foul sewer that flows east to west along Glebelands to the south of the site. This sewer then turns to flow southward, away from the site, at the western end of Glebelands.
- A small network of foul sewer that serve the houses to the south of the site, which collate and flow into the 150mm diameter foul sewer on Glebelands.

2.1.3.2 Private

Surface water runoff currently discharges to the surface water drainage channels throughout the site via overland flow. Evidence of this was found during a site visit. Photo 6 within **Appendix L** highlights a surface water flow route within the surface geology.

2.2 Development proposals

The development proposals for the site include the construction of residential development of approximately 170 dwellings, with access, green spaces and associated amenities.

The relevant proposed site plans are included as **Appendix D**.

3 ENVIRONMENTAL SETTING

3.1 Hydrology

Reference to Ordnance Survey (OS) mapping and the EA's web-based mapping indicates that the nearest EA main river is the River Arun, which is located approximately 800m southwest of the site. This main river generally flows north to south, meandering eastward past the town of Pulborough.

Other notable surface water features in the vicinity of the site include:

- A small man-made reservoir located within the centre of the site. It is assumed that the water stored within this reservoir is used to water the plantings within the nursery.
- A small drainage channel that begins approximately 50m northwest of the site and flows southwest, adjacent to the railway line. This channel flows into a ponded region, 200m west of the site.
- A surface water channel located approximately 300m north of the site.
- A series of connected ponds located approximately 400m southeast of the site.
- The River Stor located approximately 900m southeast of the site. This EA main river flows east to west and discharges into the River Arun south of the town of Pulborough.

The topographic survey conducted by NJC Surveys indicates four surface water channels within the site boundary, these were confirmed during a site visit.

Two of the channels flow north to south within hedge lines that run through the site and act as field borders. These channels are the main drainage channels within the site and collect surface run off from the site. There are also two channels that flow east to west, one in the east of the site and the other along the southern boundary of the site. The ditch to the east discharges into the central ditch via a culvert; whilst the ditch on the southern boundary connects the eastern north to south ditch to the western ditch. The western north to south ditch has an offsite connection through a culvert which discharges surface water flows to an Ordinary Watercourse that runs parallel to the footpath off Strawberry Field. **Figure 3.1** shows the onsite water features.

Evidence of these channels and their connections can be found within **Appendix L.**



Figure 3.1: QGIS mapping of Surface Water features on site

3.2 Geology

Based on published geological records for the area (British Geological Survey online mapping), the site exhibits the following geology:

- Superficial Geology: None.
- Bedrock Geology: Hythe Formation – Sandstone.

Site-specific geotechnical investigations have been undertaken by GRM Development Solutions Ltd. and were carried out in August 2022 (report reference: GRM/P7298/F.2), with a subsequent ground investigation undertaken by LEAP Environmental in July 2024 (report ref: 3750605/PIII/1). These reports detail the existing geology and hydrogeology, groundwater levels, permeability and contamination. The key points related to flood risk and drainage are highlighted below:

- The ground conditions on site were observed to be:
    - Topsoil,
    - Made ground,
    - Head Deposits (Clays and Silts),
    - Hythe Formation (Sandstone).

- Contamination observations were limited to Made Ground that contained occasional anthropogenic materials throughout its depth (typically brick, concrete or plastic).
- During the GRM investigation, across all monitoring locations (21 in total) and all visits (12 spread out over the three investigations), typically the trial pit locations recorded no groundwater. Some locations recorded small amounts of water intermittently, which is considered to be representative of water infiltrating through low permeable soils or from perched lenses.
- The LEAP investigation groundwater was not observed within any of the boreholes, but within the 8 groundwater monitoring wells, only 2 recorded perched groundwater. One (WS207) had groundwater depths between 1.27mBGL – Dry; and the other (WS301) had depths between 0.32mBGL – 0.61mBGL).

Soakage Tests were also carried out by GRM Development Solutions Ltd. (report reference: GRM/ P7298 SA.2) in a number of trial pits across the site and the infiltration rates in **Table 3.1** were calculated. The full report has been included as **Appendix M.**

Table 3.1: Trial pit reference and average infiltration rate

Trial pit	Average infiltration rate (m/s)
SA101	1.45×10^{-5}
SA102	6.48×10^{-6}
SA103	1.56×10^{-4}
SA104	1.05×10^{-5}
SA105	1.23×10^{-5}
SA106	1.61×10^{-5}
SA107	5.05×10^{-6}
SA108	N/A

Trial pit	Average infiltration rate (m/s)
WS103	2.28×10^{-6}
WS104	N/A
WS105	4.36×10^{-6}
WS106	1.98×10^{-6}
WS108	9.73×10^{-5}
WS109	2.78×10^{-6}
WS111	N/A
WS112	N/A
WS112a	2.53×10^{-6}
WS113	2.32×10^{-6}
WS114	2.38×10^{-6}
WS115	2.94×10^{-6}
WS118	2.97×10^{-6}

The GRM report states: *"It is considered that the variability is due to the geology of the site, specifically the variable nature of the head deposits, with cohesive clays and silts being recorded, compared to the underlying Hythe Formation."* With the results *"considered to indicate potentially but variably good performance in the Hythe Formation and generally poor and variable performance in the Head Deposits."*

3.3 Hydrogeology

Hydrogeological information was obtained from the online Magic Maps service. These maps indicate that:

- The site is not underlain by a superficial aquifer.
- The site is underlain by a Principal bedrock aquifer.
- The site is located in an area of High groundwater vulnerability.
- The site is not located within a groundwater Source Protection Zone.

Although the site-specific ground investigation carried out by GRM Development Solutions Ltd. notes that the majority of the boreholes carried out did not note any groundwater, the report states: *"long term monitoring of groundwater levels has not been conducted… and levels may be seasonally variable".*

4 SOURCES OF FLOOD RISK

4.1 Criteria

In accordance with the NPPF and advice from the EA, an assessment of the risk associated with various flooding sources is required along with consideration of the effects of climate change over the design life of the development (in this case assumed to be 100 years for a residential development).

The EA's most recent climate change guidance, published in May 2022[3], should be referenced in order to identify the appropriate peak river flow and rainfall intensity allowances for the scheme. The appropriate allowance for peak river flow is based on the location of the site in the country, the lifetime of development, the relevant flood zone and the vulnerability of the proposed end use.

The flood risk elements that need to be considered for any site are defined in BS 8533 'Assessing and managing flood risk in development Code of practice'[4] as the "Forms of Flooding" and are listed as:

- Flooding from rivers (fluvial flood risk);
- Flooding from the sea (tidal flood risk);
- Flooding from the land;
- Flooding from groundwater;
- Flooding from sewers (sewer and drain exceedance, pumping station failure etc); and
- Flooding from reservoirs, canals and other artificial structures.

The following section reviews each of these in respect of the subject site.

4.2 Flood risk from rivers (fluvial flood risk)

The EA Flood Zone mapping study for England is available on their website at: https://flood-map-for-planning.service.gov.uk.

The latest EA published flood zone map **(Figure 4.1)** shows that the site lies within Flood Zone 1, representing a 1 in 1000 year or less annual probability of flooding from fluvial and tidal sources.

[3] Environment Agency, 'Guidance: Flood Risk Assessments: Climate Change Allowances'. https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances, last updated May 2022.

[4] BSI, 'BS 8533-2017 Assessing and managing flood risk in development Code of practice', December 2017.

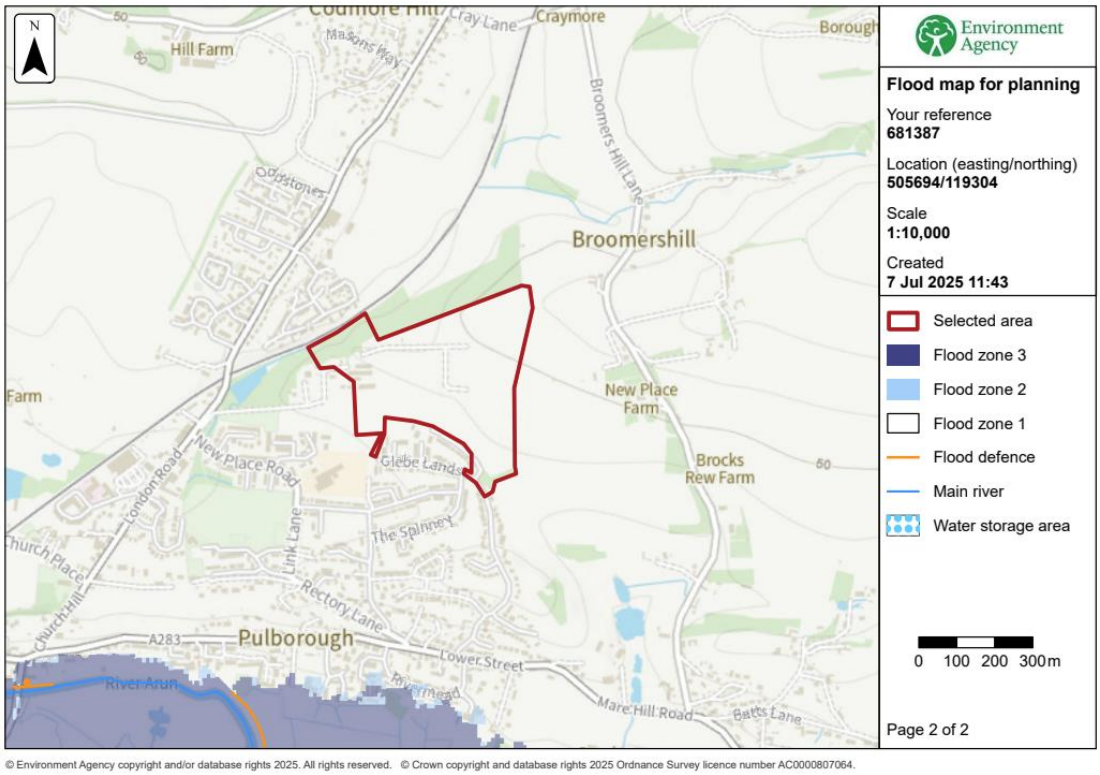


Figure 4.1: Environment Agency 'Flood map for planning'

A site visit confirmed there are several minor drainage ditches throughout the site, these have not been modelled by the EA due to the very limited catchment areas. These ditches are not considered to be a flood risk to the site as the high point of the region is located within the northeastern corner of the site and thus there is a small upstream catchment for these ditches and hence limited flows will be present. These ditches serve as surface water management for the current site, and this has been considered in the post development drainage strategy for the site.

Fluvial flooding is likely to increase as a result of climate change. A greater intensity and frequency of precipitation is likely to raise river levels and increase the likelihood of a river overtopping its banks. Climate change guidance for river modelling was updated by the EA in May 2022. The impact upon the site should be negligible given its location within Flood Zone 1.

The overall risk of fluvial flooding is **very low.**

4.3 Flood risk from the sea (tidal flood risk)

The site is not considered to be at risk from tidal flooding due to its inland location.

The overall tidal flood risk is **very low.**

4.4 Flood risk from the land (surface water flood risk)

If intense rain is unable to soak into the ground or be carried through manmade drainage systems, for a variety of reasons, it can run off over the surface causing localised floods before reaching a river or other watercourse.

Generally, where there is impermeable surfacing or where the ground infiltration capacity is exceeded, surface water runoff can occur. Excess surface water flows from the site are believed to drain naturally to the local water features, either by overland flow or through infiltration.

The EA's surface water flood map (**Figure 4.2**) shows that the majority of the site to be at 'very low' risk i.e. a less than 1 in 1000 year annual probability of surface water flooding. There is an overland flow path which runs through the woodland region to the northwest of the site. This flow path is present during the 'high' risk i.e. a greater than 3.3% annual probability and flows parallel to the railway line with depths between 300mm and 900mm for the 'high', 'medium' and 'low' risk events.

It was confirmed during a site visit that the woodland section within the northwestern corner of the site is significantly downgradient from the rest of the site. It was also confirmed that there is a ditch that runs alongside the railway line which is likely where the flow path discussed above is contained. Hence there is minimal flood risk to the developable area of the site associated with this flow path.

There are two areas of 'low' to 'medium' surface water ponding within the central and western area of the site. These areas are where an existing building and reservoir are located and are shown as regions of lowered topography within the LiDAR data **(Figure 2.2),** as the building has likely been 'stamped down' and survey will have picked up the bottom of the reservoir. Since LiDAR data is used within the EA's national scale surface water modelling, flows simulated within the EA's model have likely been trapped within these lowered areas and resulted in ponding. The reality is that the surface water would runoff from the roof of the building and into the drainage ditches on site and flows within the reservoir would be controlled, resulting in negligible flood risk to the site.



Figure 4.2: Environment Agency 'Flood risk from surface water' map

The topography on site shows the site falls towards the southwest and therefore any surface water runoff will likely fall away in this direction. Runoff generated by the proposed development will need to be controlled to prevent surface water flooding elsewhere. This is discussed below in **Section 7.**

Surface water flooding is likely to increase as a result of climate change in a similar ratio to fluvial flooding. Increased intensity and frequency of precipitation is likely to lead to reduced infiltration and increased overland flow. Climate change guidance was updated by the EA in May 2022. Revised allowances for climate change have been included in the indicative drainage strategy.

The overall risk of surface water flooding at the site is **very low.**

4.5 Flood risk from groundwater

Groundwater flooding tends to occur after long periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. In low-lying areas, the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

The site-specific ground investigation conducted by GRM Development Solutions Ltd. in August 2022 and LEAP Environmental in July 2024 confirmed the site's underlying

geologies to be Topsoil, Made ground and Head Deposits, over Hythe Formation. It also confirmed that the majority of the investigative boreholes did not strike groundwater.

Some locations recorded small amounts of water intermittently, only 2 of the 8 LEAP investigation groundwater monitoring wells recording perched groundwater. This was considered to be representative of water infiltrating through low permeable soils or from perched lenses.

Climate change could increase the risk of groundwater flooding as a result of increased precipitation filtering into the groundwater body. This is less likely to cause a significant change to flood risk than from other sources, since groundwater flow is not as confined. It is probable that any locally perched aquifers may be more affected, but these are likely to be isolated. The change in flood risk as a result of climate change is likely to be low.

The overall groundwater flood risk is **very low.**

4.6 Flood risk from sewers

Flooding from artificial drainage systems occurs when flow entering a system, such as an urban storm water drainage system, exceeds its conveyance capacity, the system becomes blocked, or it cannot discharge due to a high water level in the receiving watercourse. When exceeded, the surcharged pipe work could lead to flooding from backed up manholes and gully connections.

Sewer details have been referenced from sewer record plans obtained from Southern Water. The plans indicate the only sewers within the vicinity of the site are the 150mm foul sewers that serve the housing to the south. Based on the local topography, any surcharged water would most likely follow the road levels and flow away from the site to the south and will unlikely impact the site.

Climate change is likely to result in an increase in flooding from sewers. Increased rainfall and more frequent flooding put existing sewer and drainage systems under additional pressure resulting in the potential for more frequent surcharging and potential flooding. This would increase the frequency of local sewer flooding but would not be significant in terms of the proposed development.

The overall sewer flood risk to the site is **very low.**

4.7 Flood risk from reservoirs

Flood events can occur from a sudden release of large volumes of water from reservoirs. The EA reservoir flood map (reproduced as **Figure 4.3**) shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. Since this is a prediction of a worst-case scenario, it is unlikely that any actual flood would be this large.

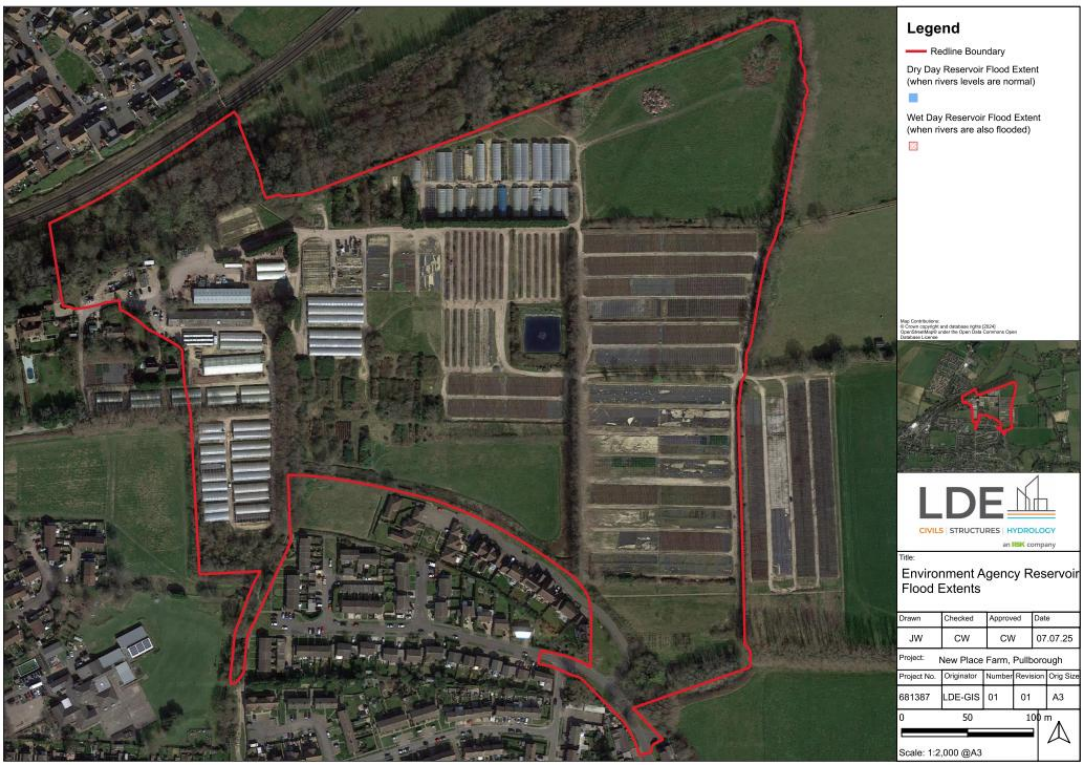


Figure 4.3: Environment Agency 'Flood risk from reservoirs' map

The EA mapping was updated in 2021 to demonstrate the potential maximum extent of flooding for two scenarios - a "dry day scenario" in which river levels are "normal", and a "wet day scenario" where the flooding from the reservoir coincides with flooding from rivers.

The mapping shows that the site is not in a location at risk of reservoir flooding when river levels are normal and should the peak fluvial event and reservoir failure occur at the same time. Reservoir flooding is extremely unlikely and there has been no loss of life in the UK from reservoir flooding since 1925. Since then, reservoir safety legislation has been introduced to ensure reservoirs are maintained.

Reservoirs can be managed over time, controlling inflow/outflow of water and therefore there is the capacity to control the effects of climate change. Increased rainfall has the potential to increase base flow, but this should be minimal. It is unlikely that there will be a substantial change to the risk of flooding for this site as a result of climate change.

The resultant flood risk is **very low.**

4.8 Other sources of flood risk

4.8.1 Canals

There are no Canal & River Trust owned canals within the vicinity of the site.

4.8.2 Other artificial features

There is a man-made reservoir located within the centre of the site that is believed to connect into the site's irrigation system to allow the plant nursery to be watered effectively. As this is a man-made system and is not considered to receive any additional inflows, it poses little flood risk to the site.

The resultant flood risk from 'other' sources is **very low.**

5 MITIGATION MEASURES AND RESIDUAL RISK

5.1 Sequential approach within application boundary

The Sequential Approach, in the context of flood risk planning, is addressed in paragraph 173 of the NPPF. Paragraph 173 specifies that a sequential risk-based approach should be taken to individual applications in areas at risk of flooding. Application of the sequential approach in the plan-making and decision-making process will help to ensure that development is steered to the lowest risk areas, where it is compatible with sustainable development objectives to do so.

The overall risk of surface water flooding at the site (when considered as a whole) is considered to be very low, with the exception of an area of surface water ponding in the central and western areas of the site and the flow path in the northwest corner. The northwest area has been set aside for open space and no built development will occur here. The areas of ponding within the development area are included within the surface water drainage catchments and hence any rainfall that lands within these areas will be collected via the proposed drainage system.

An overlay of the proposed development layout and the EA's risk of surface water flooding layers has been included in **Appendix I** as drawing **681387-R1-RSK-A-ALL-P01,** and the surface water drainage catchment plan is included in **Appendix I** as drawing **890815-RSK-ZZ-XX-DR-C-8305 Rev P04 Catchment plan.**

The most vulnerable elements of the scheme have been placed in the lowest risk parts of the site with all areas at surface water risk remaining as open space. There will also be no ground level raising in this area in line with the NPPF. This can be secured and controlled by planning condition with further detail on the ground level plans being provided at reserved matters application stage.

5.2 Overland flood flow

There is a surface water overland flow route present within the woodland region in the northwestern corner of the site. Since no development will be placed within this region, the flow path will remain undisrupted and continue to flow as per the current situation.

All surface water runoff up to the 1 in 100 year climate change storm generated on site will be stored on site and discharged to the watercourses on site as per the indicative drainage design in **Section 7**. Surface flows may be generated on site due to drainage capacity exceedance; these can be conveyed into the SuDS features.

5.3 Finished floor levels

As this site is unlikely to be affected by fluvial, surface water or any other sources of flooding there is no need to incorporate any raised finished floor levels into the design. Low lying areas that could lead to ponding of surface flows will be avoided by careful design of finished levels.

5.4 Easements and consents

Under the Water Resources Act 1991 and associated byelaws, works in, over, under or adjacent to main rivers require the consent of the EA and works in, over, under or adjacent to ordinary watercourses will require IDB, Local Authority or LLFA consent. This is to ensure that they neither interfere with the IDB/EA/LPA/LLFA's work nor adversely affect the environment, fisheries, wildlife and flood defence in the locality.

Due to the presence of a multiple surface water drainage channels within the vicinity of the site location it is possible that the LLFA may require consents and easements for works in and around these channels. Since the indicative drainage strategy will also look to discharge to a drainage channel, the LLFA should be contacted to determine feasibility and constraints.

Any consent works usually take place post planning, prior to construction, however, the principals of any development within the appropriate easements should be agreed at the planning stage.

5.5 Flood compensation

The site is shown to be outside the 1 in 100 year climate change floodplain, so floodplain compensatory measures are not deemed necessary.

5.6 Safe access/egress

As the site is lies outside of the 1 in 100 year plus climate change fluvial flood extent and is not identified as being at significant risk of flooding from other sources, safe access and egress will be available for the design flood event.

5.7 Groundwater

The site-specific investigation carried out by GRM Development Solutions Ltd and LEAP Environmental confirmed that the underlying geologies and groundwater levels are unlikely to pose a flood risk to this site.

Long-term groundwater monitoring could be undertaken as a precautionary measure.

6 PLANNING POLICY CONTEXT

6.1 National planning policy

Section 14 of the NPPF details the overarching requirements relating to flood risk for any development. The key message is that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.

In areas at risk of flooding, the NPPF requires that the following criteria are met:

a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;

b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;

c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;

d) any residual risk can be safely managed; and

e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

The PPG supports the NPPF and provides further advice regarding the assessment of flood risk and the application of the Sequential and Exception Tests.

6.1.1 Land use vulnerability

Table 2 of the PPG indicates the compatibility of various land uses in each flood zone, dependent on their vulnerability to flooding. **Table 6.1** below is reproduced from Table 2 of PPG.

Table 6.1: Flood risk vulnerability and flood zone 'compatibility'

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate
	Zone 2	Appropriate	Appropriate	Exception Test Required	Appropriate	Appropriate
	Zone 3a	Exception Test Required	Appropriate	Should not be permitted	Exception Test Required	Appropriate
	Zone 3b functional floodplain	Exception Test Required	Appropriate	Should not be permitted	Should not be permitted	Should not be permitted

With reference to Annex 3 of the NPPF, the proposed development, based on its residential use, is classed as 'more vulnerable'. This classification of development is appropriate for areas within Flood Zone 1 and therefore appropriate for the subject site.

6.1.2 Sequential Test

The Sequential Test aims to direct new development to areas with the lowest probability of flooding. The site has been identified as located within Flood Zone 1 with no other significant flooding issues from other sources, as such the sequential test has been passed.

6.1.3 Exception Test

In accordance with **Table 6.1**, there is no requirement to apply the Exception Test for a 'more vulnerable' development within Flood Zone 1.

6.2 Local planning policy

Key and current local planning policy of relevance relating to flood risk and drainage for the area which the site is located in, has been reproduced below.

West Sussex County Council Local Flood Risk Management Strategy[5]

The District and Borough Councils are the responsible authorities for managing planning control and making decisions on what will or will not be granted planning permission. West Sussex County Council is responsible for planning control of libraries, waste sites, mineral sites and schools. Current planning policy directs development away from flood risk areas, however, there remains an emphasis on development and the economy. Permitting safe housing is a constant challenge for developers and planners.

With regard to development in flood risk areas, site allocations and planning applications are informed and assessed by the planning process in a number of ways. The planning process, in accordance with the National Planning Policy Framework (NPPF), applies a principle called the Sequential Test that seeks to direct development towards areas with the lowest risk of flooding.

Where the Sequential Test is not possible, the Exception Test is undertaken whereby it must be demonstrated that any development in an area at risk of flooding will provide wider sustainability benefits to the community that outweigh flood risk, and that such development will be safe for its lifetime. Flood risk should not be increased elsewhere as a result of development. Flooding from new development cannot be allowed to impact on third parties.

West Sussex LLFA Policy for the Management of Surface Water[6]

SuDS Policy 1: Follow the drainage hierarchy

1. Surface runoff not collected for use must be discharged according to the following discharge hierarchy:
    a. to ground,
    b. to a surface water body,
    c. to a surface water sewer, highway drain, or another drainage system, or
    d. to a combined sewer where there are absolutely no other options, and only where agreed in advance with the relevant sewerage undertaker.
2. The selection of a discharge point should be clearly demonstrated and evidenced.

SuDS Policy 2: Manage Flood Risk Through Design

1. The drainage scheme proposed is to:
    a. protect people and property on the development site from flooding; and,

[5] West Sussex County Council Local Flood Risk Management Strategy, accessible at: https://www.westsussex.gov.uk/media/1595/local_flood_risk_management_strategy.pdf

[6] West Sussex LLFA Policy for the Management of Surface Water, accessible at: https://www.midsussex.gov.uk/media/3826/ws-llfa-policy-for-management-of-surface-water.pdf

b. avoid creating any additional flood risk outside of the development in any part of the catchment, either upstream or downstream.

2. Any drainage scheme must manage all sources of surface water, including exceedance flows and surface flows from offsite, provide for emergency ingress and egress and ensure adequate connectivity.

3. For large sites where development is to be phased, there will need to be a strategic site surface water management system that allows different parts of the site to be developed at different times while ensuring that each of the design criteria can be met.

SuDS Policy 3: Mimic Natural Flows and Drainage Flow Paths

1. Drainage schemes should be designed to match greenfield discharge rates and follow natural drainage routes as far as possible; pumps should therefore not form part of drainage schemes.

2. Greenfield runoff should be calculated from FEH or a similar approved method. SAAR and any other rainfall data used in run-off storage calculations should be based upon FEH rainfall values.

Horsham District Council Local Plan 2023 – 2040 (Regulation 19)[7]

Strategic Policy 6: Climate Change

Climate Change Adaptation

1. Development will only be supported if it includes site and building level measures to adapt to the future impacts of climate change and reduce vulnerability, particularly in terms of the comfort, health and wellbeing of current and future occupiers. Flood risk, water supply, overheating and changes to the District's landscape should also be considered. Measures should include but are not limited to:

    a. Use of site and interior building layout: new buildings should be orientated to maximise the opportunities for both natural heating and ventilation and to reduce the exposure to wind and other elements, and the potential for overheating;

    b. The conservation of water supplies to minimise the risk and impact of drought and flooding;

    c. The use of green/blue infrastructure and dual use Sustainable Drainage Systems (SuDS) to provide multifunctional benefits such as helping to absorb heat, reduce surface water runoff, provide flood storage capacity and assist habitat migration; and

[7] Horsham District Council Local Plan 2023 – 2040 (Regulation 19), accessible at: https://strategicplanning.horsham.gov.uk/Regulation_19_Local_Plan/consultationHome

d. Moderating external temperatures through the use of green walls and roofs, tree planting or other nature-based solutions and landscaping for shade and drainage design.

2. Development will be supported providing it avoids responses to climate impacts which lead to increases in energy use and carbon dioxide emissions. In considering the likely impact of climate change over the lifetime of the development reference should be made to the most recent climate change projections.

Sustainability Statement

3. Development will be supported provided a Sustainability Statement is submitted which demonstrates how the development has taken measures to mitigate and adapt to the effects of climate change.

Strategic Policy 10: Flooding

1. Development proposals will only be supported where they follow a sequential approach to flood risk management, so that priority is given to development sites and areas with the lowest risk of flooding, where shown to be safe, and shown not to increase flood risk elsewhere.
2. Development proposals will be supported provided that they meet all of the following that are relevant:
    a. Consider flood risk at an early stage in deciding the layout and design of the site;
    b. Take a sequential approach to ensure most vulnerable uses are placed in lowest risk areas;
    c. Are not located on the functional floodplain (Flood Zone 3b), except for water compatible uses and essential infrastructure;
    d. Where located in Flood Zone 2 and 3, have undergone a sequential test and, if necessary, exceptions test, using a 1 in 100 annual probability flood level including an appropriate allowance for climate change;
    e. Not result in a net loss of flood storage capacity, and not adversely affect flood routing and thereby increase flood risk elsewhere;
    f. If over 1 hectare and in Flood Zone 1, or in Flood Zone 2 and 3, are accompanied by a site-specific Flood Risk Assessment;
    g. Comply with the tests and recommendations set out in the Horsham District Strategic Flood Risk Assessments (SFRAs);
    h. Where there is the potential to increase flood risk, incorporate the use of sustainable drainage systems (SuDS) unless technically unfeasible, or incorporate water management measures which reduce the risk of flooding and ensure flood risk is not increased elsewhere;
    i. Make appropriate provision for surface water drainage to ground, water courses or surface water sewer. Development will not be allowed to drain to the foul sewer;

j. Where technically feasible, utilise drainage techniques that mimic natural drainage patterns and manage surface water as close to the source as possible;

k. Comply with the objective of the Water Framework Directive, and with the findings of the Gatwick Sub Region Water Cycle Study, in order to maintain water quality and water availability in rivers and wetlands and wastewater treatment requirements; and

l. Include a management plan to maintain the flood water assets in perpetuity.

3. New development which incorporates SuDS will be supported where it considers amenity value, green infrastructure, local ecological resources including water quality and biodiversity, natural flood management methods, and contributes towards environmental net gain. An appropriately detailed assessment should be submitted to demonstrate an appropriate SuDS strategy.

7 SURFACE AND FOUL WATER DRAINAGE ASSESSMENT

7.1 Scope

This section discusses the potential quantitative effects of the development on both the risk of surface water flooding on-site and elsewhere within the catchment, as well as the type of potential SuDS features that could be incorporated as part of the masterplan.

The NPPF states that SuDS should be considered wherever practical. The use of SuDS is also encouraged by regional and local policy. In accordance with the Horsham District Council Local Plan, West Sussex County Council Local Flood Risk Management Strategy and Policy for Management of Surface Water; the surface water drainage strategy should seek to implement a SuDS hierarchy that aspires to achieve reductions in surface water runoff rates to greenfield rates.

In addition, Building Regulations Part H[8] requires that the first choice of surface water disposal should be to discharge to an adequate soakaway or infiltration system, where practicable. If this is not reasonably practicable then discharge should be to a watercourse, the least favourable option being to a sewer (surface water before combined). Infiltration techniques should therefore be applied wherever they are appropriate.

This assessment includes an overview and comparison of the existing scenario and proposed development scenario. The existing and proposed areas are provided in the Table below:

Table 7.1: Existing and proposed site areas

Land use	Existing area (m^2)	Proposed area (m^2)
Impermeable	14,067m^2 (9%)	39,980m^2 (25%)
Permeable	146,229m^2 (91%)	122,978m^2 (75%)
Total	162,958m^2	162,958m^2

[8] HM Government (2010 with 2013 amendments), 'The Building Regulations 2010: Approved Document H - Drainage and Waste Disposal (2002 Edition incorporating 2010 amendments)'.

7.2 Pre-development situation

The pro-rata IoH 124[9] method has been used to estimate the Greenfield surface water runoff for a 1ha site to give a l/s/ha rate, using the HR Wallingford Greenfield runoff rate estimation tool. Calculations are contained in **Appendix G**.

Table 7.2: IOH 124 surface water runoff (greenfield) for 1ha

Return period	Peak flow (l/s)
QBar	6.1
1 in 1 year	5.2
1 in 30 year	13.8
1 in 100 year	19.4

7.3 Post-development situation

The proposed development is for a residential end use. This will result in an increase in impermeable area and surface water runoff across the site. It will therefore be necessary to manage surface water on-site through conveyance towards the proposed point of discharge, whilst providing sufficient attenuation for all events up to the 1 in 100 year event inclusive of a climate change percentage. Based on latest climate change guidance sites located within the Arun and Western Streams Management Catchment and have a design lifetime that exceeds the 2100 epoch should use the 'upper end' climate change allowance, which in this case is 45%.

7.3.1 Point of discharge

Discharge options from the site have been considered in line with the SuDS hierarchy, as follows.

Infiltration

Infiltration should be considered as the primary option to discharge surface water from the developed study area. The effectiveness of infiltration is completely dependent on the physical conditions at the study area.

A site specific ground investigation and soakaway testing conducted by GRM Development Solutions Ltd. in August 2022 stated that *"soakaway rates were highly variable due to the nature of head deposits"* and that rates were *"generally poor"*. As such, infiltration based SuDS are not considered a viable discharge option at this site.

Discharge to watercourse

[9] Institute of Hydrology (IoH), 'Flood Estimation for small catchments - Report 124', 1994.

There are several surface water drainage channels within the boundary, that collate surface water from the site to the southwest corner where the site discharges to an Ordinary Watercourse via a culvert.

Discharging surface water directly to a local watercourse is considered feasible and since the site drains naturally in this way utilising/enhancing the existing connection(s) will act to mimic the natural scenario.

As per the requirements of local policy any discharge to the watercourse will not exacerbate flood risk when restricted to the 1 in 1 year greenfield rate of 5.2l/s/ha.

Discharge to surface water sewer

Due to the lack of surface water sewers within the immediate vicinity of the site and as preferable methods are available, it is not considered feasible to discharge surface water to a sewer.

7.3.2 Network Flow modelling

To determine whether the proposed SuDS provide sufficient attenuation storage, the Causeway Flow design tool has been used. Causeway Flow allows for an indicative network to be modelled based upon attenuation feature dimensions, rainfall values and permitted discharge rates, in line with CIRIA guidance. These volumes can be later revised at detail design stage by the introduction of specific flow control methods.

The proposed surface water discharge rate from the site will be 22.60 l/s. This rate was previously agreed to be the LLFA in outline planning application (DC/21/2321). In the application a drainage concept plan was completed by RPS Group in May 2021 (drawing ref: AAC5680-RPS-xx-xx-DR-C-600-01) using this rate. It should be noted that this runoff rate is between the 1 in 1 year greenfield rate of 20.74l/s and the QBar rate of 24.33l/s.

Calculations have been run using the approved rate by the LLFA, restricting offsite flows to 22.60l/s. The proposed impermeable area has been based on an assumed 100% of the developable area, with an additional allowance for Urban Creep included. No allowance is included in the calculations for infiltration as a worse-case scenario.

Calculations show this system can attenuate surface water runoff without flooding during a 1 in 100 year event inclusive of 45% climate change. Further details on the storage structure and sizing, with attenuation calculations can be found in **Appendix H**.

7.3.3 Proposed drainage strategy

The surface water strategy has been designed and split into 3 catchment areas (East, Central and West) which outfall into the southern boundary ditch. Each catchment has a detention basin storage area and flow control to restrict the discharge rate into the existing ditch. The discharge rates do not exceed the approved outline planning discharge rates.

Network 1 – East

The proposed strategy for the eastern area is for the surface water drainage to discharge into the Detention Basin 1 in the south under gravity. A flow control set at 4.9 l/s will restrict surface water entering the southern ditch which has been designed in accordance with the principles set out during the outline planning stage. A Detention Basin storage capacity of 1,223m^3 is required with the flow restriction.

Network 2 – West

The proposed strategy for the western area is for the drainage to discharge into the Storage Basin in the south under gravity. The catchment for Basin 4 includes Phase 1 residential housing and an additional allowance for a future development of 10 dwellings within the Heritage site. A flow control set at 5.2 l/s will restrict surface water entering the southern ditch which has been designed in accordance with the principles set out during the outline planning stage. Attenuation Basin 4 has a storage volume of 1,450m^3.

Network3 – Central

The proposed strategy for the central area is for the drainage to discharge into the Storage Basin in the south under gravity. A flow control of 12.5 l/s will restrict surface water entering the southern ditch which has been designed in accordance with the principles set out during the outline planning stage. The surface water runoff from this part of the development is through a system of sewers, swales and Attenuation Basins 2 and 3, and has a combined storage capacity of 1,834m^3.

The proposed SuDS for the site include a combination of permeable paving and modular storage which have been located depending on the positions of proposed building, topography and location of outfalls. The proposed SuDS features are designed to provide the required storage volume to retain the 1 in 100 plus 45% climate change event. The SuDS measures are outlined in the Indicative Surface Water Strategy as attached in **Appendix I**.

In principle, the strategy contains the following features:

- **Infiltration** rates are considered variable / poor on site due to the nature of the underlying geology and therefore **soakaways** will be considered in moderation. Additional soakaway tests will be required within the soft landscaping features to ascertain infiltration rates and the suitability of soakaways being partially incorporated into the drainage storage design areas. Individual house soakaways may be possible depending on ownership and responsibility. Alternatively modular storage could also be designed as soakaways beneath communal parking areas. All soakaways will need to be designed taking into consideration groundwater levels (to prevent any interference with the water table), any potential contamination (considered unlikely on this site) and the site-specific infiltration rates, all of which will need to be confirmed at the detailed design stage. All soakaway features should be located at a minimum 5m distance from buildings in accordance with Building Regulations Part H[8].
- **Permeable paving** has been located along the access road in the north of the site and is indicated as 0.3m deep. This feature provides surface water attenuation and water quality benefits. Main roads will not be constructed using permeable paving

due to ownership and future maintenance issues, where responsibility will most likely lie with the highway authority.

- **A modular storage tank** has been located within the eastern catchment to provide additional surface water attenuation. Modular storage has been indicated as one to two cells deep (0.4m - 0.8m). There is potential to introduce modular storage under the detention basins to reduce the depth of the water depth at peak events in the detention basins. It should be noted that in areas of high groundwater levels, these tanks may need to be lined to prevent groundwater ingress. Potential floatation issues should also be considered at the detailed design stage.
- **Swales** have been utilised alongside roads to convey runoff through the drainage network to the various attenuation features.
- Four **detention basins** have been strategically located within the area of open space along the southern boundary. The topography in this area is suitable for SuDS features. To accommodate the required volumes, the feature has been designed up to 1m deep and has side slopes of 1:3 to comply with safety and maintenance guidelines as highlighted in the SuDS Manual[10]. A 3m easement distance for access and maintenance has been included in all proposed basins.
- **Rainwater harvesting** is proposed as part of this development, through the use of water butts for individual residential units, but they have not been included as part of any of the calculations.

The dimensions, volumes and location of the SuDS features will need to be revised as the masterplan develops and during the detailed planning stage. Detailed design of individual features is not part of the scope of this report. Preliminary design criteria have been based upon guidance given in the CIRIA publication 'The SUDS Manual'[10].

Temporary drainage should be established for the construction phase of development to prevent silt mobilisation, potentially impacting on flow regimes and silt pollution downstream. Construction of the site will be phased, and all existing watercourses will remain untouched during construction. Basins and any new drainage will be constructed first, to allow runoff to be discharge into the Basins. Silt management will be monitored at the Basin outfalls and at the final discharge point into the ditch. Silt matting will be located at the outfalls and silt fencing will be located along the southern boundary for any potential overland flows. A construction phase Surface Water Management Plan (SWMP) could be used to secure these mitigation measures to protect water quality during construction.

A summary of the proposed surface water drainage strategy is included within the completed West Sussex drainage proforma, attached as **Appendix J**. A West Sussex Flood Risk Validation Checklist can also be found in **Appendix J.**

[10] CIRIA, 'The SUDS Manual – C753', 2015.

7.3.4 Adoption and maintenance

The Design and Construction Guidance for Foul and Surface Water Sewers (DCG)[11] states that as of April 1st 2020, sewerage authorities are required to adopt some SuDS features, including basins and swales. However, SuDS features that are classified as forming part of a building or yard (i.e. permeable paving) will not be adoptable under the DCG and will require a second adopting authority or maintenance company. Therefore, the long-term maintenance of some SuDS features within the site boundary will most likely be undertaken by Southern Water as the adopting authority. However, the maintenance of other features such as permeable paving will most likely be undertaken by a management company.

Maintenance of SuDS features should be undertaken in line with maintenance schedules outlined in the SuDS Manual and if adopted, any Southern Water maintenance guidance. An example of a typical maintenance regime for the proposed SuDS can be found in **Appendix K**. Similar regimes would be applicable for all other SuDS features on site. Full maintenance schedules should be confirmed at the detailed design stage in consultation with appropriate product suppliers.

7.4 Water quality

The SUDS Manual contains guidance on how to assess water quality, stating *"Determining the hazard posed by the land use activities at a site and the extent to which underlying soil layers and/or proposed treatment components reduce the associated risk can be done using a variety of methods that vary in complexity and data requirements."*

The assessment methodology required is determined by reference to Table 4.3 of the SuDS Manual. Based on this, the quality impacts of the proposed development can be summarised with the following pollution hazard levels and management requirements for discharge to the receiving surface water (there will be no infiltration on site, therefore receiving groundwater is not considered here):

- Residential roofs – **Very Low** Pollution Hazard – Simple Index Approach;
- Individual property driveways, roofs, residential car parks, low traffic roads, non-residential car parking with infrequent change (schools, offices) – **Low** Pollution Hazard – Simple Index Approach; and

It is therefore considered appropriate to use the Simple Index Approach (SIA) for the purpose of this assessment. The Simple Index Approach (SIA) to assessing water quality management requirements has been developed by CIRIA to support the implementation of the water quality management design methods set out in the SuDS Manual, with appropriate cross referencing to the relevant 'Design Conditions'. The CIRIA Susdrain website contains a spreadsheet based procedure that can be used for all the UK.

[11] Water UK, 'Sewerage Sector Guidance Appendix C – Design and Construction Guidance for foul and surface water sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England', March 2020.

Simple Index Approach

Table 26.1 of the SUDS Manual indicates that for the Simple Index Approach:

- Simple pollution hazard indices should be based on land use (e.g. Table 26.2).
- Risk reduction for Surface Water should be done using Simple SuDS hazard mitigation indices (e.g. Table 26.3).

Extracts of Tables 26.2 and 26.3 are replicated below, highlighting the relevant features applicable to this site:

Table 7.3: Extract of SuDS Manual Table 26.2: Pollution hazard indices for different land use classifications

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very Low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (e.g. cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices) i.e. <300 traffic movements/day	Low	0.5	0.4	0.4

Table 7.4: Extract of Table 26.3: Indicative SuDS mitigation indices for discharges to surface waters

	Mitigation Indices		
	TSS	Metals	Hydro-carbons
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6

The SuDS Manual States:

Total SuDS mitigation index ≥ pollution hazard index

(for each contaminant type) (for each contaminant type)

When two or more SuDS components are used in a series:

Total SuDS mitigation index = mitigation index $_1$, + 0.5 (mitigation index $_2$)

Where: Mitigation index $_n$ = mitigation index for component n

A factor of 0.5 is used to account for the reduction performance of secondary or tertiary components associated with already reduced inflow concentrations.

Taking each land type use in turn:

- Commercial roofs – has a TSS index of 0.3, a Metals index of 0.2 and a Hydrocarbons index of 0.05.
- Individual driveways – has a TSS index of 0.5, a Metals index of 0.4 and a Hydrocarbons index of 0.4.
- Total pollution index – TSS has an index of 0.8, Metals has an index of 0.6 and Hydrocarbons has an index of 0.45.

Taking each SuDS technique used in turn:

- Permeable Paving – has a TSS index of 0.7, a Metals index of 0.6 and a Hydrocarbons index of 0.7.
- Detention Basin (x0.5) – has a TSS index of 0.5, a Metals index of 0.5 and a Hydrocarbons index of 0.6.
- Total mitigation index – TSS has an index of 0.95, Metals has an index of 0.75 and Hydrocarbons has an index of 1.0.

As is required by the SuDS manual, the total SuDS mitigation index is greater than the total pollution hazard index.

In summary, the use of a combination of SuDS as outlined above should demonstrate that in line with current guidelines, runoff is limited from the site following redevelopment and the use of treatment train consisting of permeable paving and an attenuation basin will also provide significant water quality benefits. Suitable planting within the open SuDS features will also provide additional water quality benefits.

7.5 Foul drainage provision

As with the surface water network, there is an extensive on-site private foul network throughout the proposed development. This foul network will connect into the Southern Water existing public foul sewer network to the south of the development.

The foul drainage will connect to two existing foul manholes at MH7001 in Glebelands and MH5103 adjacent to the southern boundary.

- MH7001 - A 150mm diameter foul sewer that begins its run to the west of the houses on Drovers Lane. This sewer flows south where it then inflows into a 150mm diameter sewer on Glebelands.

- MH5103 - A 150mm diameter foul sewer that flows east to west along Glebelands to the south of the site. This sewer then turns to flow southward, away from the site, at the western end of Glebelands.

The upstream foul drainage will connect into these manholes under gravity and be offered for adoption under a S104 Agreement.

The foul water design follows the approved Drainage Strategy and is shown connecting to MH7001 and MH5103. The foul drainage strategy for the subject site is shown in **(Appendix I).**

Southern Water confirm that there is currently adequate capacity in the local sewer network to accommodate foul flows from the proposed development. Southern Water were contacted to assess the proposed connection point at existing manhole 7001 in Glebelands. A response was received on 31st August 2021 and Southern Water have confirmed MH5103 is located within private land ownership and will require the landlord's consent. A S98 Sewer requisition may be required to connect to the Southern Water manhole.

8 CONCLUSIONS AND RECOMMENDATIONS

This FRA complies with the NPPF and Planning Practice Guidance and demonstrates that flood risk from all sources has been considered in the proposed development. It is also consistent with the Local Planning Authority requirements with regard to flood risk.

The proposed development site lies in an area designated by the EA as Flood Zone 1 and is outlined to have a chance of flooding of less than 1 in 1,000 (<0.1%) in any year from fluvial sources. The site is also considered to be at no significant risk from all other sources of flooding.

The proposed development is classified as 'more vulnerable' and therefore considered appropriate within Flood Zone 1 without application of the Exception Test.

This FRA has considered multiple sources of flooding and concluded the following:

Table 8.1: Flood risk summary

Source	Level of risk	Mitigation
Fluvial	**Very Low** Flood Zone 1	-No Mitigation Required.
Tidal	**Very Low** Inland Location	-No Mitigation Required.
Surface water	**Very Low**	-No Mitigation Required. -No development will be placed within the area the surface water flow path intersects the boundary. -The development will incorporate a surface water drainage strategy to accommodate surface water generated on site. Surface water will be attenuated on site and discharged directly to the nearby watercourse(s). -Areas of surface water ponding within the site will be incorporated into the surface water drainage catchment and reduce residual risk. -SuDS will be utilised to control surface water flows, designed to store the volume of water associated with a 1 in 100 year rainfall event (including a 45% allowance for climate change), providing a betterment over the existing scenario.

Source	Level of risk	Mitigation
Groundwater	**Very Low**	-No Mitigation Required.
Sewers	**Very Low**	-No Mitigation Required.
Reservoir	**Very Low**	-No Mitigation Required.
Other sources	**Very Low**	-No Mitigation Required.

Overall, taking into account the above points, the development of the site should not be precluded on flood risk grounds.

APPENDIX A
RSK GROUP SERVICE CONSTRAINTS

1. This report and the drainage design carried out in connection with the report (together the "Services") were compiled and carried out by RSK LDE Ltd (RSK) for BDW Southern Counties (the "client") in accordance with the terms of a contract between RSK and the "client" dated June 2024. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable civil engineer at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.

2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.

3. Unless otherwise agreed in writing, the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.

4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.

5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate, or such other terms as may be agreed between RSK and the client.

6. The observations and conclusions described in this report are based solely upon the Services, which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.

7. The Services are based upon RSK's observations of existing physical conditions at the site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.

8. The phase II or intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.

9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (boreholes, trial pits etc) annotated on site plans are not drawn to scale but are centred over the appropriate location. Such features should not be used for setting out and should be considered indicative only.

APPENDIX B
TOPOGRAPHIC SURVEY

Survey Notes

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Survey Key

Street Furniture Symbols & Abbreviations

BB Bollshe Beacon
Bo Bollard
BS Bus Stop
Dr Drain
EP Electric Pole
FL Flood Light
FP Flag staff
GP Gate Post
GU Gully
GV Gas Valve
IC Inspection Cover
LB Litter Bin
PO Post
TL Traffic Light
MH Manhole
SP Spot Rams Plate
FH Fire Hydrant
WO Wash Out
WM Water Meter
TV Cable Television
Mkr Marker Post
MP Mile Post
PB Pillar Box
Pipe
PM Parking Meter
Post
RE Rodding Eye
RP Reflector Post
RS Road Sign
BT Bus Tac
Sign
Stump
SV Stop Valve
TP Telegraph Pole
VP Vent Pipe
TC Telecommunication
WT Water Tap
KO Kerb Outlet
AV Air Valve
TCB Tel Cell Box
TrP Trial Pit
STN Survey Control Station

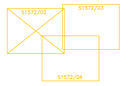
Fence Types & Abbreviations

CrP Chestnut Paling
CrR Cross Rounded
CrL Chain Link
ConP Concrete Panel
CrI Corrugated Iron
CBr Cram Barrier
El Electric
HM Hit and Miss
Hed Hoarding
Int Interwoven
IR Iron Railings
OrL Ornamental
Pal Palisade
PrK Picket (Wooden)
R/W Post & Barbed Wire
P/C Post & Chain
P/R Post & Rail
P/B Post & Wire
P/M Post & Wire Mesh
TR Trip Rail

Feature Lines

Hedge
Fence
Gate
Stile
Footpath
Kerbline
Verge/Edge of Track or Change Of Surface
Sewer Lines
Ditch / Embankment etc.
Overhead Electric Line
Overhead Telecom Line
Individual Tree-Sized
Building
Structure
Wall
Retaining Wall

SHEET LAYOUT



SURVEY CONTROL

STN	EASTINGS	NORTHINGS	LEVEL
DR5	505345.481	119231.981	32.1915
DR6	505304.494	119226.745	30.8235
DR6A	505290.547	119225.086	30.3351
DR7	505212.798	119220.600	26.2733
DR8	505107.959	119213.415	19.6564
DR9	505088.754	119208.478	19.4816
DR10	505059.696	119176.765	19.8648
EM7	505439.502	119371.925	37.4748
EM8	505404.868	119366.381	34.2807
EX99	505395.415	119334.656	36.6468
FUT1	505915.977	119404.095	54.9680
FUT2	505929.572	119489.034	59.2422
FUT3	505818.378	119511.878	53.8487
FUT4	505705.799	119452.618	49.1318
FUT5	505712.489	119468.555	49.4077
FUT6	505483.769	119502.318	38.0996
FUT7	505459.060	119534.404	30.7989
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LD6A	505543.647	119347.296	41.9986
LD9	505475.651	119162.959	30.8198
NJC1	505683.016	119079.365	53.2100
NJC2	505772.768	119052.159	35.5550
NJC2A	505812.909	119005.457	34.3540
NJC2B	505806.844	118993.664	34.0190
NJC97	505537.561	119207.708	33.6850
NJC98	505540.665	119158.816	31.5210
NJC99	505508.729	119091.845	28.4040
NJC100	505553.568	119087.291	29.3160
RB1	505387.822	119242.307	33.4574
RB1B	505383.675	119261.215	34.0645
RB1E	505434.563	119285.470	36.0480
RB2	505382.605	119328.992	36.3169
RB3	505449.923	119333.400	39.1324
RB4	505476.233	119363.262	40.6631
RB10	505119.067	119276.846	26.0065
RB11	505024.600	119138.585	19.3881
RB12	505066.811	119141.086	19.2314

REV	DATE	DESCRIPTION	BY	APP.

njc SURVEYS LTD
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South Street,
Ashby de la Zouch,
Leicestershire
LE65 1BS
Telephone 01530 414251
Mobile 07876 792994
Mail office@njcsurveys.co.uk
Web www.njcsurveys.co.uk
Topographical Surveys ● Building Surveys ● GPS Surveys ● Setting Out
Dimensional Control ● Monitoring Surveys ● Ground Modelling ● Volumetric Calculations

Client

CATESBY PROPERTY GROUP

Project Title

London Road,
Pulborough

Drawing Title

Topographical
Survey

Drawn	Checked	Authorised
TMB	NJC	NJC
Date	Scale	Sheet size
18/03/2019	1/500	A0
Drg. No.		Revision
S1572/02		



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Street Furniture Symbols & Abbreviations

BB Belisha Beacon
Bo Bollard
BS Bus Stop
Ch Drain
EP Electric Pole
FL Flood Light
FS Flag staff
GP Gate Post
Gy Gully
GV Gas Valve
IC Inspection Cover
LB Litter Bin
PB Post Box
TL Traffic Light
Manhole
Name Plate
FH Fire Hydrant
WO Wash Out
WM Water Meter
TV Cable Television
Mkr Marker Post
MP Mile Post
PB Pillar Box
Pipe
PM Parking Meter
PO Post
RE Rodding Eye
RP Reflector Post
RS Road Sign
BT Bus Tac
Sign
Stump
SV Stay Valve
TP Telephone Pole
VP Vent Pipe
TC Telecommunication
WT Water Tap
KO Kerb Outlet
AV Air Valve
TCB Tel Call Box
TrP Trial Pit
STN Survey Control Station

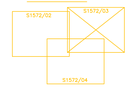
Fence Types & Abbreviations

CrP Chestnut Paling
CB Close Boarded
CL Chain Link
ConcPan Concrete Panel
CI Corrugated Iron
CBR Crash Barrier
El Electric
HM Hit and Miss
Hdg Hoarding
Int Interwoven
MR Metal Railings
OIL Oil Drum
Pal Palisade
PIK Picket (Wooden)
B/W Post & Barbed Wire
P/C Post & Chain
P/R Post & Rail
P/B Post & Wire
P/M Post & Wire Mesh
TR Trip Rail

Feature Lines

Hedge
Fence
Gate
Stile
Footpath
Kerbline
Verge/Edge of Track or Change Of Surface
Sewer Lines
Ditch / Embankment etc.
Overhead Electric Line
Overhead Telecom Line
Individual Tree-Sized
Building
Structure
Wall
Retaining Wall

SHEET LAYOUT



SURVEY CONTROL

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Client

CATESBY PROPERTY GROUP

Project Title

London Road,
Pulborough

Drawing Title

Topographical
Survey

Drawn	Checked	Authorised
TMB	NJC	NJC
Date	Scale	Sheet size
18/03/2019	1/500	A0

Drg. No.

S1572/03

Revision

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Street Furniture Symbols & Abbreviations

- BB — Belisha Beacon
- Bo — Bollard
- Bl — Bollard
- BS — Bus Stop
- Ch — Drain
- EP — Electric Light Pole
- FL — Flood Light
- FP — Flag staff
- GP — Gate Post
- GU — Gully
- GV — Gas Valve
- IC — Inspection Cover
- LB — Litter Bin
- TL — Traffic Light
- MK — Marker Post
- MH — Manhole
- PH — Fire Hydrant
- WO — Wash Out
- WM — Water Meter
- TV — Cable Television
- MK — Mile Post
- PB — Pillar Box
- Pipe — Pipe
- PM — Parking Meter
- Post — Post
- RE — Rodding Eye
- BP — Bollard Post
- RS — Road Sign
- SP — Sign
- SI — Stump
- SV — Stop Valve
- UP — Telegraph Pole
- VP — Vent Pipe
- TC — Telephone/communication
- WT — Water Tap
- KO — Kerb Outlet
- AV — Air Valve
- TCB — Tel Call Box
- TP — Trial Pit
- STN — Survey Control Station

Fence Types & Abbreviations

- C/P — Chestnut Paling
- D/R — Drive Boarded
- C/L — Chain Link
- C/P — Concrete Panel
- C/I — Corrugated Iron
- C/B — Cream Barrier
- Ele — Electric
- H/M — Hit and Miss
- H/d — Hoarding
- Int — Interwoven
- Iron — Iron Railings
- O/S — Open Slat
- Pal — Palisade
- P/K — Picket (Wooden)
- B/W — Post & Barbed Wire
- P/C — Post & Chain
- P/R — Post & Rail
- P/W — Post & Wire
- P/M — Post & Wire Mesh
- T/R — Trip Rail

Feature Lines

- Hedge
- Fence
- Gate
- Stile
- Footpath
- Kerbline
- Verge/Edge of Track or Change Of Surface
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- Ditch / Embankment etc.
- Overhead Electric Line
- Overhead Telecom Line
- Individual Tree-Sized
- Building — Structure
- Wall — Wall
- R/Wall — Retaining Wall

SHEET LAYOUT



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Client

CATESBY PROPERTY GROUP

Project Title

London Road,
Pulborough

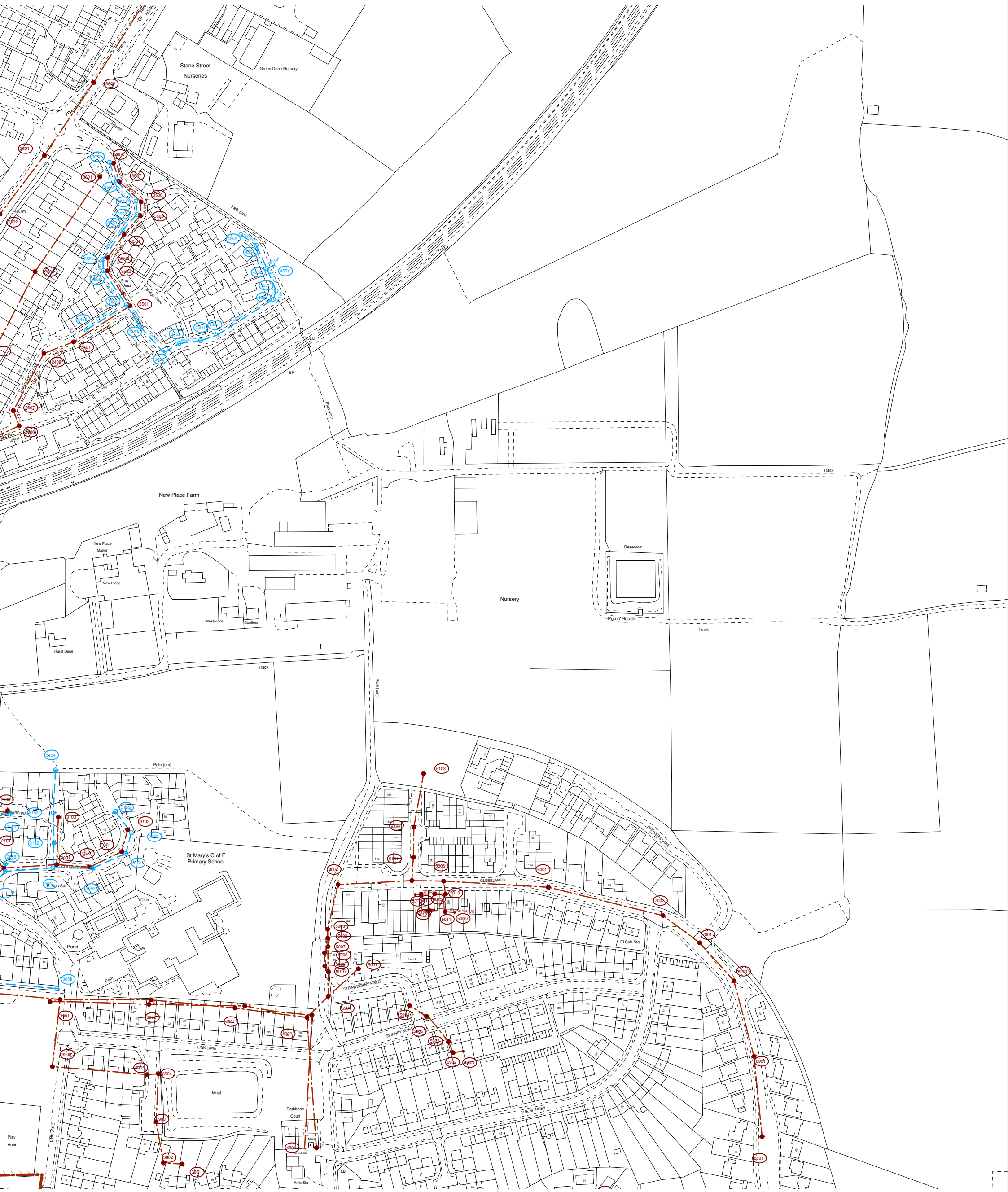
Drawing Title

Topographical
Survey

Drawn	Checked	Authorised
TMB	NJC	NJC
Date	Scale	Sheet size
18/03/2019	1/500	A0
Drg. No.		Revision
S1572/04		

APPENDIX C
SOUTHERN WATER SEWER RECORDS

SOUTHERN WATER



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.

Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530

Southern Water

O.S. REF: TQ0519SE

Scale: 1:2500

N

Printed By: Mercy

Date: 24-2-2021

Sewer Plot

Site Plan

WARNING: BAC pipes are constructed of Bonded Asbestos Cement

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

Requested By:

Adam Granger
RPS Consultancy Services
321 Bradford Street
Birmingham
West Midlands
B5 6ET

Your ref

Our ref
DS_CC_PPE-123163

Date
31 August 2021

Contact
Tel 0330 303 0119

Dear Mr Granger,

Level 1 Capacity Check Enquiry: Former Nursery, Drovers Lane, Pulborough, West Sussex, RH20 2GN.

We have completed the capacity check for the above development site and the results are as follows:

Foul Water

The enquiry has been reassessed to determine the capacity available for 1.81 l/s at manhole reference TQ05197001.

There is currently adequate capacity in the local sewerage network to accommodate a foul flow of **1.81 l/s** for the above development at manhole reference TQ0519**7001**. Please note that no surface water flows (existing or proposed) can be accommodated within the existing foul sewerage system unless agreed by the Lead Local Flood Authority in consultation with Southern Water, after the hierarchy Part H3 of Building Regulations has been complied with.

Connecting to our network

It should be noted that this information is only a hydraulic assessment of the existing sewerage network and does not grant approval for a connection to the public sewerage system. A formal Sewer Connection (S106) application is required to be completed and approved by Southern Water Services. To make an application visit: Developer Services Portal (southernwater.co.uk)

Please note the information provided above does not grant approval for any designs/drawings submitted for the capacity analysis. The results quoted above are only valid for 12 months from the date of issue of this letter.

Southern Water Services Ltd, Registered Office: Southern House, Yeoman Road, Worthing, West Sussex, BN13 3NX Registered in England No. 2366670

from Southern Water

Adam Granger
RPS Consultancy Services
321 Bradford Street
Birmingham
West Midlands
B5 6ET

Your ref

Our ref
DS_CC_PPE-123163

Date
23 July 2021

Contact
Tel 0330 303 0119

Dear Mr Granger,

Level 1 Capacity Check Enquiry: Former Nursery, Drovers Lane, Pulborough, West Sussex, RH20 2GN.

We have completed the capacity check for the above development site and the results are as follows:

Foul Water

There is currently adequate capacity in the local sewerage network to accommodate a split foul flow of **1.81 l/s** for the above development at manhole reference TQ0519**7001** and TQ0519**5103**. Please note that no surface water flows (existing or proposed) can be accommodated within the existing foul sewerage system unless agreed by the Lead Local Flood Authority in consultation with Southern Water, after the hierarchy Part H3 of Building Regulations has been complied with.

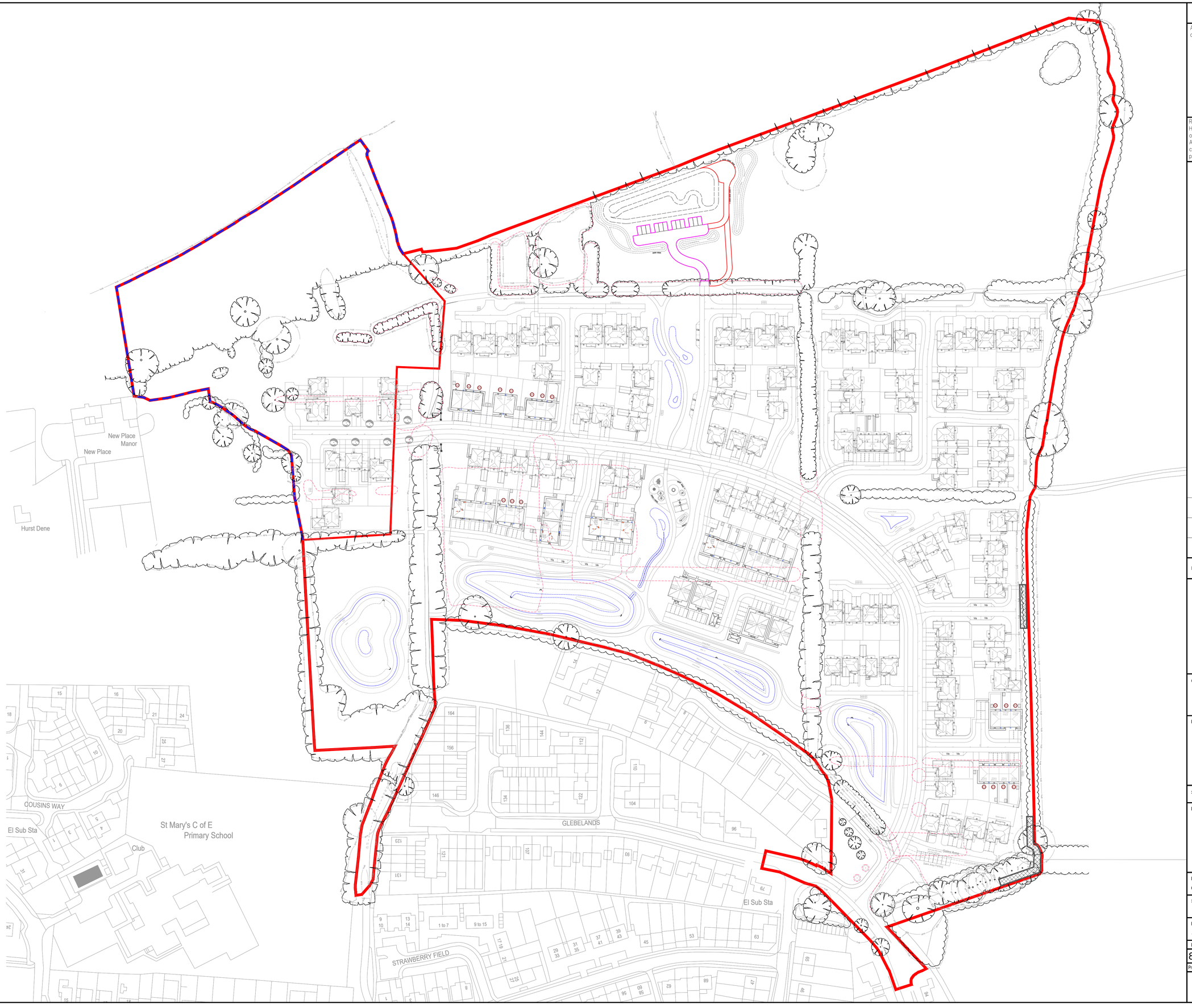
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Southern Water Services Ltd, Registered Office: Southern House, Yeoman Road, Worthing, West Sussex, BN13 3NX Registered in England No. 2366670

APPENDIX D
PROPOSED DEVELOPMENT PLANS



CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:–

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

Notes:

1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings and specifications.
2. Topographical Survey and Levels from NJC Survey Ltd, Drawing Number S1572 Dated 18th March 2019
3. Layout based on FINC Architects Drawing, dated .25.10.2024

Legend:

- Planning Application Boundary
- Future Phase 2 Heritage Planning Application Boundary

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P03	30.06.25	Updated with new site layout Redrow House Types	SH	GXA	RD
P02	13.12.2024	Issued for PLANNING RESUBMISSION	SH	GXA	RD
P01	25.10.2024	Issued for PLANNING	SH	GXA	RD

LDE
CIVILS | STRUCTURES | HYDROLOGY
an RSK company

Abbey Park
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Client
BARRATT DAVID WILSON (SOUTHERN COUNTIES)

Project Title
NEW PLACE FARM
PULBOROUGH
WEST SUSSEX

Status
PLANNING

Drawing Title
SITE LAYOUT

Drawn	Date	Checked	Date	Approved	Date
GXA	08.24	GXA	08.24	RD	08.24

Scale	Orig Size	Dimensions
1:1,000	A1	m

Project No.: 890815
Drawing File: 890815-RSK-ZZ-XX-DR-C-8000 Site Layout.dwg

Drawing No.: 890815 RSK ZZ XX DR C 8000 P03
(Project | Orig. | Vol./Sys. | Lev./Loc. | Type | Role | Draw. No. | Rev.)

Scale
0 10 20 30 40 50m

File Location: Z:\890815 - NEW PLACE FARM, PULBOROUGH\GROUP\INFRASTRUCTURE\DRAWINGS\3- PLANNING\890815-RSK-ZZ-XX-DR-C-8000 SITE LAYOUT.DWG

APPENDIX E
ENVIRONMENT AGENCY CORRESPONDENCE

Response to your request

The Environment Agency's records indicate that the above site is located in Flood Zone 1 (land assessed as having less than 0.1% (1 in 1,000) chance of flooding in any given year from **rivers or the sea**). Therefore, the likelihood of flooding from rivers and sea in this area is estimated as 'very low'.

Proximity to Flood Zones 2 or 3

The above site is approximately 591 metres away from Flood Zone 3. We are therefore unable to provide data from our detailed fluvial or tidal models which is relevant to your site.

More information on Flood Zones can be found on the GOV.UK website:

http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/flood-zone-and-flood-risk-tables/table-1-flood-zones/

Surface water flooding

Our mapping indicates that this site is within 80m of surface water flooding.

For information on flooding from all other sources, such as surface water, please contact the Lead Local Flood Authority, which in this case is West Sussex County Council. A link to their information available online is shown below:

https://www.westsussex.gov.uk/fire-emergencies-and-crime/dealing-with-extreme-weather/dealing-with-flooding/flood-risk-management/local-flood-risk-management-strategy/

Please note that the above is a link to an external website which the Environment Agency does not control or maintain. Therefore, the link may not be the most up-to-date at the date of this letter. If the link does not work, and you are unable to find the information about surface water flooding on the relevant website, please contact the authority named above directly.

Where you can find further information

- Detailed long-term flood information and maps can be found on the GOV.UK website:

  https://flood-warning-information.service.gov.uk/long-term-flood-risk/

- Flood maps for planning can be found on the GOV.UK website:

  https://flood-map-for-planning.service.gov.uk/

- Please be aware that in February 2016 the Environment Agency updated its guidance on climate change allowances. The standard allowance of adding 20% to peak flows – as per previous guidance in the National Planning Policy Framework, may not be applicable for the purposes of informing development proposals. It is possible that our current modelling has under estimated flood risk when taking climate change into consideration. This does not however have an effect on Flood Zones 2 or 3. For further information please visit:

  https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

- Further details about the Environment Agency information supplied can be found on the GOV.UK website:

  https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

- If you have requested this information to help inform a development proposal, then you should note the information on GOV.UK on the use of Environment Agency information for Flood Risk Assessments:

  https://www.gov.uk/planning-applications-assessing-flood-risk

  https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

If you have any queries or would like to discuss the content of this letter further please call us on 03708 506 506, or reply to the email sent to you with this letter attached.

Please get in touch if you have any further queries or contact us within two (2) months if you would like us to review the information we have sent.

For information on what you can expect from us and our full service commitment to you, please click on this link:

https://www.gov.uk/government/publications/environment-agency-customer-service-commitment--2/environment-agency-customer-service-commitment

Yours sincerely,

Customers & Engagement Team, Environmental Planning and Engagement, Solent and South Downs Area
Environment Agency, Guildbourne House, Chatsworth Road, Worthing, West Sussex, BN11 1LD

SSDEnquiries@environment-agency.gov.uk

National Contact Call Centre 03708 506506

Risk of Flooding from Surface Water, Created 3/2/2021

Environment Agency

Legend

- Statutory Main Rivers
- Flood Extent 1 in 1000



1: 5,000

0 125

Metres

N W E S

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APPENDIX F
LLFA CORRESPONDENCE

Further to my recent email. Below is a link to our current Surface Water Policy which should answer your questions re. requirements for surface water drainage and SuDS schemes and what climate change allowances you require etc.

https://www.westsussex.gov.uk/media/12230/ws_llfa_policy_for_management_of_surface_water.pdf

Regards,

Kevin Macknay
Flood Risk Management – Team Leader
Highways, Transport and Planning
Place Services
West Sussex County Council

CALL IM EMAIL
Location: Western Area Office, Drayton Lane, Nr. Chichester, West Sussex. PO20 2AJ.
Contact: Internal: 26429 | **External:** +44 (0)330 222 6429 | **Mobile:** +44 (0)7540 641819
E-mail: kevin.macknay@westsussex.gov.uk

Report a problem with a road or pavement or raise a highways related enquiry

Follow us at @WSHighways

APPENDIX G
GREENFIELD RUNOFF CALCULATIONS

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.470
Area (ha)	1.000	Urban	0.000
SAAR (mm)	852	Region Number	Region 7

Results	**l/s**
QBAR Rural	6.1
QBAR Urban	6.1
Q100 years	19.4
Q1 year	5.2
Q30 years	13.8
Q100 years	19.4

APPENDIX H
SURFACE WATER DRAINAGE CALCULATIONS

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	30	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	5.000
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	999.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
2	0.063	5.00	45.100	1200	505876.700	119266.258	1.500
3	0.000		43.000	1200	505821.069	119264.749	1.425
basin b	0.000		43.000		505804.787	119255.274	2.000
5	0.117	5.00	42.136	1200	505797.314	119235.979	1.581
6	0.097	5.00	42.008	1350	505810.127	119222.001	2.208
15	0.091	5.00	43.790	1200	505876.413	119216.709	1.425
17	0.070	5.00	43.223	1200	505876.274	119192.802	1.500
16	0.000		43.473	1200	505876.200	119203.479	1.930
7	0.105	5.00	41.623	1500	505818.124	119204.022	2.548
8	0.131	5.00	40.909	1500	505817.984	119158.342	3.184
9	0.077	5.00	39.512	1500	505782.161	119158.385	2.212
18	0.089	5.00	41.488	1200	505854.114	119126.026	1.588
19	0.071	5.00	40.808	1200	505820.858	119126.268	2.308
20	0.050	5.00	40.149	1200	505820.221	119105.449	2.349
23	0.149	5.00	39.400	1350	505812.236	119076.028	1.950
21	0.000		38.950	1200	505803.833	119100.425	1.870
basin	0.000		38.900		505781.158	119140.144	2.200
FCC	0.000		38.900	1800	505765.828	119123.658	2.250
OUTFALL	0.000		38.500	1800	505744.646	119124.699	1.900

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)
1.001	2	3	55.651	0.600	43.600	41.575	2.025	27.5	225	5.37	149.2
1.002	3	basin b	18.838	0.600	41.575	41.000	0.575	32.8	225	5.51	149.5
1.003	basin b	5	20.827	0.600	41.000	40.630	0.370	56.3	300	5.67	146.1
1.004	5	6	12.079	0.600	40.555	39.800	0.755	16.0	300	5.72	145.5
1.005	6	7	24.796	0.600	39.800	39.150	0.650	38.1	300	5.89	142.8
4.000	15	16	13.232	0.600	42.365	41.618	0.747	17.7	225	5.07	153.4
5.000	17	16	10.677	0.600	41.723	41.543	0.180	59.3	300	5.09	153.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.001	2.505	99.6	34.0	1.275	1.200	0.063	0.0	90	2.269
1.002	2.293	91.2	34.0	1.200	1.775	0.063	0.0	95	2.134
1.003	2.099	148.4	33.3	1.700	1.206	0.063	0.0	96	1.706
1.004	3.949	279.2	94.7	1.281	1.908	0.180	0.0	120	3.577
1.005	2.553	180.5	143.0	1.908	2.173	0.277	0.0	202	2.820
4.000	3.123	124.2	50.4	1.200	1.630	0.091	0.0	100	2.966
5.000	2.045	144.5	38.7	1.200	1.630	0.070	0.0	106	1.742

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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	16	7	58.079	0.600	41.543	39.150	2.393	24.3	300	5.39	149.3
1.006	7	8	39.085	0.600	39.075	38.000	1.075	36.4	375	6.10	138.0
1.007	8	9	35.823	0.600	37.725	37.300	0.425	84.3	525	6.35	136.9
1.008	9	basin	18.269	0.600	37.300	37.000	0.300	60.9	525	6.45	136.4
6.000	18	19	33.257	0.600	39.900	38.500	1.400	23.8	300	5.17	151.1
6.001	19	20	20.829	0.600	38.500	37.950	0.550	37.9	300	5.31	149.7
6.002	20	21	17.141	0.600	37.800	37.218	0.582	29.5	450	5.38	148.8
7.001	23	21	25.804	0.600	37.450	37.305	0.145	178.0	300	5.37	146.3
6.003	21	basin	45.736	0.600	37.080	36.720	0.360	127.0	525	5.77	139.4
6.004	basin	FCC	22.512	0.600	36.700	36.650	0.050	450.2	975	6.70	133.5
1.010	FCC	OUTFALL	21.208	0.600	36.650	36.600	0.050	424.2	825	6.94	130.5

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	3.204	226.5	86.9	1.630	2.173	0.161	0.0	129	2.999
1.006	3.013	332.8	270.8	2.173	2.534	0.543	0.0	258	3.341
1.007	2.441	528.3	333.5	2.659	1.687	0.674	0.0	303	2.574
1.008	2.874	622.1	370.2	1.687	1.375	0.751	0.0	292	2.991
6.000	3.239	228.9	48.6	1.288	2.008	0.089	0.0	93	2.591
6.001	2.562	181.1	86.6	2.008	1.899	0.160	0.0	146	2.536
6.002	3.757	597.5	112.9	1.899	1.282	0.210	0.0	131	2.913
7.001	1.175	83.1	78.8	1.650	1.345	0.149	0.0	234	1.330
6.003	1.986	429.8	180.9	1.345	1.655	0.359	0.0	237	1.903
6.004	1.545	1153.3	535.5	1.225	1.275	1.110	0.0	467	1.518
1.010	1.435	767.0	523.5	1.425	1.075	1.110	0.0	502	1.538

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)
1.001	55.651	27.5	225	Circular_Default Sewer Type	45.100	43.600	1.275	43.000	41.575	1.200
1.002	18.838	32.8	225	Circular_Default Sewer Type	43.000	41.575	1.200	43.000	41.000	1.775
1.003	20.827	56.3	300	Circular_Default Sewer Type	43.000	41.000	1.700	42.136	40.630	1.206
1.004	12.079	16.0	300	Circular_Default Sewer Type	42.136	40.555	1.281	42.008	39.800	1.908
1.005	24.796	38.1	300	Circular_Default Sewer Type	42.008	39.800	1.908	41.623	39.150	2.173
4.000	13.232	17.7	225	Circular_Default Sewer Type	43.790	42.365	1.200	43.473	41.618	1.630
5.000	10.677	59.3	300	Circular_Default Sewer Type	43.223	41.723	1.200	43.473	41.543	1.630
4.001	58.079	24.3	300	Circular_Default Sewer Type	43.473	41.543	1.630	41.623	39.150	2.173
1.006	39.085	36.4	375	Circular_Default Sewer Type	41.623	39.075	2.173	40.909	38.000	2.534

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.001	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
1.002	3	1200	Manhole	Adoptable	basin b		Junction	
1.003	basin b		Junction		5	1200	Manhole	Adoptable
1.004	5	1200	Manhole	Adoptable	6	1350	Manhole	Adoptable
1.005	6	1350	Manhole	Adoptable	7	1500	Manhole	Adoptable
4.000	15	1200	Manhole	Adoptable	16	1200	Manhole	Adoptable
5.000	17	1200	Manhole	Adoptable	16	1200	Manhole	Adoptable
4.001	16	1200	Manhole	Adoptable	7	1500	Manhole	Adoptable
1.006	7	1500	Manhole	Adoptable	8	1500	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)
1.007	35.823	84.3	525	Circular_Default Sewer Type	40.909	37.725	2.659	39.512	37.300	1.687
1.008	18.269	60.9	525	Circular_Default Sewer Type	39.512	37.300	1.687	38.900	37.000	1.375
6.000	33.257	23.8	300	Circular_Default Sewer Type	41.488	39.900	1.288	40.808	38.500	2.008
6.001	20.829	37.9	300	Circular_Default Sewer Type	40.808	38.500	2.008	40.149	37.950	1.899
6.002	17.141	29.5	450	Circular_Default Sewer Type	40.149	37.800	1.899	38.950	37.218	1.282
7.001	25.804	178.0	300	Circular_Default Sewer Type	39.400	37.450	1.650	38.950	37.305	1.345
6.003	45.736	127.0	525	Circular_Default Sewer Type	38.950	37.080	1.345	38.900	36.720	1.655
6.004	22.512	450.2	975	Circular_Default Sewer Type	38.900	36.700	1.225	38.900	36.650	1.275
1.010	21.208	424.2	825	Circular_Default Sewer Type	38.900	36.650	1.425	38.500	36.600	1.075

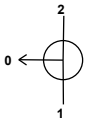
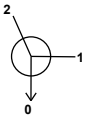
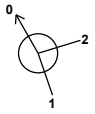
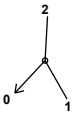
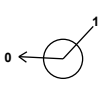
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.007	8	1500	Manhole	Adoptable	9	1500	Manhole	Adoptable
1.008	9	1500	Manhole	Adoptable	basin		Junction	
6.000	18	1200	Manhole	Adoptable	19	1200	Manhole	Adoptable
6.001	19	1200	Manhole	Adoptable	20	1200	Manhole	Adoptable
6.002	20	1200	Manhole	Adoptable	21	1200	Manhole	Adoptable
7.001	23	1350	Manhole	Adoptable	21	1200	Manhole	Adoptable
6.003	21	1200	Manhole	Adoptable	basin		Junction	
6.004	basin		Junction		FCC	1800	Manhole	Adoptable
1.010	FCC	1800	Manhole	Adoptable	OUTFALL	1800	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
2	505876.700	119266.258	45.100	1.500	1200				
						0	1.001	43.600	225
3	505821.069	119264.749	43.000	1.425	1200	1	1.001	41.575	225
									
						0	1.002	41.575	225
basin b	505804.787	119255.274	43.000	2.000		1	1.002	41.000	225
									
						0	1.003	41.000	300
5	505797.314	119235.979	42.136	1.581	1200	1	1.003	40.630	300
									
						0	1.004	40.555	300
6	505810.127	119222.001	42.008	2.208	1350	1	1.004	39.800	300
									
						0	1.005	39.800	300
15	505876.413	119216.709	43.790	1.425	1200				
						0	4.000	42.365	225

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
17	505876.274	119192.802	43.223	1.500	1200		0	5.000	41.723	300
16	505876.200	119203.479	43.473	1.930	1200		1 2 0	5.000 4.000 4.001	41.543 41.618 41.543	300 225 300
7	505818.124	119204.022	41.623	2.548	1500		1 2 0	4.001 1.005 1.006	39.150 39.150 39.075	300 300 375
8	505817.984	119158.342	40.909	3.184	1500		1 0	1.006 1.007	38.000 37.725	375 525
9	505782.161	119158.385	39.512	2.212	1500		1 0	1.007 1.008	37.300 37.300	525 525
18	505854.114	119126.026	41.488	1.588	1200		0	6.000	39.900	300
19	505820.858	119126.268	40.808	2.308	1200		1 0	6.000 6.001	38.500 38.500	300 300
20	505820.221	119105.449	40.149	2.349	1200		1 0	6.001 6.002	37.950 37.800	300 450
23	505812.236	119076.028	39.400	1.950	1350		0	7.001	37.450	300
21	505803.833	119100.425	38.950	1.870	1200		1 2 0	7.001 6.002 6.003	37.305 37.218 37.080	300 450 525
basin	505781.158	119140.144	38.900	2.200			1 2 0	6.003 1.008 6.004	36.720 37.000 36.700	525 525 975
FCC	505765.828	119123.658	38.900	2.250	1800		1 0	6.004 1.010	36.650 36.650	975 825
OUTFALL	505744.646	119124.699	38.500	1.900	1800		1	1.010	36.600	825

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Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	✓	Check Discharge Rate(s)	✓
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	✓
Winter CV	1.000	Additional Storage (m³/ha)	0.0	100 year 360 minute (m³)	

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

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

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)		Betterment (%)	0
SAAR (mm)		QBar	
Soil Index	1	Q 1 year (l/s)	
SPR	0.10	Q 30 year (l/s)	
Region	1	Q 100 year (l/s)	
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)		Storm Duration (mins)	360
Soil Index	1	Betterment (%)	0
SPR	0.10	PR	
CWI		Runoff Volume (m³)	

Node FCC Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	36.650	Product Number	CTL-SHE-0092-4900-1900-4900
Design Depth (m)	1.900	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	4.9	Min Node Diameter (mm)	1200

Node basin Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	36.700
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	187.0	0.0	2.200	1220.0	0.0

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Node basin b Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	41.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	49.7	0.0	2.000	154.5	0.0

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.62%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	2	10	43.654	0.054	12.6	0.0606	0.0000	OK
15 minute summer	3	10	41.636	0.061	12.5	0.0694	0.0000	OK
30 minute summer	basin b	20	41.049	0.049	11.4	2.5125	0.0000	OK
15 minute summer	5	11	40.619	0.064	28.1	0.0723	0.0000	OK
15 minute summer	6	11	39.909	0.109	46.6	0.1559	0.0000	OK
15 minute summer	15	10	42.426	0.061	18.1	0.0687	0.0000	OK
15 minute summer	17	10	41.788	0.065	14.0	0.0740	0.0000	OK
15 minute summer	16	10	41.619	0.076	31.9	0.0863	0.0000	OK
15 minute summer	7	11	39.220	0.145	97.8	0.2562	0.0000	OK
15 minute summer	8	11	37.905	0.180	123.1	0.3189	0.0000	OK
15 minute summer	9	11	37.475	0.175	138.2	0.3100	0.0000	OK
15 minute summer	18	10	39.956	0.056	17.7	0.0633	0.0000	OK
15 minute summer	19	10	38.588	0.088	31.8	0.1000	0.0000	OK
15 minute summer	20	10	37.884	0.084	41.4	0.0948	0.0000	OK
15 minute summer	23	10	37.578	0.128	29.7	0.1838	0.0000	OK
480 minute winter	21	464	37.396	0.316	10.5	0.3579	0.0000	OK
480 minute winter	basin	464	37.396	0.696	32.0	243.8415	0.0000	OK
480 minute winter	FCC	456	37.396	0.746	5.1	1.8984	0.0000	OK
15 minute summer	OUTFALL	1	36.600	0.000	4.2	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)
15 minute summer	2	1.001	3	12.5	1.566	0.125	0.4447	
15 minute summer	3	1.002	basin b	12.5	2.148	0.138	0.1267	
30 minute summer	basin b	1.003	5	8.6	1.150	0.058	0.1551	
15 minute summer	5	1.004	6	28.1	1.677	0.101	0.2055	
15 minute summer	6	1.005	7	46.5	2.093	0.258	0.5515	
15 minute summer	15	4.000	16	18.0	2.164	0.145	0.1102	
15 minute summer	17	5.000	16	13.9	1.099	0.096	0.1356	
15 minute summer	16	4.001	7	31.3	2.259	0.138	0.8068	
15 minute summer	7	1.006	8	98.2	2.587	0.295	1.4848	
15 minute summer	8	1.007	9	123.7	1.921	0.234	2.3067	
15 minute summer	9	1.008	basin	138.9	2.289	0.223	1.1084	
15 minute summer	18	6.000	19	17.6	1.352	0.077	0.4385	
15 minute summer	19	6.001	20	31.4	1.880	0.173	0.3477	
15 minute summer	20	6.002	21	41.1	2.111	0.069	0.3340	
15 minute summer	23	7.001	21	29.2	1.056	0.352	0.7157	
480 minute winter	21	6.003	basin	10.4	0.512	0.024	8.0499	
480 minute winter	basin	6.004	FCC	5.1	0.173	0.004	13.2789	
480 minute winter	FCC	Hydro-Brake®	OUTFALL	4.2				152.7

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.62%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	2	10	43.690	0.090	33.8	0.1013	0.0000	OK
15 minute summer	3	10	41.675	0.100	33.5	0.1130	0.0000	OK
15 minute summer	basin b	12	41.091	0.091	33.5	4.7173	0.0000	OK
15 minute summer	5	11	40.670	0.115	85.2	0.1306	0.0000	OK
15 minute summer	6	11	40.012	0.212	134.8	0.3041	0.0000	OK
15 minute summer	15	10	42.472	0.107	48.9	0.1211	0.0000	OK
15 minute summer	17	10	41.838	0.115	37.6	0.1300	0.0000	OK
15 minute summer	16	10	41.670	0.127	86.1	0.1433	0.0000	OK
15 minute summer	7	11	39.360	0.285	273.9	0.5029	0.0000	OK
15 minute summer	8	11	38.064	0.339	341.1	0.5984	0.0000	OK
720 minute winter	9	705	37.955	0.655	32.8	1.1571	0.0000	SURCHARGED
15 minute summer	18	10	39.992	0.092	47.8	0.1043	0.0000	OK
15 minute summer	19	10	38.657	0.157	85.7	0.1780	0.0000	OK
720 minute winter	20	705	37.955	0.155	8.9	0.1751	0.0000	OK
720 minute winter	23	705	37.955	0.505	6.3	0.7224	0.0000	SURCHARGED
720 minute winter	21	705	37.955	0.875	19.8	0.9894	0.0000	SURCHARGED
720 minute winter	basin	705	37.955	1.255	117.6	604.3177	0.0000	SURCHARGED
720 minute winter	FCC	705	37.955	1.305	5.5	3.3208	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	36.600	0.000	4.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	2	1.001	3	33.5	2.116	0.337	0.8825	
15 minute summer	3	1.002	basin b	33.5	2.469	0.367	0.2863	
15 minute summer	basin b	1.003	5	28.3	1.611	0.191	0.3656	
15 minute summer	5	1.004	6	85.2	2.182	0.305	0.4731	
15 minute summer	6	1.005	7	134.9	2.583	0.747	1.3134	
15 minute summer	15	4.000	16	48.7	2.778	0.392	0.2319	
15 minute summer	17	5.000	16	37.5	1.411	0.259	0.2836	
15 minute summer	16	4.001	7	85.5	2.360	0.378	2.3321	
15 minute summer	7	1.006	8	274.1	3.234	0.824	3.3087	
15 minute summer	8	1.007	9	342.8	2.399	0.649	5.1190	
720 minute winter	9	1.008	basin	98.8	1.246	0.159	3.9467	
15 minute summer	18	6.000	19	47.6	1.718	0.208	0.9271	
15 minute summer	19	6.001	20	84.8	2.405	0.468	0.7342	
720 minute winter	20	6.002	21	8.9	1.253	0.015	1.7715	
720 minute winter	23	7.001	21	11.3	0.674	0.136	1.8171	
720 minute winter	21	6.003	basin	18.8	0.542	0.044	9.8805	
720 minute winter	basin	6.004	FCC	5.5	0.168	0.005	16.7601	
720 minute winter	FCC	Hydro-Brake®	OUTFALL	4.2				215.1

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Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 99.62%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	2	10	43.711	0.111	49.0	0.1254	0.0000	OK
15 minute summer	3	10	41.698	0.123	48.6	0.1394	0.0000	OK
15 minute summer	basin b	12	41.115	0.115	48.4	6.0671	0.0000	OK
15 minute summer	5	11	41.092	0.537	128.8	0.6070	0.0000	SURCHARGED
15 minute summer	6	11	40.877	1.077	191.4	1.5408	0.0000	SURCHARGED
15 minute summer	15	10	42.502	0.137	70.8	0.1544	0.0000	OK
15 minute summer	17	10	41.868	0.145	54.5	0.1642	0.0000	OK
15 minute summer	16	10	41.700	0.157	124.8	0.1775	0.0000	OK
15 minute summer	7	11	39.990	0.915	382.0	1.6163	0.0000	SURCHARGED
720 minute winter	8	720	38.348	0.623	41.6	1.1014	0.0000	SURCHARGED
720 minute winter	9	720	38.348	1.048	70.7	1.8525	0.0000	SURCHARGED
15 minute summer	18	10	40.012	0.112	69.3	0.1267	0.0000	OK
15 minute summer	19	10	38.703	0.203	124.3	0.2298	0.0000	OK
720 minute winter	20	705	38.348	0.548	13.0	0.6198	0.0000	SURCHARGED
720 minute winter	23	720	38.351	0.901	9.2	1.2891	0.0000	SURCHARGED
720 minute winter	21	705	38.349	1.269	22.1	1.4352	0.0000	SURCHARGED
720 minute winter	basin	720	38.348	1.648	149.1	946.1688	0.0000	SURCHARGED
720 minute winter	FCC	720	38.348	1.698	5.8	4.3224	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	36.600	0.000	4.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	2	1.001	3	48.6	2.329	0.488	1.1609	
15 minute summer	3	1.002	basin b	48.4	2.603	0.531	0.3814	
15 minute summer	basin b	1.003	5	47.2	1.794	0.318	0.9923	
15 minute summer	5	1.004	6	123.1	2.242	0.441	0.8506	
15 minute summer	6	1.005	7	185.0	2.628	1.025	1.7461	
15 minute summer	15	4.000	16	70.5	3.008	0.568	0.3101	
15 minute summer	17	5.000	16	54.3	1.528	0.376	0.3794	
15 minute summer	16	4.001	7	124.1	2.392	0.548	3.1279	
15 minute summer	7	1.006	8	373.5	3.386	1.122	4.3102	
720 minute winter	8	1.007	9	41.6	1.321	0.079	7.7389	
720 minute winter	9	1.008	basin	126.4	1.206	0.203	3.9467	
15 minute summer	18	6.000	19	69.0	1.841	0.302	1.2435	
15 minute summer	19	6.001	20	122.9	2.596	0.679	0.9860	
720 minute winter	20	6.002	21	13.0	1.255	0.022	2.7159	
720 minute winter	23	7.001	21	9.5	0.690	0.114	1.8171	
720 minute winter	21	6.003	basin	22.6	0.581	0.053	9.8805	
720 minute winter	basin	6.004	FCC	5.8	0.166	0.005	16.7601	
720 minute winter	FCC	Hydro-Brake®	OUTFALL	4.7				236.0

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.62%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	2	10	43.728	0.128	61.5	0.1447	0.0000	OK
15 minute summer	3	10	41.715	0.140	61.0	0.1588	0.0000	OK
15 minute summer	basin b	13	41.307	0.307	103.7	17.7064	0.0000	SURCHARGED
15 minute summer	5	12	41.278	0.723	158.4	0.8173	0.0000	SURCHARGED
15 minute summer	6	11	41.156	1.356	192.2	1.9402	0.0000	SURCHARGED
15 minute summer	15	10	42.527	0.162	88.9	0.1835	0.0000	OK
15 minute summer	17	10	41.897	0.174	68.4	0.1969	0.0000	OK
15 minute summer	16	11	41.755	0.212	156.5	0.2399	0.0000	OK
15 minute summer	7	11	40.422	1.347	425.6	2.3801	0.0000	SURCHARGED
960 minute winter	8	945	38.614	0.889	40.3	1.5717	0.0000	SURCHARGED
960 minute winter	9	945	38.614	1.314	71.1	2.3227	0.0000	SURCHARGED
15 minute summer	18	10	40.027	0.127	86.9	0.1435	0.0000	OK
15 minute summer	19	10	38.747	0.247	156.0	0.2792	0.0000	OK
960 minute winter	20	960	38.615	0.815	12.6	0.9218	0.0000	SURCHARGED
960 minute winter	23	945	38.615	1.165	8.9	1.6666	0.0000	SURCHARGED
960 minute winter	21	960	38.614	1.534	21.0	1.7347	0.0000	SURCHARGED
960 minute winter	basin	945	38.614	1.914	85.1	1218.4900	0.0000	FLOOD RISK
960 minute winter	FCC	945	38.614	1.964	5.0	4.9996	0.0000	FLOOD RISK
15 minute summer	OUTFALL	1	36.600	0.000	4.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	2	1.001	3	61.0	2.506	0.612	1.3730	
15 minute summer	3	1.002	basin b	61.9	2.694	0.679	0.6040	
15 minute summer	basin b	1.003	5	123.9	2.180	0.835	1.4666	
15 minute summer	5	1.004	6	163.6	2.324	0.586	0.8506	
15 minute summer	6	1.005	7	197.3	2.801	1.093	1.7461	
15 minute summer	15	4.000	16	88.6	3.131	0.713	0.3738	
15 minute summer	17	5.000	16	67.9	1.581	0.470	0.5067	
15 minute summer	16	4.001	7	152.5	2.393	0.673	3.5917	
15 minute summer	7	1.006	8	419.6	3.805	1.261	4.3047	
960 minute winter	8	1.007	9	39.5	1.269	0.075	7.7389	
960 minute winter	9	1.008	basin	69.0	1.100	0.111	3.9467	
15 minute summer	18	6.000	19	86.7	1.901	0.379	1.5026	
15 minute summer	19	6.001	20	154.0	2.686	0.850	1.1938	
960 minute winter	20	6.002	21	12.2	1.174	0.021	2.7159	
960 minute winter	23	7.001	21	9.5	0.641	0.114	1.8171	
960 minute winter	21	6.003	basin	20.8	0.564	0.048	9.8805	
960 minute winter	basin	6.004	FCC	5.0	0.170	0.004	16.7601	
960 minute winter	FCC	Hydro-Brake®	OUTFALL	5.0				309.0

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Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	30	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	5.000
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	999.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
18	0.083	5.00	45.971	1200	505696.946	119378.733	1.500
19	0.027	5.00	44.453	1200	505696.267	119351.844	1.528
1	0.046	5.00	43.458	1200	505695.094	119334.349	1.575
20	0.050	5.00	44.700	1200	505675.358	119379.943	1.700
2	0.000		43.400	1350	505682.327	119334.278	1.700
2A	0.000		41.980	1350	505677.573	119309.260	1.780
3	0.052	5.00	41.672	1350	505674.904	119295.206	1.922
21	0.204	5.00	44.562	1200	505619.936	119377.895	1.577
22	0.059	5.00	42.629	1200	505620.451	119334.165	1.629
4	0.191	5.00	41.393	1500	505617.978	119303.748	2.293
5	0.237	5.00	40.862	1800	505553.972	119310.749	2.862
6	0.087	5.00	40.015	1800	505522.801	119308.351	2.515
7	0.097	5.00	39.082	1800	505492.792	119305.024	2.032
8	0.095	5.00	38.568	1800	505475.154	119304.798	2.028
9	0.000	5.00	37.470	1800	505474.384	119284.557	1.875
10	0.045	5.00	36.100	1800	505468.625	119265.091	1.875
11	0.000	5.00	35.200	1800	505468.690	119249.978	1.700
12	0.000	5.00	36.000	1800	505494.686	119250.220	2.935
13	0.000	5.00	35.400	1800	505499.188	119242.744	2.430
14	0.000	5.00	35.890	1875	505522.350	119243.609	3.155
Basin	0.000	5.00	32.500		505501.988	119190.045	1.550
FCC	0.000	5.00	32.500	1800	505518.120	119170.287	1.650
OUTFALL	0.000		31.982	1800	505535.198	119155.009	1.182

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	18	19	26.898	0.600	44.471	43.000	1.471	18.3	225	5.15	152.6
1.001	19	1	17.534	0.600	42.925	41.958	0.967	18.1	225	5.24	151.7
1.002	1	2	12.767	0.600	41.883	41.800	0.083	153.8	300	5.41	150.0
2.000	20	2	46.194	0.600	43.000	41.700	1.300	35.5	500	5.13	151.8
1.003	2	2A	25.466	0.600	41.700	40.200	1.500	17.0	500	5.46	145.9

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	3.074	122.2	45.8	1.275	1.228	0.083	0.0	95	2.860
1.001	3.087	122.7	60.3	1.303	1.275	0.110	0.0	111	3.072
1.002	1.265	89.4	84.6	1.275	1.300	0.156	0.0	233	1.431
2.000	5.932	5931.6	27.4	1.200	1.200	0.050	0.0	33	1.388
1.003	8.587	8587.4	108.6	1.200	1.280	0.206	0.0	58	2.771

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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)
1.004	2A	3	14.305	0.600	40.200	39.750	0.450	31.8	375	5.53	148.2
1.005	3	4	57.563	0.600	39.750	39.175	0.575	100.1	375	6.06	144.6
3.000	21	22	43.733	0.600	42.985	41.000	1.985	22.0	300	5.22	151.9
3.001	22	4	30.517	0.600	41.000	39.175	1.825	16.7	375	5.33	151.1
1.006	4	5	64.388	0.600	39.100	38.000	1.100	58.5	450	6.47	135.6
1.007	5	6	31.263	0.600	38.000	37.500	0.500	62.5	600	6.63	134.6
1.008	6	14	64.744	0.600	37.500	32.735	4.765	13.6	600	6.80	137.2
1.009	7	8	17.639	0.600	37.050	36.540	0.510	34.6	600	5.07	133.5
1.010	8	9	20.256	0.600	36.540	35.595	0.945	21.4	600	5.13	132.9
1.011	9	10	20.300	0.600	35.595	34.225	1.370	14.8	600	5.19	132.4
1.012	10	11	15.113	0.600	34.225	33.500	0.725	20.8	600	5.24	132.6
1.013	11	12	25.997	0.600	33.500	33.065	0.435	59.8	600	5.37	129.3
1.014	12	13	8.727	0.600	33.065	32.970	0.095	91.9	600	5.43	128.3
1.015	13	14	23.178	0.600	32.970	32.735	0.235	98.6	600	5.59	128.1
1.016	14	Basin	57.304	0.600	32.735	30.950	1.785	32.1	600	7.02	116.9
1.017	Basin	FCC	25.507	0.600	30.950	30.850	0.100	255.1	900	7.24	105.0
1.018	FCC	OUTFALL	22.915	0.600	30.850	30.800	0.050	458.3	825	7.51	103.5

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)
1.004	3.223	356.0	110.3	1.405	1.547	0.206	0.0	143	2.859
1.005	1.811	200.0	134.8	1.547	1.843	0.258	0.0	226	1.937
3.000	3.364	237.8	112.0	1.277	1.329	0.204	0.0	145	3.317
3.001	4.449	491.4	143.6	1.254	1.843	0.263	0.0	138	3.878
1.006	2.661	423.2	348.9	1.843	2.412	0.712	0.0	313	2.957
1.007	3.083	871.6	461.6	2.262	1.915	0.949	0.0	311	3.126
1.008	6.628	1874.0	513.7	1.915	2.555	1.036	0.0	214	5.694
1.009	4.149	1173.2	46.8	1.432	1.428	0.097	0.0	81	2.077
1.010	5.274	1491.3	92.2	1.428	1.275	0.192	0.0	99	2.989
1.011	6.346	1794.4	91.9	1.275	1.275	0.192	0.0	91	3.408
1.012	5.349	1512.3	113.6	1.275	1.100	0.237	0.0	110	3.214
1.013	3.153	891.6	110.7	1.100	2.335	0.237	0.0	142	2.184
1.014	2.541	718.5	109.9	2.335	1.830	0.237	0.0	157	1.863
1.015	2.452	693.2	109.7	1.830	2.555	0.237	0.0	160	1.812
1.016	4.307	1217.9	537.8	2.555	0.950	1.273	0.0	279	4.179
1.017	1.957	1244.9	483.1	0.650	0.750	1.273	0.0	388	1.839
1.018	1.380	737.7	476.2	0.825	0.357	1.273	0.0	484	1.462

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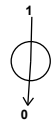
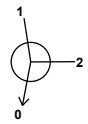
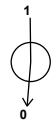
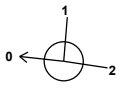
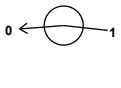
Pipeline Schedule

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	26.898	18.3	225	Circular_Default Sewer Type	45.971	44.471	1.275	44.453	43.000	1.228
1.001	17.534	18.1	225	Circular_Default Sewer Type	44.453	42.925	1.303	43.458	41.958	1.275
1.002	12.767	153.8	300	Circular_Default Sewer Type	43.458	41.883	1.275	43.400	41.800	1.300
2.000	46.194	35.5	500	SWALE	44.700	43.000	1.200	43.400	41.700	1.200
1.003	25.466	17.0	500	SWALE	43.400	41.700	1.200	41.980	40.200	1.280
1.004	14.305	31.8	375	Circular_Default Sewer Type	41.980	40.200	1.405	41.672	39.750	1.547
1.005	57.563	100.1	375	Circular_Default Sewer Type	41.672	39.750	1.547	41.393	39.175	1.843
3.000	43.733	22.0	300	Circular_Default Sewer Type	44.562	42.985	1.277	42.629	41.000	1.329
3.001	30.517	16.7	375	Circular_Default Sewer Type	42.629	41.000	1.254	41.393	39.175	1.843
1.006	64.388	58.5	450	Circular_Default Sewer Type	41.393	39.100	1.843	40.862	38.000	2.412
1.007	31.263	62.5	600	Circular_Default Sewer Type	40.862	38.000	2.262	40.015	37.500	1.915
1.008	64.744	13.6	600	Circular_Default Sewer Type	40.015	37.500	1.915	35.890	32.735	2.555
1.009	17.639	34.6	600	Circular_Default Sewer Type	39.082	37.050	1.432	38.568	36.540	1.428
1.010	20.256	21.4	600	Circular_Default Sewer Type	38.568	36.540	1.428	37.470	35.595	1.275
1.011	20.300	14.8	600	Circular_Default Sewer Type	37.470	35.595	1.275	36.100	34.225	1.275
1.012	15.113	20.8	600	Circular_Default Sewer Type	36.100	34.225	1.275	35.200	33.500	1.100
1.013	25.997	59.8	600	Circular_Default Sewer Type	35.200	33.500	1.100	36.000	33.065	2.335
1.014	8.727	91.9	600	Circular_Default Sewer Type	36.000	33.065	2.335	35.400	32.970	1.830
1.015	23.178	98.6	600	Circular_Default Sewer Type	35.400	32.970	1.830	35.890	32.735	2.555
1.016	57.304	32.1	600	Circular_Default Sewer Type	35.890	32.735	2.555	32.500	30.950	0.950
1.017	25.507	255.1	900	Circular_Default Sewer Type	32.500	30.950	0.650	32.500	30.850	0.750
1.018	22.915	458.3	825	Circular_Default Sewer Type	32.500	30.850	0.825	31.982	30.800	0.357

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	18	1200	Manhole	Adoptable	19	1200	Manhole	Adoptable
1.001	19	1200	Manhole	Adoptable	1	1200	Manhole	Adoptable
1.002	1	1200	Manhole	Adoptable	2	1350	Manhole	Adoptable
2.000	20	1200	Manhole	Adoptable	2	1350	Manhole	Adoptable
1.003	2	1350	Manhole	Adoptable	2A	1350	Manhole	Adoptable
1.004	2A	1350	Manhole	Adoptable	3	1350	Manhole	Adoptable
1.005	3	1350	Manhole	Adoptable	4	1500	Manhole	Adoptable
3.000	21	1200	Manhole	Adoptable	22	1200	Manhole	Adoptable
3.001	22	1200	Manhole	Adoptable	4	1500	Manhole	Adoptable
1.006	4	1500	Manhole	Adoptable	5	1800	Manhole	Adoptable
1.007	5	1800	Manhole	Adoptable	6	1800	Manhole	Adoptable
1.008	6	1800	Manhole	Adoptable	14	1875	Manhole	Adoptable
1.009	7	1800	Manhole	Adoptable	8	1800	Manhole	Adoptable
1.010	8	1800	Manhole	Adoptable	9	1800	Manhole	Adoptable
1.011	9	1800	Manhole	Adoptable	10	1800	Manhole	Adoptable
1.012	10	1800	Manhole	Adoptable	11	1800	Manhole	Adoptable
1.013	11	1800	Manhole	Adoptable	12	1800	Manhole	Adoptable
1.014	12	1800	Manhole	Adoptable	13	1800	Manhole	Adoptable
1.015	13	1800	Manhole	Adoptable	14	1875	Manhole	Adoptable
1.016	14	1875	Manhole	Adoptable	Basin		Junction	
1.017	Basin		Junction		FCC	1800	Manhole	Adoptable
1.018	FCC	1800	Manhole	Adoptable	OUTFALL	1800	Manhole	Adoptable

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
18	505696.946	119378.733	45.971	1.500	1200		0	1.000	44.471	225
19	505696.267	119351.844	44.453	1.528	1200		1 0	1.000 1.001	43.000 42.925	225 225
1	505695.094	119334.349	43.458	1.575	1200		1 0	1.001 1.002	41.958 41.883	225 300
20	505675.358	119379.943	44.700	1.700	1200		0	2.000	43.000	500
2	505682.327	119334.278	43.400	1.700	1350		1 2 0	2.000 1.002 1.003	41.700 41.800 41.700	500 300 500
2A	505677.573	119309.260	41.980	1.780	1350		1 0	1.003 1.004	40.200 40.200	500 375
3	505674.904	119295.206	41.672	1.922	1350		1 0	1.004 1.005	39.750 39.750	375 375
21	505619.936	119377.895	44.562	1.577	1200		0	3.000	42.985	300
22	505620.451	119334.165	42.629	1.629	1200		1 0	3.000 3.001	41.000 41.000	300 375
4	505617.978	119303.748	41.393	2.293	1500		1 2 0	3.001 1.005 1.006	39.175 39.175 39.100	375 375 450
5	505553.972	119310.749	40.862	2.862	1800		1 0	1.006 1.007	38.000 38.000	450 600
6	505522.801	119308.351	40.015	2.515	1800		1 0	1.007 1.008	37.500 37.500	600 600
7	505492.792	119305.024	39.082	2.032	1800		0	1.009	37.050	600

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
8	505475.154	119304.798	38.568	2.028	1800	1	1.009	36.540	600
						0	1.010	36.540	600
9	505474.384	119284.557	37.470	1.875	1800	1	1.010	35.595	600
						0	1.011	35.595	600
10	505468.625	119265.091	36.100	1.875	1800	1	1.011	34.225	600
						0	1.012	34.225	600
11	505468.690	119249.978	35.200	1.700	1800	1	1.012	33.500	600
						0	1.013	33.500	600
12	505494.686	119250.220	36.000	2.935	1800	1	1.013	33.065	600
						0	1.014	33.065	600
13	505499.188	119242.744	35.400	2.430	1800	1	1.014	32.970	600
						0	1.015	32.970	600
14	505522.350	119243.609	35.890	3.155	1875	1	1.015	32.735	600
						2	1.008	32.735	600
						0	1.016	32.735	600
Basin	505501.988	119190.045	32.500	1.550		1	1.016	30.950	600
						0	1.017	30.950	900
FCC	505518.120	119170.287	32.500	1.650	1800	1	1.017	30.850	900
						0	1.018	30.850	825
OUTFALL	505535.198	119155.009	31.982	1.182	1800	1	1.018	30.800	825

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	✓	Check Discharge Rate(s)	✓
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	✓
Winter CV	1.000	Additional Storage (m³/ha)	0.0	100 year 360 minute (m³)	

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

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

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)		Betterment (%)	0
SAAR (mm)		QBar	
Soil Index	1	Q 1 year (l/s)	
SPR	0.10	Q 30 year (l/s)	
Region	1	Q 100 year (l/s)	
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)		Storm Duration (mins)	360
Soil Index	1	Betterment (%)	0
SPR	0.10	PR	
CWI		Runoff Volume (m^3)	

Node FCC Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	30.850	Product Number	CTL-SHE-0102-5200-1400-5200
Design Depth (m)	1.400	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.2	Min Node Diameter (mm)	1200

Node Basin Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00003	Safety Factor	2.0	Invert Level (m)	30.950
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)
0.000	828.0	828.0	1.550	1719.0	828.0

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	18	10	44.528	0.057	16.6	0.0645	0.0000	OK
15 minute summer	19	10	42.992	0.067	21.8	0.0755	0.0000	OK
15 minute summer	1	10	42.014	0.131	30.9	0.1479	0.0000	OK
15 minute summer	20	10	43.018	0.018	10.0	0.0205	0.0000	OK
15 minute summer	2	11	41.733	0.033	40.5	0.0474	0.0000	OK
15 minute summer	2A	11	40.285	0.085	40.3	0.1221	0.0000	OK
15 minute summer	3	11	39.880	0.130	50.6	0.1866	0.0000	OK
15 minute summer	21	10	43.071	0.086	40.7	0.0969	0.0000	OK
15 minute summer	22	10	41.081	0.081	52.2	0.0922	0.0000	OK
15 minute summer	4	11	39.276	0.176	136.9	0.3102	0.0000	OK
15 minute summer	5	11	38.208	0.207	182.6	0.5281	0.0000	OK
15 minute summer	6	11	37.630	0.130	199.8	0.3301	0.0000	OK
15 minute summer	7	10	37.103	0.053	19.3	0.1345	0.0000	OK
15 minute summer	8	10	36.609	0.069	38.1	0.1752	0.0000	OK
15 minute summer	9	10	35.654	0.059	37.9	0.1510	0.0000	OK
15 minute summer	10	10	34.297	0.072	46.7	0.1824	0.0000	OK
15 minute summer	11	10	33.593	0.093	46.4	0.2359	0.0000	OK
15 minute summer	12	11	33.179	0.114	46.5	0.2910	0.0000	OK
15 minute summer	13	11	33.074	0.104	46.8	0.2637	0.0000	OK
15 minute summer	14	11	32.948	0.213	246.6	0.5870	0.0000	OK
480 minute winter	Basin	464	31.272	0.322	50.2	296.8871	0.0000	OK
480 minute winter	FCC	440	31.286	0.436	25.4	1.1087	0.0000	OK
15 minute summer	OUTFALL	1	30.800	0.000	5.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	18	1.000	19	16.5	2.123	0.135	0.2084	
15 minute summer	19	1.001	1	21.7	2.276	0.177	0.1673	
15 minute summer	1	1.002	2	30.6	1.102	0.342	0.3553	
15 minute summer	20	2.000	2	9.9	0.668	0.002	0.6890	
15 minute summer	2	1.003	2A	40.3	1.010	0.005	1.0744	
15 minute summer	2A	1.004	3	40.7	1.562	0.114	0.3780	
15 minute summer	3	1.005	4	50.0	1.505	0.250	1.9148	
15 minute summer	21	3.000	22	40.4	2.524	0.170	0.7003	
15 minute summer	22	3.001	4	51.9	2.722	0.106	0.6254	
15 minute summer	4	1.006	5	137.6	2.141	0.325	4.1402	
15 minute summer	5	1.007	6	183.4	2.830	0.210	2.0497	
15 minute summer	6	1.008	14	199.8	3.020	0.107	4.3394	
15 minute summer	7	1.009	8	19.2	1.291	0.016	0.2633	
15 minute summer	8	1.010	9	37.9	2.362	0.025	0.3259	
15 minute summer	9	1.011	10	37.7	2.278	0.021	0.3378	
15 minute summer	10	1.012	11	46.4	2.008	0.031	0.3511	
15 minute summer	11	1.013	12	46.5	1.440	0.052	0.8416	
15 minute summer	12	1.014	13	46.8	1.343	0.065	0.3043	
15 minute summer	13	1.015	14	46.8	0.791	0.068	1.4105	
15 minute summer	14	1.016	Basin	247.4	5.553	0.203	2.9144	
480 minute winter	Basin	1.017	FCC	25.4	0.313	0.020	6.4723	
480 minute winter	Basin	Infiltration		0.0				
480 minute winter	FCC	Hydro-Brake®	OUTFALL	5.2				414.9

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	18	10	44.569	0.098	44.6	0.1105	0.0000	OK
15 minute summer	19	10	43.034	0.109	58.8	0.1233	0.0000	OK
15 minute summer	1	10	42.143	0.260	83.3	0.2945	0.0000	OK
15 minute summer	20	10	43.032	0.032	26.8	0.0365	0.0000	OK
15 minute summer	2	10	41.758	0.058	109.0	0.0826	0.0000	OK
15 minute summer	2A	11	40.354	0.154	108.1	0.2202	0.0000	OK
15 minute summer	3	11	39.984	0.234	135.6	0.3350	0.0000	OK
15 minute summer	21	10	43.135	0.150	109.4	0.1696	0.0000	OK
15 minute summer	22	10	41.135	0.135	140.6	0.1530	0.0000	OK
15 minute summer	4	11	39.446	0.346	372.7	0.6107	0.0000	OK
15 minute summer	5	11	38.377	0.377	494.8	0.9590	0.0000	OK
15 minute summer	6	11	37.716	0.216	542.0	0.5502	0.0000	OK
15 minute summer	7	10	37.136	0.086	52.1	0.2181	0.0000	OK
15 minute summer	8	10	36.654	0.114	102.9	0.2904	0.0000	OK
15 minute summer	9	10	35.692	0.097	102.4	0.2472	0.0000	OK
15 minute summer	10	10	34.346	0.121	126.1	0.3077	0.0000	OK
15 minute summer	11	10	33.657	0.157	125.3	0.4003	0.0000	OK
15 minute summer	12	11	33.262	0.197	124.9	0.5024	0.0000	OK
15 minute summer	13	11	33.142	0.172	125.7	0.4371	0.0000	OK
15 minute summer	14	10	33.092	0.357	668.9	0.9848	0.0000	OK
600 minute winter	Basin	600	31.651	0.701	62.9	722.2438	0.0000	OK
600 minute winter	FCC	615	31.654	0.804	28.8	2.0473	0.0000	OK
15 minute summer	OUTFALL	1	30.800	0.000	5.2	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)
15 minute summer	18	1.000	19	44.3	2.765	0.362	0.4309	
15 minute summer	19	1.001	1	58.6	2.366	0.478	0.4739	
15 minute summer	1	1.002	2	82.4	1.359	0.922	0.7725	
15 minute summer	20	2.000	2	26.6	0.929	0.004	1.3422	
15 minute summer	2	1.003	2A	108.1	1.272	0.013	2.3783	
15 minute summer	2A	1.004	3	109.0	1.896	0.306	0.8217	
15 minute summer	3	1.005	4	136.4	1.844	0.682	4.5325	
15 minute summer	21	3.000	22	109.0	3.302	0.458	1.4435	
15 minute summer	22	3.001	4	139.9	2.718	0.285	1.8332	
15 minute summer	4	1.006	5	373.5	2.739	0.883	8.7701	
15 minute summer	5	1.007	6	497.4	3.585	0.571	4.3403	
15 minute summer	6	1.008	14	542.7	4.092	0.290	8.6030	
15 minute summer	7	1.009	8	51.9	1.689	0.044	0.5453	
15 minute summer	8	1.010	9	102.4	3.078	0.069	0.6759	
15 minute summer	9	1.011	10	101.9	2.925	0.057	0.7099	
15 minute summer	10	1.012	11	125.3	2.537	0.083	0.7497	
15 minute summer	11	1.013	12	124.9	1.801	0.140	1.8069	
15 minute summer	12	1.014	13	125.7	1.718	0.175	0.6421	
15 minute summer	13	1.015	14	126.2	1.067	0.182	2.7915	
15 minute summer	14	1.016	Basin	676.4	6.434	0.555	6.7655	
600 minute winter	Basin	1.017	FCC	28.8	0.264	0.023	14.3748	
600 minute winter	Basin	Infiltration		0.0				
600 minute winter	FCC	Hydro-Brake®	OUTFALL	5.2				578.3

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Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	18	10	44.593	0.122	64.6	0.1385	0.0000	OK
15 minute summer	19	10	43.073	0.148	85.2	0.1674	0.0000	OK
15 minute summer	1	10	42.294	0.411	120.6	0.4648	0.0000	SURCHARGED
15 minute summer	20	10	43.040	0.040	38.9	0.0451	0.0000	OK
15 minute summer	2	10	41.771	0.071	158.3	0.1014	0.0000	OK
15 minute summer	2A	12	40.598	0.398	157.3	0.5700	0.0000	SURCHARGED
15 minute summer	3	11	40.486	0.736	203.5	1.0534	0.0000	SURCHARGED
15 minute summer	21	10	43.176	0.191	158.7	0.2161	0.0000	OK
15 minute summer	22	11	41.175	0.175	204.4	0.1981	0.0000	OK
15 minute summer	4	11	40.124	1.024	494.5	1.8094	0.0000	SURCHARGED
15 minute summer	5	11	38.462	0.462	660.2	1.1763	0.0000	OK
15 minute summer	6	11	37.753	0.253	726.1	0.6449	0.0000	OK
15 minute summer	7	10	37.154	0.104	75.5	0.2655	0.0000	OK
15 minute summer	8	10	36.679	0.139	149.2	0.3540	0.0000	OK
15 minute summer	9	10	35.713	0.118	148.5	0.2998	0.0000	OK
15 minute summer	10	10	34.374	0.149	182.9	0.3793	0.0000	OK
15 minute summer	11	10	33.695	0.195	181.9	0.4958	0.0000	OK
15 minute summer	12	11	33.316	0.251	180.9	0.6386	0.0000	OK
15 minute summer	13	11	33.203	0.233	181.7	0.5919	0.0000	OK
15 minute summer	14	11	33.166	0.431	910.6	1.1891	0.0000	OK
960 minute winter	Basin	945	31.963	1.013	65.4	1134.3590	0.0000	SURCHARGED
960 minute winter	FCC	945	31.963	1.113	25.6	2.8338	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	30.800	0.000	5.2	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)
15 minute summer	18	1.000	19	64.2	3.020	0.525	0.5715	
15 minute summer	19	1.001	1	84.8	2.326	0.691	0.5914	
15 minute summer	1	1.002	2	119.7	1.703	1.339	0.8691	
15 minute summer	20	2.000	2	38.6	1.046	0.007	1.7368	
15 minute summer	2	1.003	2A	157.3	1.337	0.018	9.1827	
15 minute summer	2A	1.004	3	183.9	1.922	0.517	1.5778	
15 minute summer	3	1.005	4	206.4	2.106	1.032	6.3490	
15 minute summer	21	3.000	22	158.6	3.560	0.667	1.9469	
15 minute summer	22	3.001	4	198.9	2.712	0.405	2.4529	
15 minute summer	4	1.006	5	484.2	3.056	1.144	10.2019	
15 minute summer	5	1.007	6	661.5	3.775	0.759	5.4099	
15 minute summer	6	1.008	14	727.2	4.408	0.388	10.6701	
15 minute summer	7	1.009	8	75.2	1.842	0.064	0.7240	
15 minute summer	8	1.010	9	148.5	3.368	0.100	0.8949	
15 minute summer	9	1.011	10	148.0	3.179	0.082	0.9484	
15 minute summer	10	1.012	11	181.9	2.732	0.120	1.0103	
15 minute summer	11	1.013	12	180.9	1.907	0.203	2.4704	
15 minute summer	12	1.014	13	181.7	1.737	0.253	0.9272	
15 minute summer	13	1.015	14	183.3	1.164	0.264	3.6779	
15 minute summer	14	1.016	Basin	920.6	6.678	0.756	9.1824	
960 minute winter	Basin	1.017	FCC	25.6	0.260	0.021	16.1657	
960 minute winter	Basin	Infiltration		0.0				
960 minute winter	FCC	Hydro-Brake®	OUTFALL	5.2				627.7

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	18	9	44.608	0.137	81.2	0.1549	0.0000	OK
15 minute summer	19	11	43.334	0.409	107.4	0.4631	0.0000	SURCHARGED
15 minute summer	1	11	42.423	0.540	147.0	0.6112	0.0000	SURCHARGED
15 minute summer	20	10	43.045	0.045	48.9	0.0513	0.0000	OK
15 minute summer	2	11	41.779	0.079	194.3	0.1137	0.0000	OK
15 minute summer	2A	13	41.013	0.813	194.9	1.1631	0.0000	SURCHARGED
15 minute summer	3	12	40.915	1.165	238.8	1.6665	0.0000	SURCHARGED
15 minute summer	21	9	43.202	0.217	199.5	0.2457	0.0000	OK
15 minute summer	22	11	41.268	0.268	256.6	0.3032	0.0000	OK
15 minute summer	4	11	40.608	1.508	537.2	2.6651	0.0000	SURCHARGED
15 minute summer	5	11	38.520	0.520	756.0	1.3240	0.0000	OK
15 minute summer	6	11	37.774	0.274	837.7	0.6985	0.0000	OK
15 minute summer	7	10	37.168	0.118	94.9	0.3003	0.0000	OK
15 minute summer	8	10	36.698	0.158	187.4	0.4011	0.0000	OK
15 minute summer	9	10	35.728	0.133	186.7	0.3385	0.0000	OK
15 minute summer	10	10	34.395	0.170	230.0	0.4331	0.0000	OK
15 minute summer	11	10	33.724	0.224	228.7	0.5705	0.0000	OK
15 minute summer	12	11	33.362	0.297	227.1	0.7550	0.0000	OK
15 minute summer	13	11	33.255	0.285	228.4	0.7253	0.0000	OK
15 minute summer	14	10	33.224	0.489	1069.8	1.3501	0.0000	OK
960 minute winter	Basin	945	32.178	1.228	76.2	1450.1600	0.0000	SURCHARGED
960 minute winter	FCC	945	32.178	1.328	21.0	3.3797	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	30.800	0.000	5.2	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)
15 minute summer	18	1.000	19	81.0	3.117	0.662	0.8632	
15 minute summer	19	1.001	1	104.1	2.618	0.848	0.6973	
15 minute summer	1	1.002	2	147.3	2.092	1.647	0.8862	
15 minute summer	20	2.000	2	48.5	1.139	0.008	2.0074	
15 minute summer	2	1.003	2A	194.9	1.379	0.023	30.9616	
15 minute summer	2A	1.004	3	223.5	2.026	0.628	1.5778	
15 minute summer	3	1.005	4	244.0	2.213	1.220	6.3490	
15 minute summer	21	3.000	22	198.9	3.570	0.836	2.5953	
15 minute summer	22	3.001	4	250.9	2.743	0.511	2.9692	
15 minute summer	4	1.006	5	535.0	3.377	1.264	10.2019	
15 minute summer	5	1.007	6	756.6	3.832	0.868	6.0203	
15 minute summer	6	1.008	14	838.3	4.538	0.447	12.0063	
15 minute summer	7	1.009	8	94.6	1.940	0.081	0.8642	
15 minute summer	8	1.010	9	186.7	3.554	0.125	1.0663	
15 minute summer	9	1.011	10	186.0	3.333	0.104	1.1368	
15 minute summer	10	1.012	11	228.7	2.840	0.151	1.2212	
15 minute summer	11	1.013	12	227.1	1.948	0.255	3.0370	
15 minute summer	12	1.014	13	228.4	1.748	0.318	1.1813	
15 minute summer	13	1.015	14	231.5	1.233	0.334	4.3612	
15 minute summer	14	1.016	Basin	1079.3	6.677	0.886	10.8383	
960 minute winter	Basin	1.017	FCC	21.0	0.242	0.017	16.1657	
960 minute winter	Basin	Infiltration		0.0				
960 minute winter	FCC	Hydro-Brake®	OUTFALL	5.2				673.8

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Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	30	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	5.000
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	999.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.111	5.00	48.889	1200	505840.220	119377.458	1.429
18	0.114	5.00	48.460	1200	505813.741	119377.684	1.500
2	0.000	5.00	48.680	1350	505827.257	119377.462	1.801
3	0.026	5.00	47.076	1350	505825.677	119345.259	1.516
19	0.037	5.00	47.841	1200	505878.484	119327.636	1.426
20	0.013	5.00	47.318	1200	505878.281	119315.881	1.508
4	0.115	5.00	45.727	1500	505825.744	119316.789	1.682
5	0.072	5.00	44.688	1500	505825.876	119289.897	1.653
6	0.009	5.00	44.363	1500	505815.671	119284.629	1.653
21	0.042	5.00	45.256	1200	505766.502	119323.880	1.576
22	0.013	5.00	43.578	1200	505766.949	119294.755	1.653
7	0.094	5.00	42.967	1500	505771.142	119284.315	1.667
8	0.025	5.00	41.725	1500	505758.990	119268.955	1.735
23	0.045	5.00	43.315	1200	505745.681	119313.897	1.445
24	0.005	5.00	42.777	1200	505740.599	119305.850	1.427
9	0.112	5.00	41.448	1800	505731.354	119282.373	1.783
10	0.067	5.00	41.472	1800	505701.306	119290.942	2.772
11	0.033	5.00	39.790	1800	505694.943	119261.756	1.950
12	0.084	5.00	38.060	1800	505686.523	119231.583	2.025
32	0.089	5.00	37.940	1800	505718.687	119220.922	2.590
32A	0.049	5.00	38.090	1200	505733.139	119215.478	1.425
33	0.084	5.00	37.380	1800	505708.479	119193.083	2.930
Basin3A	0.000	5.00	35.700	1800	505675.683	119188.198	1.500
29	0.047	5.00	39.807	1200	505630.324	119272.149	1.427
30	0.066	5.00	38.596	1200	505624.987	119249.627	1.426
13	0.022	5.00	37.973	1800	505623.261	119236.173	2.088
31	0.103	5.00	37.569	1200	505585.956	119242.066	1.469
14	0.055	5.00	37.787	1800	505605.267	119238.629	2.487
14A	0.000	5.00	35.700	1500	505603.166	119228.310	1.575
Basin3	0.000	5.00	34.800	1800	505601.126	119218.174	1.650
fcc	0.000	5.00	34.850	1800	505579.032	119206.030	1.724
OUTFALL	0.000		34.600	1500	505577.244	119198.521	1.500

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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)
1.000	1	2	12.963	0.600	47.460	46.954	0.506	25.6	225	5.08	153.2
2.000	18	2	13.518	0.600	46.960	46.879	0.081	166.9	300	5.19	151.9
1.001	2	3	32.242	0.600	46.879	45.560	1.319	24.4	300	5.35	147.3
1.002	3	4	28.470	0.600	45.560	44.120	1.440	19.8	300	5.49	146.3
3.000	19	20	11.757	0.600	46.415	45.885	0.530	22.2	225	5.07	152.9
3.001	20	4	52.545	0.600	45.810	44.120	1.690	31.1	300	5.38	148.0
1.003	4	5	26.892	0.600	44.045	43.110	0.935	28.8	375	5.62	142.1
1.004	5	6	11.485	0.600	43.035	42.710	0.325	35.3	450	5.68	141.5
1.005	6	7	44.530	0.600	42.710	41.300	1.410	31.6	450	5.88	140.1
4.000	21	22	29.128	0.600	43.680	42.000	1.680	17.3	225	5.15	151.2
4.001	22	7	11.251	0.600	41.925	41.388	0.537	21.0	300	5.21	150.3
1.006	7	8	19.586	0.600	41.300	39.990	1.310	15.0	450	5.94	137.3
1.007	8	9	30.721	0.600	39.990	39.665	0.325	94.5	525	6.16	136.6
5.000	23	24	9.517	0.600	41.870	41.350	0.520	18.3	225	5.05	152.5
5.001	24	9	25.232	0.600	41.350	39.965	1.385	18.2	225	5.19	151.0
1.008	9	10	31.246	0.600	39.665	38.700	0.965	32.4	525	6.30	134.8
1.009	10	11	29.872	0.600	38.700	37.840	0.860	34.7	525	6.43	135.0
1.010	11	12	31.326	0.600	37.840	36.110	1.730	18.1	525	6.53	131.0
1.011	12	32	33.885	0.600	36.035	35.350	0.685	49.5	600	6.69	126.8
1.012	32	33	29.652	0.600	35.350	34.600	0.750	39.5	600	6.82	123.5
1.013	33	Basin3A	33.158	0.600	34.450	34.200	0.250	132.6	600	7.08	119.9
1.014	Basin3A	Basin3	80.357	0.600	34.200	33.225	0.975	82.4	750	7.51	112.2
7.000	29	30	23.146	0.600	38.380	37.170	1.210	19.1	225	5.13	152.2
7.001	30	13	13.564	0.600	37.170	35.960	1.210	11.2	225	5.19	151.2

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	2.595	103.2	61.5	1.204	1.501	0.111	0.0	125	2.705
2.000	1.214	85.8	62.6	1.200	1.501	0.114	0.0	191	1.321
1.001	3.193	225.7	119.8	1.501	1.216	0.225	0.0	156	3.239
1.002	3.551	251.0	132.7	1.216	1.307	0.251	0.0	155	3.598
3.000	2.790	110.9	20.4	1.201	1.208	0.037	0.0	65	2.147
3.001	2.829	200.0	26.7	1.208	1.307	0.050	0.0	74	1.987
1.003	3.389	374.3	213.6	1.307	1.203	0.416	0.0	203	3.496
1.004	3.428	545.2	249.6	1.203	1.203	0.488	0.0	213	3.353
1.005	3.627	576.9	251.6	1.203	1.217	0.497	0.0	208	3.510
4.000	3.157	125.5	23.0	1.351	1.353	0.042	0.0	65	2.413
4.001	3.450	243.8	29.9	1.353	1.279	0.055	0.0	71	2.369
1.006	5.278	839.4	320.5	1.217	1.285	0.646	0.0	192	4.933
1.007	2.304	498.7	331.3	1.210	1.258	0.671	0.0	314	2.457
5.000	3.073	122.2	24.8	1.220	1.202	0.045	0.0	68	2.416
5.001	3.080	122.5	27.3	1.202	1.258	0.050	0.0	72	2.487
1.008	3.946	854.1	405.8	1.258	2.247	0.833	0.0	255	3.897
1.009	3.809	824.6	439.1	2.247	1.425	0.900	0.0	272	3.865
1.010	5.281	1143.1	441.7	1.425	1.425	0.933	0.0	226	4.955
1.011	3.467	980.4	466.0	1.425	1.990	1.017	0.0	291	3.425
1.012	3.880	1097.1	515.5	1.990	2.180	1.155	0.0	289	3.823
1.013	2.113	597.3	536.9	2.330	0.900	1.239	0.0	447	2.374
1.014	3.084	1362.3	502.4	0.750	0.825	1.239	0.0	315	2.862
7.000	3.005	119.5	25.9	1.202	1.201	0.047	0.0	71	2.411
7.001	3.930	156.2	61.7	1.201	1.788	0.113	0.0	98	3.703

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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)
7.002	13	14	18.161	0.600	35.885	35.300	0.585	31.0	300	5.29	118.2
8.000	31	14	19.614	0.600	36.100	35.375	0.725	27.1	225	5.13	152.5
7.003	14	14A	20.870	0.600	35.300	34.125	1.175	17.8	375	5.37	116.1
7.004	14A	Basin3	10.339	0.600	34.125	33.200	0.925	11.2	375	5.41	149.6
1.015	Basin3	fcc	9.700	0.600	33.150	33.126	0.024	404.2	825	7.62	120.3
1.016	fcc	OUTFALL	7.719	0.600	33.126	33.100	0.026	296.9	825	7.70	120.2
9.000	32A	32	15.443	0.600	36.665	35.650	1.015	15.2	225	5.08	153.1

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)
7.002	2.831	200.1	57.7	1.788	2.187	0.135	0.0	110	2.459
8.000	2.525	100.4	56.8	1.244	2.187	0.103	0.0	121	2.597
7.003	4.316	476.7	122.9	2.112	1.200	0.293	0.0	129	3.642
7.004	5.444	601.3	158.4	1.200	1.225	0.293	0.0	131	4.620
1.015	1.470	785.9	666.1	0.825	0.899	1.532	0.0	587	1.639
1.016	1.718	918.1	665.5	0.899	0.675	1.532	0.0	522	1.863
9.000	3.371	134.0	27.1	1.200	2.065	0.049	0.0	68	2.651

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	12.963	25.6	225	Circular_Default Sewer Type	48.889	47.460	1.204	48.680	46.954	1.501
2.000	13.518	166.9	300	Circular_Default Sewer Type	48.460	46.960	1.200	48.680	46.879	1.501
1.001	32.242	24.4	300	Circular_Default Sewer Type	48.680	46.879	1.501	47.076	45.560	1.216
1.002	28.470	19.8	300	Circular_Default Sewer Type	47.076	45.560	1.216	45.727	44.120	1.307
3.000	11.757	22.2	225	Circular_Default Sewer Type	47.841	46.415	1.201	47.318	45.885	1.208
3.001	52.545	31.1	300	Circular_Default Sewer Type	47.318	45.810	1.208	45.727	44.120	1.307
1.003	26.892	28.8	375	Circular_Default Sewer Type	45.727	44.045	1.307	44.688	43.110	1.203
1.004	11.485	35.3	450	Circular_Default Sewer Type	44.688	43.035	1.203	44.363	42.710	1.203
1.005	44.530	31.6	450	Circular_Default Sewer Type	44.363	42.710	1.203	42.967	41.300	1.217
4.000	29.128	17.3	225	Circular_Default Sewer Type	45.256	43.680	1.351	43.578	42.000	1.353
4.001	11.251	21.0	300	Circular_Default Sewer Type	43.578	41.925	1.353	42.967	41.388	1.279
1.006	19.586	15.0	450	Circular_Default Sewer Type	42.967	41.300	1.217	41.725	39.990	1.285
1.007	30.721	94.5	525	Circular_Default Sewer Type	41.725	39.990	1.210	41.448	39.665	1.258

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1200	Manhole	Adoptable	2	1350	Manhole	Adoptable
2.000	18	1200	Manhole	Adoptable	2	1350	Manhole	Adoptable
1.001	2	1350	Manhole	Adoptable	3	1350	Manhole	Adoptable
1.002	3	1350	Manhole	Adoptable	4	1500	Manhole	Adoptable
3.000	19	1200	Manhole	Adoptable	20	1200	Manhole	Adoptable
3.001	20	1200	Manhole	Adoptable	4	1500	Manhole	Adoptable
1.003	4	1500	Manhole	Adoptable	5	1500	Manhole	Adoptable
1.004	5	1500	Manhole	Adoptable	6	1500	Manhole	Adoptable
1.005	6	1500	Manhole	Adoptable	7	1500	Manhole	Adoptable
4.000	21	1200	Manhole	Adoptable	22	1200	Manhole	Adoptable
4.001	22	1200	Manhole	Adoptable	7	1500	Manhole	Adoptable
1.006	7	1500	Manhole	Adoptable	8	1500	Manhole	Adoptable
1.007	8	1500	Manhole	Adoptable	9	1800	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	9.517	18.3	225	Circular_Default Sewer Type	43.315	41.870	1.220	42.777	41.350	1.202
5.001	25.232	18.2	225	Circular_Default Sewer Type	42.777	41.350	1.202	41.448	39.965	1.258
1.008	31.246	32.4	525	Circular_Default Sewer Type	41.448	39.665	1.258	41.472	38.700	2.247
1.009	29.872	34.7	525	Circular_Default Sewer Type	41.472	38.700	2.247	39.790	37.840	1.425
1.010	31.326	18.1	525	Circular_Default Sewer Type	39.790	37.840	1.425	38.060	36.110	1.425
1.011	33.885	49.5	600	Circular_Default Sewer Type	38.060	36.035	1.425	37.940	35.350	1.990
1.012	29.652	39.5	600	Circular_Default Sewer Type	37.940	35.350	1.990	37.380	34.600	2.180
1.013	33.158	132.6	600	Circular_Default Sewer Type	37.380	34.450	2.330	35.700	34.200	0.900
1.014	80.357	82.4	750	Circular_Default Sewer Type	35.700	34.200	0.750	34.800	33.225	0.825
7.000	23.146	19.1	225	Circular_Default Sewer Type	39.807	38.380	1.202	38.596	37.170	1.201
7.001	13.564	11.2	225	Circular_Default Sewer Type	38.596	37.170	1.201	37.973	35.960	1.788
7.002	18.161	31.0	300	Circular_Default Sewer Type	37.973	35.885	1.788	37.787	35.300	2.187
8.000	19.614	27.1	225	Circular_Default Sewer Type	37.569	36.100	1.244	37.787	35.375	2.187
7.003	20.870	17.8	375	Circular_Default Sewer Type	37.787	35.300	2.112	35.700	34.125	1.200
7.004	10.339	11.2	375	Circular_Default Sewer Type	35.700	34.125	1.200	34.800	33.200	1.225
1.015	9.700	404.2	825	Circular_Default Sewer Type	34.800	33.150	0.825	34.850	33.126	0.899
1.016	7.719	296.9	825	Circular_Default Sewer Type	34.850	33.126	0.899	34.600	33.100	0.675
9.000	15.443	15.2	225	Circular_Default Sewer Type	38.090	36.665	1.200	37.940	35.650	2.065

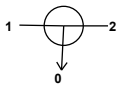
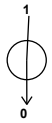
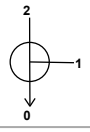
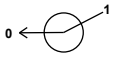
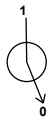
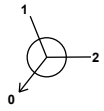
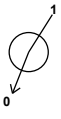
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
5.000	23	1200	Manhole	Adoptable	24	1200	Manhole	Adoptable
5.001	24	1200	Manhole	Adoptable	9	1800	Manhole	Adoptable
1.008	9	1800	Manhole	Adoptable	10	1800	Manhole	Adoptable
1.009	10	1800	Manhole	Adoptable	11	1800	Manhole	Adoptable
1.010	11	1800	Manhole	Adoptable	12	1800	Manhole	Adoptable
1.011	12	1800	Manhole	Adoptable	32	1800	Manhole	Adoptable
1.012	32	1800	Manhole	Adoptable	33	1800	Manhole	Adoptable
1.013	33	1800	Manhole	Adoptable	Basin3A	1800	Manhole	Adoptable
1.014	Basin3A	1800	Manhole	Adoptable	Basin3	1800	Manhole	Adoptable
7.000	29	1200	Manhole	Adoptable	30	1200	Manhole	Adoptable
7.001	30	1200	Manhole	Adoptable	13	1800	Manhole	Adoptable
7.002	13	1800	Manhole	Adoptable	14	1800	Manhole	Adoptable
8.000	31	1200	Manhole	Adoptable	14	1800	Manhole	Adoptable
7.003	14	1800	Manhole	Adoptable	14A	1500	Manhole	Adoptable
7.004	14A	1500	Manhole	Adoptable	Basin3	1800	Manhole	Adoptable
1.015	Basin3	1800	Manhole	Adoptable	fcc	1800	Manhole	Adoptable
1.016	fcc	1800	Manhole	Adoptable	OUTFALL	1500	Manhole	Adoptable
9.000	32A	1200	Manhole	Adoptable	32	1800	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	505840.220	119377.458	48.889	1.429	1200				
						0	1.000	47.460	225
18	505813.741	119377.684	48.460	1.500	1200				
						0	2.000	46.960	300

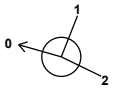
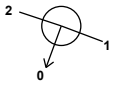
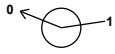
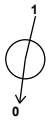
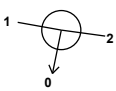
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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
2	505827.257	119377.462	48.680	1.801	1350		1	2.000	46.879	300
							2	1.000	46.954	225
							0	1.001	46.879	300
3	505825.677	119345.259	47.076	1.516	1350		1	1.001	45.560	300
							0	1.002	45.560	300
19	505878.484	119327.636	47.841	1.426	1200		0	3.000	46.415	225
20	505878.281	119315.881	47.318	1.508	1200		1	3.000	45.885	225
							0	3.001	45.810	300
4	505825.744	119316.789	45.727	1.682	1500		1	3.001	44.120	300
							2	1.002	44.120	300
							0	1.003	44.045	375
5	505825.876	119289.897	44.688	1.653	1500		1	1.003	43.110	375
							0	1.004	43.035	450
6	505815.671	119284.629	44.363	1.653	1500		1	1.004	42.710	450
							0	1.005	42.710	450
21	505766.502	119323.880	45.256	1.576	1200		0	4.000	43.680	225
22	505766.949	119294.755	43.578	1.653	1200		1	4.000	42.000	225
							0	4.001	41.925	300
7	505771.142	119284.315	42.967	1.667	1500		1	4.001	41.388	300
							2	1.005	41.300	450
							0	1.006	41.300	450
8	505758.990	119268.955	41.725	1.735	1500		1	1.006	39.990	450
							0	1.007	39.990	525
23	505745.681	119313.897	43.315	1.445	1200		0	5.000	41.870	225
24	505740.599	119305.850	42.777	1.427	1200		1	5.000	41.350	225
							0	5.001	41.350	225

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
9	505731.354	119282.373	41.448	1.783	1800		1 2 0	5.001 1.007 1.008	39.965 39.665 39.665	225 525 525
10	505701.306	119290.942	41.472	2.772	1800		1 0	1.008 1.009	38.700 38.700	525 525
11	505694.943	119261.756	39.790	1.950	1800		1 0	1.009 1.010	37.840 37.840	525 525
12	505686.523	119231.583	38.060	2.025	1800		1 0	1.010 1.011	36.110 36.035	525 600
32	505718.687	119220.922	37.940	2.590	1800		1 2 0	9.000 1.011 1.012	35.650 35.350 35.350	225 600 600
32A	505733.139	119215.478	38.090	1.425	1200		0	9.000	36.665	225
33	505708.479	119193.083	37.380	2.930	1800		1 0	1.012 1.013	34.600 34.450	600 600
Basin3A	505675.683	119188.198	35.700	1.500	1800		1 0	1.013 1.014	34.200 34.200	600 750
29	505630.324	119272.149	39.807	1.427	1200		0	7.000	38.380	225
30	505624.987	119249.627	38.596	1.426	1200		1 0	7.000 7.001	37.170 37.170	225 225
13	505623.261	119236.173	37.973	2.088	1800		1 0	7.001 7.002	35.960 35.885	225 300
31	505585.956	119242.066	37.569	1.469	1200		0	8.000	36.100	225
14	505605.267	119238.629	37.787	2.487	1800		1 2 0	8.000 7.002 7.003	35.375 35.300 35.300	225 300 375

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
14A	505603.166	119228.310	35.700	1.575	1500	1	7.003	34.125	375
						0	7.004	34.125	375
Basin3	505601.126	119218.174	34.800	1.650	1800	1	7.004	33.200	375
						2	1.014	33.225	750
						0	1.015	33.150	825
fcc	505579.032	119206.030	34.850	1.724	1800	1	1.015	33.126	825
						0	1.016	33.126	825
OUTFALL	505577.244	119198.521	34.600	1.500	1500	1	1.016	33.100	825

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	✓	Check Discharge Rate(s)	✓
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	✓
Winter CV	1.000	Additional Storage (m³/ha)	0.0	100 year 360 minute (m³)	

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

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

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)		Betterment (%)	0
SAAR (mm)		QBar	
Soil Index	1	Q 1 year (l/s)	
SPR	0.10	Q 30 year (l/s)	
Region	1	Q 100 year (l/s)	
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)		Storm Duration (mins)	360
Soil Index	1	Betterment (%)	0
SPR	0.10	PR	
CWI		Runoff Volume (m³)	

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Node fcc Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	33.126	Product Number	CTL-SHE-0157-1250-1300-1250
Design Depth (m)	1.300	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	12.5	Min Node Diameter (mm)	1500

Node Basin3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00003	Safety Factor	2.0	Invert Level (m)	33.150
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	1088

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	662.0	662.0	1.650	1981.0	662.0

Node Basin3A Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	34.200
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	296.0	0.0	1.500	1031.0	0.0

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	47.535	0.075	22.1	0.0848	0.0000	OK
15 minute summer	18	10	47.071	0.111	22.7	0.1251	0.0000	OK
15 minute summer	2	10	46.971	0.092	44.5	0.1319	0.0000	OK
15 minute summer	3	10	45.653	0.093	49.5	0.1332	0.0000	OK
15 minute summer	19	10	46.456	0.041	7.4	0.0459	0.0000	OK
15 minute summer	20	10	45.855	0.045	9.9	0.0509	0.0000	OK
15 minute summer	4	10	44.170	0.125	81.7	0.2201	0.0000	OK
15 minute summer	5	10	43.178	0.143	95.1	0.2535	0.0000	OK
15 minute summer	6	11	42.840	0.130	96.9	0.2291	0.0000	OK
15 minute summer	21	10	43.720	0.040	8.4	0.0450	0.0000	OK
15 minute summer	22	10	41.970	0.045	10.9	0.0506	0.0000	OK
15 minute summer	7	11	41.416	0.116	125.9	0.2055	0.0000	OK
15 minute summer	8	11	40.187	0.197	131.1	0.3474	0.0000	OK
15 minute summer	23	10	41.913	0.043	9.0	0.0481	0.0000	OK
15 minute summer	24	10	41.394	0.044	10.0	0.0497	0.0000	OK
15 minute summer	9	11	39.825	0.160	162.7	0.4076	0.0000	OK
15 minute summer	10	11	38.878	0.178	176.0	0.4530	0.0000	OK
15 minute summer	11	11	37.989	0.149	182.6	0.3796	0.0000	OK
15 minute summer	12	11	36.227	0.192	198.3	0.4885	0.0000	OK
15 minute summer	32	11	35.548	0.198	224.2	0.5028	0.0000	OK
15 minute summer	32A	10	36.707	0.042	9.8	0.0477	0.0000	OK
15 minute summer	33	10	34.751	0.301	239.2	0.7654	0.0000	OK
30 minute summer	Basin3A	22	34.364	0.164	218.3	55.4436	0.0000	OK
15 minute summer	29	10	38.422	0.042	9.4	0.0480	0.0000	OK
15 minute summer	30	10	37.230	0.060	22.5	0.0682	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	22.0	1.988	0.213	0.1433	
15 minute summer	18	2.000	2	22.6	1.078	0.263	0.2834	
15 minute summer	2	1.001	3	44.3	2.396	0.196	0.5957	
15 minute summer	3	1.002	4	49.0	2.715	0.195	0.5141	
15 minute summer	19	3.000	20	7.3	1.553	0.066	0.0556	
15 minute summer	20	3.001	4	9.8	1.415	0.049	0.3730	
15 minute summer	4	1.003	5	81.2	2.650	0.217	0.8242	
15 minute summer	5	1.004	6	95.2	2.350	0.175	0.4654	
15 minute summer	6	1.005	7	97.4	2.778	0.169	1.5620	
15 minute summer	21	4.000	22	8.3	1.782	0.066	0.1357	
15 minute summer	22	4.001	7	10.8	1.708	0.044	0.0714	
15 minute summer	7	1.006	8	126.3	2.580	0.150	0.9688	
15 minute summer	8	1.007	9	131.7	2.039	0.264	1.9878	
15 minute summer	23	5.000	24	9.0	1.685	0.073	0.0507	
15 minute summer	24	5.001	9	9.9	1.839	0.081	0.1355	
15 minute summer	9	1.008	10	163.3	2.722	0.191	1.8758	
15 minute summer	10	1.009	11	176.4	3.077	0.214	1.7149	
15 minute summer	11	1.010	12	182.3	3.790	0.159	1.5067	
15 minute summer	12	1.011	32	198.0	2.500	0.202	2.6835	
15 minute summer	32	1.012	33	223.2	2.945	0.203	2.2478	
15 minute summer	32A	9.000	32	9.7	1.936	0.073	0.0776	
15 minute summer	33	1.013	Basin3A	241.1	2.868	0.404	2.9394	
30 minute summer	Basin3A	1.014	Basin3	140.4	2.027	0.103	5.5647	
15 minute summer	29	7.000	30	9.3	1.372	0.078	0.1589	
15 minute summer	30	7.001	13	22.4	2.714	0.143	0.1119	

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	13	10	35.959	0.074	26.8	0.1885	0.0000	OK
15 minute summer	31	10	36.171	0.071	20.5	0.0808	0.0000	OK
15 minute summer	14	10	35.393	0.093	58.0	0.2358	0.0000	OK
15 minute summer	14A	10	34.210	0.085	57.7	0.1506	0.0000	OK
360 minute summer	Basin3	288	33.511	0.361	78.2	291.7657	0.0000	OK
360 minute summer	fcc	288	33.511	0.385	12.7	0.9790	0.0000	OK
15 minute summer	OUTFALL	1	33.100	0.000	10.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	13	7.002	14	26.6	1.669	0.133	0.2904	
15 minute summer	31	8.000	14	20.4	1.938	0.203	0.2061	
15 minute summer	14	7.003	14A	57.7	2.891	0.121	0.4164	
15 minute summer	14A	7.004	Basin3	57.4	3.269	0.095	0.1816	
360 minute summer	Basin3	1.015	fcc	12.7	0.187	0.016	2.2673	
360 minute summer	Basin3	Infiltration		0.0				
360 minute summer	fcc	Hydro-Brake®	OUTFALL	12.5				467.0

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	47.597	0.137	59.6	0.1554	0.0000	OK
15 minute summer	18	10	47.159	0.199	61.2	0.2249	0.0000	OK
15 minute summer	2	10	47.042	0.163	120.2	0.2333	0.0000	OK
15 minute summer	3	10	45.727	0.167	133.5	0.2383	0.0000	OK
15 minute summer	19	10	46.483	0.068	19.9	0.0773	0.0000	OK
15 minute summer	20	10	45.883	0.073	26.8	0.0829	0.0000	OK
15 minute summer	4	10	44.273	0.228	220.5	0.4034	0.0000	OK
15 minute summer	5	10	43.303	0.268	257.0	0.4727	0.0000	OK
15 minute summer	6	11	42.936	0.226	261.2	0.3988	0.0000	OK
15 minute summer	21	10	43.746	0.066	22.6	0.0746	0.0000	OK
15 minute summer	22	10	41.995	0.070	29.4	0.0790	0.0000	OK
15 minute summer	7	11	41.508	0.208	339.5	0.3674	0.0000	OK
15 minute summer	8	11	40.352	0.362	353.1	0.6396	0.0000	OK
15 minute summer	23	10	41.942	0.072	24.2	0.0818	0.0000	OK
15 minute summer	24	10	41.424	0.074	26.8	0.0832	0.0000	OK
15 minute summer	9	11	39.956	0.291	437.8	0.7396	0.0000	OK
15 minute summer	10	11	39.028	0.328	473.9	0.8339	0.0000	OK
15 minute summer	11	11	38.100	0.260	492.9	0.6610	0.0000	OK
15 minute summer	12	11	36.389	0.354	536.8	0.9010	0.0000	OK
15 minute summer	32	11	35.713	0.363	608.0	0.9240	0.0000	OK
15 minute summer	32A	10	36.736	0.071	26.3	0.0801	0.0000	OK
15 minute summer	33	11	35.021	0.571	651.6	1.4534	0.0000	OK
30 minute summer	Basin3A	21	34.512	0.312	597.2	116.7827	0.0000	OK
15 minute summer	29	10	38.450	0.070	25.2	0.0789	0.0000	OK
15 minute summer	30	10	37.276	0.106	60.5	0.1198	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	59.3	2.509	0.575	0.3063	
15 minute summer	18	2.000	2	60.9	1.371	0.710	0.5993	
15 minute summer	2	1.001	3	119.5	3.016	0.529	1.2776	
15 minute summer	3	1.002	4	132.3	3.466	0.527	1.0867	
15 minute summer	19	3.000	20	19.8	2.033	0.178	0.1145	
15 minute summer	20	3.001	4	26.5	1.405	0.133	1.3006	
15 minute summer	4	1.003	5	218.7	3.348	0.584	1.7604	
15 minute summer	5	1.004	6	256.4	2.893	0.470	1.0203	
15 minute summer	6	1.005	7	262.4	3.474	0.455	3.3642	
15 minute summer	21	4.000	22	22.4	2.361	0.178	0.2764	
15 minute summer	22	4.001	7	29.3	1.893	0.120	0.2172	
15 minute summer	7	1.006	8	340.3	3.216	0.405	2.0390	
15 minute summer	8	1.007	9	354.4	2.514	0.711	4.3224	
15 minute summer	23	5.000	24	24.1	2.168	0.197	0.1059	
15 minute summer	24	5.001	9	26.6	2.421	0.217	0.2772	
15 minute summer	9	1.008	10	439.6	3.325	0.515	4.1294	
15 minute summer	10	1.009	11	476.0	3.832	0.577	3.7066	
15 minute summer	11	1.010	12	493.8	4.447	0.432	3.4934	
15 minute summer	12	1.011	32	537.1	3.070	0.548	5.9523	
15 minute summer	32	1.012	33	608.6	3.359	0.555	5.7765	
15 minute summer	32A	9.000	32	26.2	2.540	0.195	0.1592	
15 minute summer	33	1.013	Basin3A	653.1	3.313	1.093	6.5491	
30 minute summer	Basin3A	1.014	Basin3	459.9	2.781	0.338	13.3047	
15 minute summer	29	7.000	30	25.1	1.752	0.210	0.3335	
15 minute summer	30	7.001	13	60.2	3.482	0.385	0.2345	

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	13	10	36.015	0.130	72.0	0.3306	0.0000	OK
15 minute summer	31	10	36.228	0.128	55.3	0.1450	0.0000	OK
15 minute summer	14	10	35.460	0.160	156.1	0.4073	0.0000	OK
15 minute summer	14A	10	34.277	0.152	155.4	0.2682	0.0000	OK
360 minute winter	Basin3	360	33.923	0.773	113.7	752.9369	0.0000	OK
360 minute winter	fcc	360	33.923	0.797	13.1	2.0292	0.0000	OK
15 minute summer	OUTFALL	1	33.100	0.000	12.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	13	7.002	14	71.7	2.126	0.358	0.6124	
15 minute summer	31	8.000	14	54.9	2.474	0.547	0.4356	
15 minute summer	14	7.003	14A	155.4	3.590	0.326	0.9037	
15 minute summer	14A	7.004	Basin3	154.7	4.131	0.257	0.5303	
360 minute winter	Basin3	1.015	fcc	13.1	0.190	0.017	5.0777	
360 minute winter	Basin3	Infiltration		0.0				
360 minute winter	fcc	Hydro-Brake®	OUTFALL	12.5				977.5

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Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 99.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	47.646	0.186	86.4	0.2104	0.0000	OK
15 minute summer	18	10	47.230	0.270	88.8	0.3059	0.0000	OK
15 minute summer	2	10	47.091	0.212	173.9	0.3038	0.0000	OK
15 minute summer	3	10	45.771	0.211	193.1	0.3022	0.0000	OK
15 minute summer	19	10	46.499	0.084	28.8	0.0952	0.0000	OK
15 minute summer	20	10	45.899	0.089	38.8	0.1001	0.0000	OK
15 minute summer	4	10	44.352	0.307	320.1	0.5417	0.0000	OK
15 minute summer	5	10	43.390	0.355	372.9	0.6266	0.0000	OK
15 minute summer	6	10	42.996	0.286	379.1	0.5045	0.0000	OK
15 minute summer	21	10	43.761	0.080	32.7	0.0910	0.0000	OK
15 minute summer	22	10	42.009	0.084	42.5	0.0952	0.0000	OK
15 minute summer	7	11	41.589	0.289	492.1	0.5102	0.0000	OK
15 minute summer	8	11	40.574	0.584	511.4	1.0321	0.0000	SURCHARGED
15 minute summer	23	10	41.959	0.089	35.0	0.1011	0.0000	OK
15 minute summer	24	10	41.440	0.090	38.8	0.1021	0.0000	OK
15 minute summer	9	11	40.050	0.385	630.9	0.9791	0.0000	OK
15 minute summer	10	11	39.138	0.438	679.3	1.1154	0.0000	OK
15 minute summer	11	11	38.165	0.325	701.6	0.8282	0.0000	OK
15 minute summer	12	11	36.795	0.760	756.3	1.9352	0.0000	SURCHARGED
15 minute summer	32	11	36.215	0.865	848.2	2.2016	0.0000	SURCHARGED
15 minute summer	32A	10	36.747	0.082	38.1	0.0923	0.0000	OK
15 minute summer	33	11	35.542	1.092	907.3	2.7790	0.0000	SURCHARGED
30 minute summer	Basin3A	21	34.598	0.398	848.2	157.3866	0.0000	OK
15 minute summer	29	10	38.465	0.085	36.6	0.0960	0.0000	OK
15 minute summer	30	10	37.305	0.135	87.8	0.1529	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	85.9	2.657	0.832	0.4172	
15 minute summer	18	2.000	2	88.1	1.457	1.026	0.8123	
15 minute summer	2	1.001	3	172.9	3.254	0.766	1.7139	
15 minute summer	3	1.002	4	192.2	3.477	0.765	1.5852	
15 minute summer	19	3.000	20	28.7	2.234	0.258	0.1509	
15 minute summer	20	3.001	4	38.5	1.389	0.192	1.9889	
15 minute summer	4	1.003	5	317.1	3.488	0.847	2.4820	
15 minute summer	5	1.004	6	372.4	3.098	0.683	1.3785	
15 minute summer	6	1.005	7	381.1	3.638	0.661	4.7449	
15 minute summer	21	4.000	22	32.4	2.609	0.258	0.3624	
15 minute summer	22	4.001	7	42.5	1.938	0.174	0.3708	
15 minute summer	7	1.006	8	492.8	3.364	0.587	2.6038	
15 minute summer	8	1.007	9	510.3	2.666	1.023	5.9233	
15 minute summer	23	5.000	24	34.9	2.362	0.286	0.1407	
15 minute summer	24	5.001	9	38.5	2.668	0.314	0.3642	
15 minute summer	9	1.008	10	629.5	3.485	0.737	5.6589	
15 minute summer	10	1.009	11	677.1	4.042	0.821	4.9767	
15 minute summer	11	1.010	12	693.9	4.482	0.607	5.5855	
15 minute summer	12	1.011	32	755.1	3.059	0.770	9.5446	
15 minute summer	32	1.012	33	847.6	3.344	0.773	8.3523	
15 minute summer	32A	9.000	32	38.0	2.586	0.284	0.4074	
15 minute summer	33	1.013	Basin3A	906.9	3.654	1.518	7.8824	
30 minute summer	Basin3A	1.014	Basin3	686.6	3.067	0.504	18.0638	
15 minute summer	29	7.000	30	36.5	1.892	0.305	0.4467	
15 minute summer	30	7.001	13	87.4	3.772	0.559	0.3141	

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Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 99.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	13	10	36.051	0.166	104.5	0.4212	0.0000	OK
15 minute summer	31	10	36.269	0.169	80.2	0.1907	0.0000	OK
15 minute summer	14	10	35.501	0.201	226.4	0.5125	0.0000	OK
15 minute summer	14A	10	34.318	0.193	225.5	0.3416	0.0000	OK
480 minute winter	Basin3	480	34.234	1.084	131.7	1190.6130	0.0000	SURCHARGED
480 minute winter	fcc	480	34.234	1.108	14.3	2.8209	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	33.100	0.000	12.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	13	7.002	14	104.0	2.305	0.520	0.8184	
15 minute summer	31	8.000	14	79.6	2.649	0.793	0.5889	
15 minute summer	14	7.003	14A	225.5	3.838	0.473	1.2263	
15 minute summer	14A	7.004	Basin3	224.5	4.457	0.373	0.6199	
480 minute winter	Basin3	1.015	fcc	14.3	0.191	0.018	5.1714	
480 minute winter	Basin3	Infiltration		0.0				
480 minute winter	fcc	Hydro-Brake®	OUTFALL	12.5				1262.9

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	48.129	0.669	108.6	0.7562	0.0000	SURCHARGED
15 minute summer	18	11	47.632	0.672	111.5	0.7605	0.0000	SURCHARGED
15 minute summer	2	11	47.456	0.577	217.8	0.8254	0.0000	SURCHARGED
15 minute summer	3	11	46.153	0.593	236.0	0.8480	0.0000	SURCHARGED
15 minute summer	19	10	46.511	0.096	36.2	0.1089	0.0000	OK
15 minute summer	20	10	45.910	0.100	48.7	0.1128	0.0000	OK
15 minute summer	4	11	44.709	0.664	376.3	1.1734	0.0000	SURCHARGED
15 minute summer	5	11	43.459	0.424	440.7	0.7496	0.0000	OK
15 minute summer	6	12	43.061	0.351	448.1	0.6194	0.0000	OK
15 minute summer	21	10	43.772	0.092	41.1	0.1035	0.0000	OK
15 minute summer	22	12	42.128	0.203	53.5	0.2300	0.0000	OK
15 minute summer	7	12	42.108	0.808	581.0	1.4270	0.0000	SURCHARGED
15 minute summer	8	12	41.216	1.226	588.5	2.1658	0.0000	SURCHARGED
15 minute summer	23	10	41.974	0.104	44.0	0.1172	0.0000	OK
15 minute summer	24	9	41.450	0.099	48.8	0.1125	0.0000	OK
15 minute summer	9	12	40.604	0.939	735.5	2.3909	0.0000	SURCHARGED
15 minute summer	10	12	39.677	0.977	758.0	2.4868	0.0000	SURCHARGED
15 minute summer	11	12	38.632	0.792	795.3	2.0163	0.0000	SURCHARGED
15 minute summer	12	11	37.474	1.439	852.0	3.6630	0.0000	SURCHARGED
15 minute summer	32	11	36.735	1.385	968.9	3.5238	0.0000	SURCHARGED
15 minute summer	32A	11	36.841	0.176	47.9	0.1991	0.0000	OK
15 minute summer	33	11	35.849	1.399	1045.9	3.5615	0.0000	SURCHARGED
30 minute summer	Basin3A	22	34.659	0.459	1022.6	188.6538	0.0000	OK
15 minute summer	29	10	38.476	0.096	46.0	0.1088	0.0000	OK
15 minute summer	30	10	37.331	0.161	110.4	0.1816	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	107.3	2.698	1.040	0.5156	
15 minute summer	18	2.000	2	110.5	1.571	1.288	0.9519	
15 minute summer	2	1.001	3	210.6	3.286	0.933	2.2705	
15 minute summer	3	1.002	4	223.3	3.471	0.890	2.0048	
15 minute summer	19	3.000	20	36.0	2.361	0.325	0.1795	
15 minute summer	20	3.001	4	48.4	1.413	0.242	2.3876	
15 minute summer	4	1.003	5	373.6	3.423	0.998	2.9660	
15 minute summer	5	1.004	6	439.7	3.157	0.806	1.6323	
15 minute summer	6	1.005	7	437.1	3.545	0.758	6.4778	
15 minute summer	21	4.000	22	40.8	2.769	0.325	0.5185	
15 minute summer	22	4.001	7	53.4	1.858	0.219	0.6821	
15 minute summer	7	1.006	8	564.0	3.604	0.672	3.1033	
15 minute summer	8	1.007	9	579.0	2.680	1.161	6.6367	
15 minute summer	23	5.000	24	43.9	2.550	0.359	0.1638	
15 minute summer	24	5.001	9	48.6	2.715	0.397	0.7105	
15 minute summer	9	1.008	10	702.9	3.432	0.823	6.7502	
15 minute summer	10	1.009	11	763.0	4.161	0.925	6.4533	
15 minute summer	11	1.010	12	792.1	4.314	0.693	6.7674	
15 minute summer	12	1.011	32	856.7	3.042	0.874	9.5446	
15 minute summer	32	1.012	33	971.2	3.448	0.885	8.3523	
15 minute summer	32A	9.000	32	45.8	2.742	0.342	0.5645	
15 minute summer	33	1.013	Basin3A	1042.1	4.078	1.745	8.4286	
30 minute summer	Basin3A	1.014	Basin3	858.8	3.197	0.630	22.3850	
15 minute summer	29	7.000	30	45.8	1.960	0.384	0.5382	
15 minute summer	30	7.001	13	109.8	3.925	0.703	0.3788	

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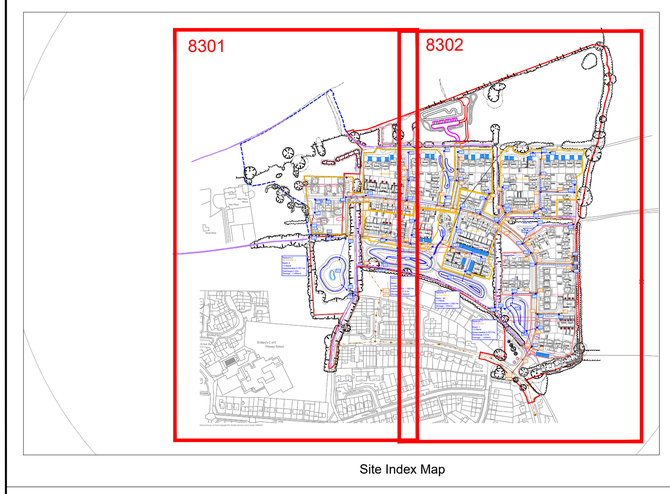
Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	13	10	36.081	0.196	131.3	0.4989	0.0000	OK
15 minute summer	31	11	36.453	0.353	100.7	0.3995	0.0000	SURCHARGED
15 minute summer	14	10	35.531	0.231	278.1	0.5883	0.0000	OK
480 minute winter	14A	472	34.403	0.278	31.2	0.4915	0.0000	OK
480 minute winter	Basin3	472	34.403	1.253	162.6	1460.4510	0.0000	SURCHARGED
480 minute winter	fcc	480	34.403	1.277	14.1	3.2506	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	33.100	0.000	12.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	13	7.002	14	130.7	2.435	0.653	0.9718	
15 minute summer	31	8.000	14	97.2	2.725	0.969	0.7176	
15 minute summer	14	7.003	14A	276.7	3.967	0.581	1.4561	
480 minute winter	14A	7.004	Basin3	36.3	1.686	0.060	1.0233	
480 minute winter	Basin3	1.015	fcc	14.1	0.192	0.018	5.1714	
480 minute winter	Basin3	Infiltration		0.0				
480 minute winter	fcc	Hydro-Brake®	OUTFALL	12.5				1271.4

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APPENDIX I
WORKING DRAWINGS AND SURFACE WATER DRAINAGE STRATEGY



Site Index Map

CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:–

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

Notes:

1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings and specifications.
2. Layout based on the Geoff Perry Associates Drawing Layout Rev E dated June 2025.
3. Topo Survey information taken from NJC Surveys Drawing S1572, dated March 2019
4. All levels quoted are in metres A.O.D.
5. For Levels Layout see Drawing No's. 890815-RSK-ZZ-XX-DR-C.8200 series Site Site Levels.
6. All drainage to be installed to Southern Water adoptable standards, DCG compliant.
7. All road gullies shall be located away from proposed entrances to houses.
8. For tree protection areas and trees to be removed refer to the Arborculturalist's drawings and/or report.

Drainage Legend:

- Proposed Adoptable Surface Water Sewer
- Adoptable Surface Water Manhole
- Permeable Block Paving
- Proposed Headwall
- Attenuation Basin Storage
- Proposed Flow Control
- Road Gully
- Proposed Adoptable Foul Water Sewer
- Proposed Adoptable Manhole
- Planning Application Boundary
- 1.001 Flow Modelling Pipe reference
- Network Catchments
- FFL 44.100 Finished Floor Level

Network 2
NETWORK 2
Basin 4
1:3 Bank
Impermeable 0.757 Ha
Discharge 5.2l/s
Storage - 1,450m3

Network 3
NETWORK 3
Basin 3
1:3 Bank
Impermeable 1.188 Ha
Discharge 12.5 l/s
Storage - 1,460m3

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P06	04.07.25	Updated to suit new Redrow House Type layout	MA	GXA	RD
P05	30.06.25	Updated to suit new site layout	SH	GXA	RD
P04	13.12.2024	Issued for PLANNING RESUBMISSION	SH	GXA	RD
P03	25.10.2024	Issued for PLANNING SUBMISSION	SH	GXA	RD
P02	21.10.2024	Preliminary Issue following BDW comments from workshop.	GXA	GXA	RD
P01	27.09.2024	Preliminary Issue	GXA	GXA	RD

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Client
BARRATT DAVID WILSON (SOUTHERN COUNTIES)

Project Title
NEW PLACE FARM
PULBOROUGH
WEST SUSSEX

Status: PLANNING

Drawing Title
SITE DRAINAGE WEST

Drawn	Date	Checked	Date	Approved	Date
GXA	08.24	GXA	08.24	RD	08.24

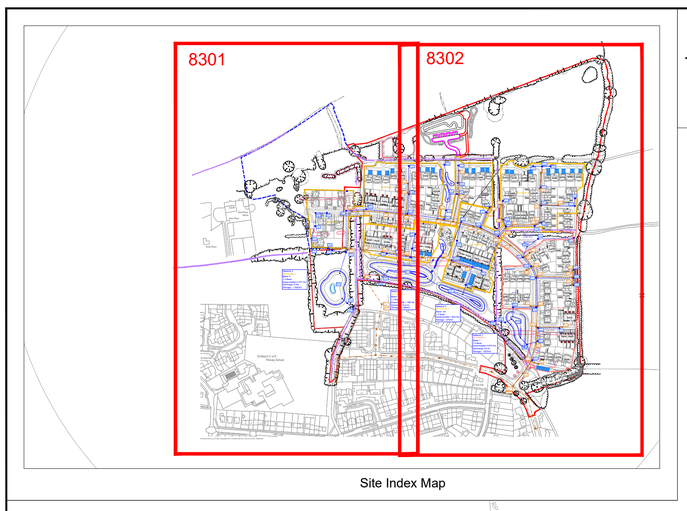
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Project No.: 890815
Drawing File: 890815-RSK-ZZ-XX-DR-C-8300 to 8302 Site Drainage.dwg

Drawing No.							Rev.
890815	RSK	ZZ	XX	DR	C	8301	P06
Project	Orig.	Vol./Sys.	Lev./Loc.	Type	Role	Draw. No.	

Scale: 0 5 10 15 20 25m

File Location: Z:\890815 - NEW PLACE FARM, PULBOROUGH\GRAPHIC\INFRASTRUCTURE\DRAWINGS\8- PLANNING\890815-RSK-ZZ-XX-DR-C-8300 TO 8302 SITE DRAINAGE.DWG



Site Index Map

CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:–

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

Notes:

1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings and specifications.
2. Layout based on the Geoff Perry Associates Drawing Layout Rev E dated June 2025.
3. Topo Survey information taken from NJC Surveys Drawing S1572, dated March 2019
4. All levels quoted are in metres A.O.D.
5. For Levels Layout see Drawing No's. 890815-RSK-ZZ-XX-DR-C.8200 series Site Site Levels.
6. All drainage to be installed to Southern Water adoptable standards, DCG compliant.
7. All road gullies shall be located away from proposed entrances to houses.
8. For tree protection areas and trees to be removed refer to the Arboculturalist's drawings and/or report.

Drainage Legend:

- Proposed Adoptable Surface Water Sewer
- Adoptable Surface Water Manhole
- Permeable Block Paving
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- Road Gully
- Proposed Adoptable Foul Water Sewer
- Proposed Adoptable Manhole
- Planning Application Boundary
- 1.001 Flow Modelling Pipe reference
- Network Catchments
- FFL 44.100 Finished Floor Level

Network 3
NETWORK 3
Basin 3
1:3 Bank
Impermeable 1.188 Ha
Discharge 12.5 l/s
Storage - 1,460m3

Network 3
NETWORK 3
Basin 3A
1:3 Bank
Impermeable 1.083 Ha
Storage - 374m3

Network 1
NETWORK 1
Basin 1
1:3 Bank
Impermeable 0.970 Ha
Discharge 4.9 l/s
Storage - 1223m3

Basin 5
Impermeable 0.065 Ha
Storage - 24m3

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P06	04.07.25	Updated to suit new Redrow House Type layout	MA	GXA	RD
P05	30.06.25	Updated with new site layout	SH	GXA	RD
P04	13.12.2024	Issued for PLANNING RESUBMISSION	SH	GXA	RD
P03	25.10.2024	Issued for PLANNING SUBMISSION	SH	GXA	RD
P02	15.10.2024	Preliminary Issue following BDW comments from workshop.	GXA	GXA	RD
P01	.27.09.2024	Preliminary Issue	GXA	GXA	RD

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Client
BARRATT DAVID WILSON (SOUTHERN COUNTIES)

Project Title
NEW PLACE FARM
PULBOROUGH
WEST SUSSEX

Status
PLANNING

Drawing Title
SITE DRAINAGE EAST

Drawn	Date	Checked	Date	Approved	Date
GXA	08.24	GXA	08.24	RD	08.24

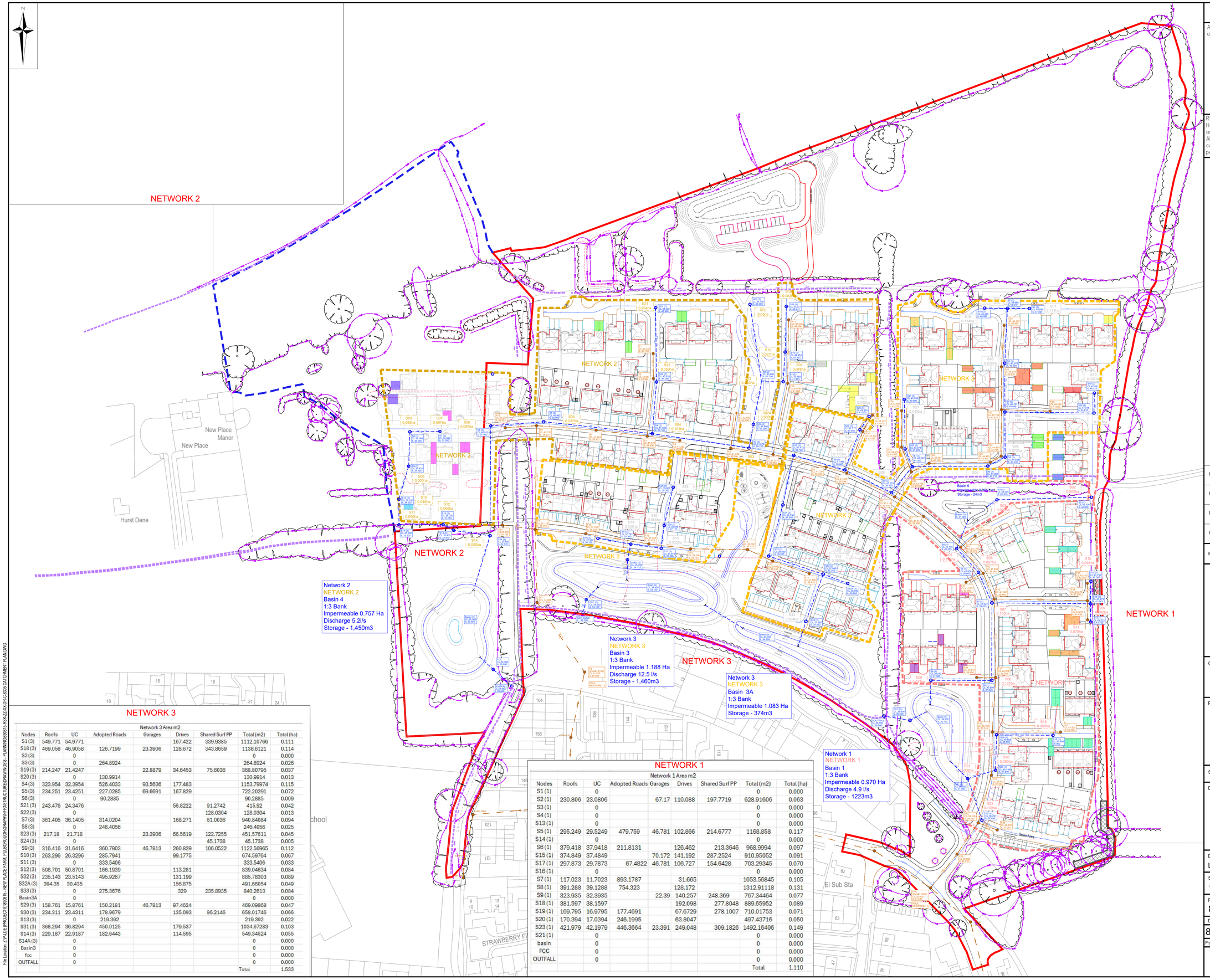
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Project No. 890815
Drawing File 890815-RSK-ZZ-XX-DR-C-8300 to 8302 Site Drainage.dwg
Drawing No.

Project	Orig.	Vol./Sys.	Lev./Loc.	Type	Role	Draw. No.	Rev.
890815	RSK	ZZ	XX	DR	C	8302	P06

Scale 0 5 10 15 20 25m

File Location: Z:\890815 - NEW PLACE FARM, PULBOROUGH\GRAPHIN\FRASTRUCTURE\DRAWINGS\8 - PLANNING\890815-RSK-ZZ-XX-DR-C-8300 TO 8302 SITE DRAINAGE.DWG



NETWORK 3

Network 3 Area m2

Nodes	Roofs	UC	Adopted Roads	Garages	Drives	Shared Surf PP	Total (m2)	Total (ha)
S1 (3)	549.771	54.9771			167.422	339.9385	1112.10766	0.111
S18 (3)	469.058	46.9058	126.7199	23.3906	128.672	343.8659	1138.6121	0.114
S2 (3)		0					0	0.000
S3 (3)		0	264.8924				264.8924	0.026
S19 (3)	214.247	21.4247		22.8879	34.6453	75.6036	368.80795	0.037
S20 (3)		0	130.9914				130.9914	0.013
S4 (3)	323.954	32.3954	526.4033	93.5636	177.483		1153.79974	0.115
S5 (3)	234.251	23.4251	227.0285	69.6691	167.829		722.20291	0.072
S6 (3)		0	90.2885				90.2885	0.009
S21 (3)	243.476	24.3476			56.8222	91.2742	415.92	0.042
S22 (3)		0				128.0304	128.0304	0.013
S7 (3)	361.405	36.1405	314.0204		168.271	61.0036	940.84084	0.094
S8 (3)		0	246.4056				246.4056	0.025
S23 (3)	217.18	21.718		23.3906	66.5619	122.7255	451.57611	0.045
S24 (3)		0				45.1738	45.1738	0.005
S9 (3)	316.416	31.6416	360.7903	46.7813	260.829	106.0522	1122.50965	0.112
S10 (3)	263.296	26.3296	285.7941		99.1775		674.59764	0.067
S11 (3)		0	333.5406				333.5406	0.033
S12 (3)	508.701	50.8701	166.1939		113.281		839.04634	0.084
S32 (3)	235.143	23.5143	495.9267		131.199		885.78303	0.089
S32A (3)	304.35	30.435			156.875		491.66054	0.049
S33 (3)		0	275.3676		329	235.8935	840.2613	0.084
Basin3A		0					0	0.000
S29 (3)	158.761	15.8761	150.2181	46.7813	97.4624		469.09868	0.047
S30 (3)	234.311	23.4311	178.9679		135.093	86.2146	658.01746	0.066
S13 (3)		0	219.392				219.392	0.022
S31 (3)	368.294	36.8294	450.0125		179.537		1034.67283	0.103
S14 (3)	229.187	22.9187	182.6443		114.595		549.34524	0.055
S14A (3)		0					0	0.000
Basin3		0					0	0.000
fcc		0					0	0.000
OUTFALL		0					0	0.000
						Total		1.533

NETWORK 1

Network 1 Area m2

Nodes	Roofs	UC	Adopted Roads	Garages	Drives	Shared Surf PP	Total (m2)	Total (ha)
S1 (1)		0					0	0.000
S2 (1)	230.806	23.0806		67.17	110.088	197.7719	628.91606	0.063
S3 (1)		0					0	0.000
S4 (1)		0					0	0.000
S13 (1)		0					0	0.000
S5 (1)	295.249	29.5249	479.759	46.781	102.866	214.6777	1168.858	0.117
S14 (1)		0					0	0.000
S6 (1)	379.418	37.9418	211.8131		126.462	213.3646	968.9994	0.097
S15 (1)	374.849	37.4849		70.172	141.192	287.2524	910.95052	0.091
S17 (1)	297.873	29.7873	67.4822	46.781	106.727	154.6428	703.29345	0.070
S16 (1)		0					0	0.000
S7 (1)	117.023	11.7023	893.1787		31.665		1053.56845	0.105
S8 (1)	391.288	39.1288	754.323		128.172		1312.91118	0.131
S9 (1)	323.935	32.3935		22.39	140.257	248.369	767.34464	0.077
S18 (1)	381.597	38.1597			192.098	277.8048	889.65952	0.089
S19 (1)	169.795	16.9795	177.4691		67.6729	278.1007	710.01753	0.071
S20 (1)	170.394	17.0394	246.1995		63.8047		497.43716	0.050
S23 (1)	421.979	42.1979	446.3664	23.391	249.048	309.1826	1492.16406	0.149
S21 (1)		0					0	0.000
basin		0					0	0.000
FCC		0					0	0.000
OUTFALL		0					0	0.000
						Total		1.110

CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

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Notes:

1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings and specifications.
2. Topographical Survey and Levels from NJC Survey Ltd, Drawing Number S1572 Dated 18th March 2019
3. Layout based on FINC Architects Drawing 24.1874.1001 Dated August 2024.

Legend:

- Proposed Adoptable Surface Water Sewer (1.001)
- Adoptable Surface Water Manhole
- Proposed Adoptable Foul Water Sewer (1.001)
- Adoptable Foul Water Manhole
- Hatch area going into proposed manhole, shown in various c
- S01 0.111ha — Total Catchment Area for each Node in Ha (Includes 10% Urban Creep Housing)
- Existing Ditch
- Planning Boundary
- Network 1 Boundary
- Network 2 Boundary
- Network 3 Boundary

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P04	30.06.2025	Updated to suit new site layout & amended catchment areas	MA	GXA	RD
P03	13.11.2024	Issued for PLANNING RESUBMISSION	CPM	GXA	RD
P02	25.10.2024	Issued for PLANNING	CPM	GXA	RD
P01	20.09.2024	Preliminary Issue	LN	GXA	RD

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Client
BARRATT DAVID WILSON (SOUTHERN COUNTIES)

Project Title
NEW PLACE FARM
PULBOROUGH
WEST SUSSEX

Status
PLANNING

Drawing Title
CATCHMENT PLAN

Drawn	Date	Checked	Date	Approved	Date
LN	09.24	GXA	09.24	RD	09.24

Scale	Orig Size	Dimensions
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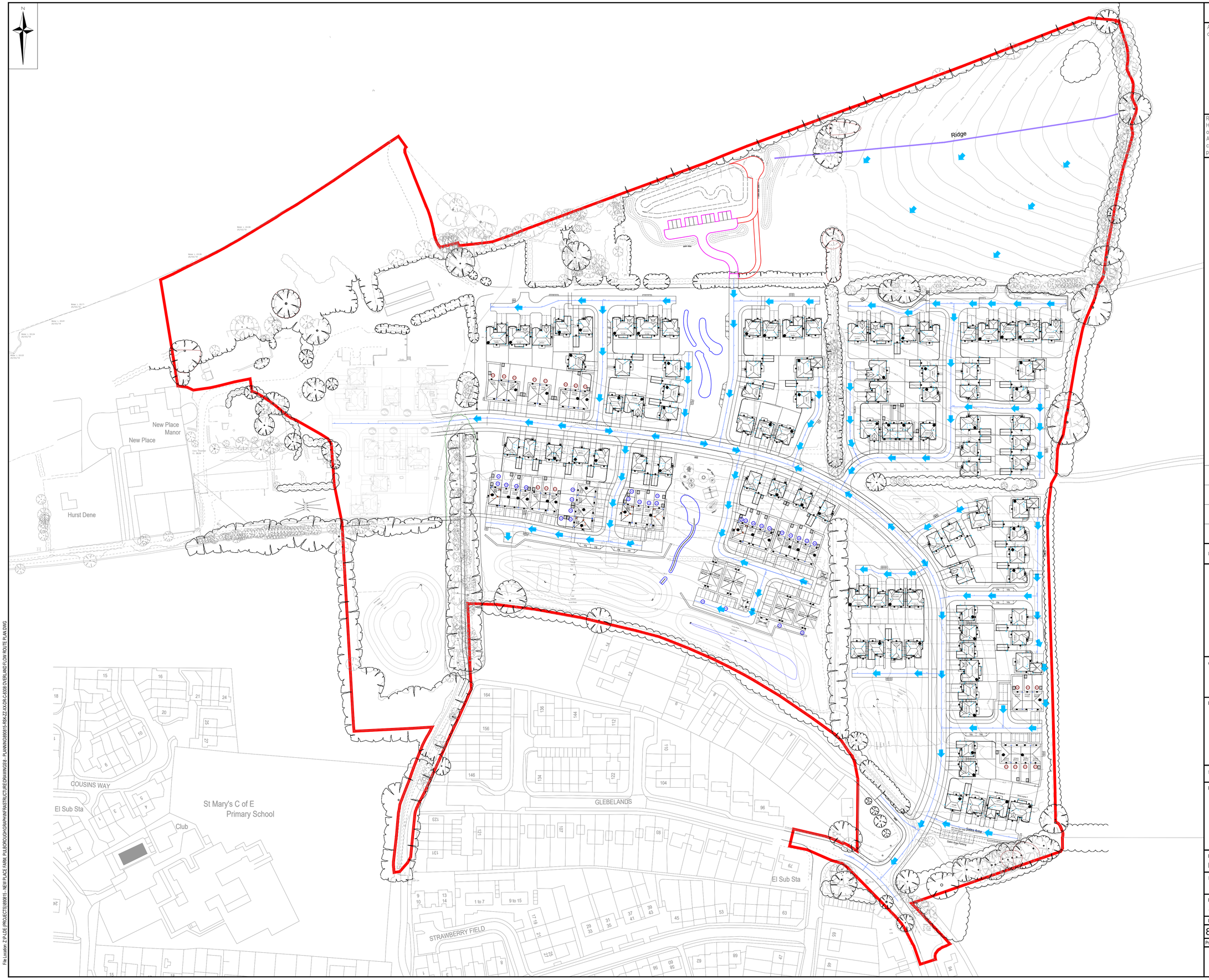
Project No. 890815
Drawing File 890815-RSK-ZZ-XX-DR-C-8305 Catchment plan.dwg

Drawing No. 890815 | RSK | ZZ | XX | DR | C | 8305 | Rev. P04

Project	Orig.	Vol./Sys.	Lev./Loc.	Type	Role	Draw. No.	

Scale
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File Location: Z:\P-LDE (PROJECTS)\890815 - NEW PLACE FARM, PULBOROUGH\GRAPHIN\FRASTRUCTURE\DRAWINGS\8 - PLANNING\890815-RSK-ZZ-XX-DR-C-8305 CATCHMENT PLAN.DWG



CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

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Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

Notes:

1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings and specifications.
2. This drawing is to be printed in COLOUR.
3. All levels quoted are in metres A.O.D.
4. For Drainage information, refer to 890815 - RSK-ZZ-XX-DR-C-8300 to 8302 Site Drainage.
5. Topographical Survey and Levels from NJC Survey Ltd, Drawing Number S1572 Dated 18th March 2019
6. Layout based on FINC Architects Drawing 24.1874.1001 Dated August 2024.

Legend:

Overland Flow Route

Site Boundary

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P04	30.06.2025	Updated to suit new site layout	LN	GXA	RD
P03	13.12.2024	Issued for PLANNING RESUBMISSION	LN	GXA	RD
P02	25.10.2024	Issued for PLANNING	LN	GXA	RD
P01	23.10.2024	Preliminary Issue	LN	GXA	RD

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Client
BARRATT DAVID WILSON (SOUTHERN COUNTIES)

Project Title
NEW PLACE FARM
PULBOROUGH
WEST SUSSEX

Status
PLANNING

Drawing Title
OVERLAND FLOW ROUTE PLAN

Drawn	Date	Checked	Date	Approved	Date
LN	09.24	GXA	09.24	RD	09.24

Scale	Orig Size	Dimensions
1:1,000	A1	m

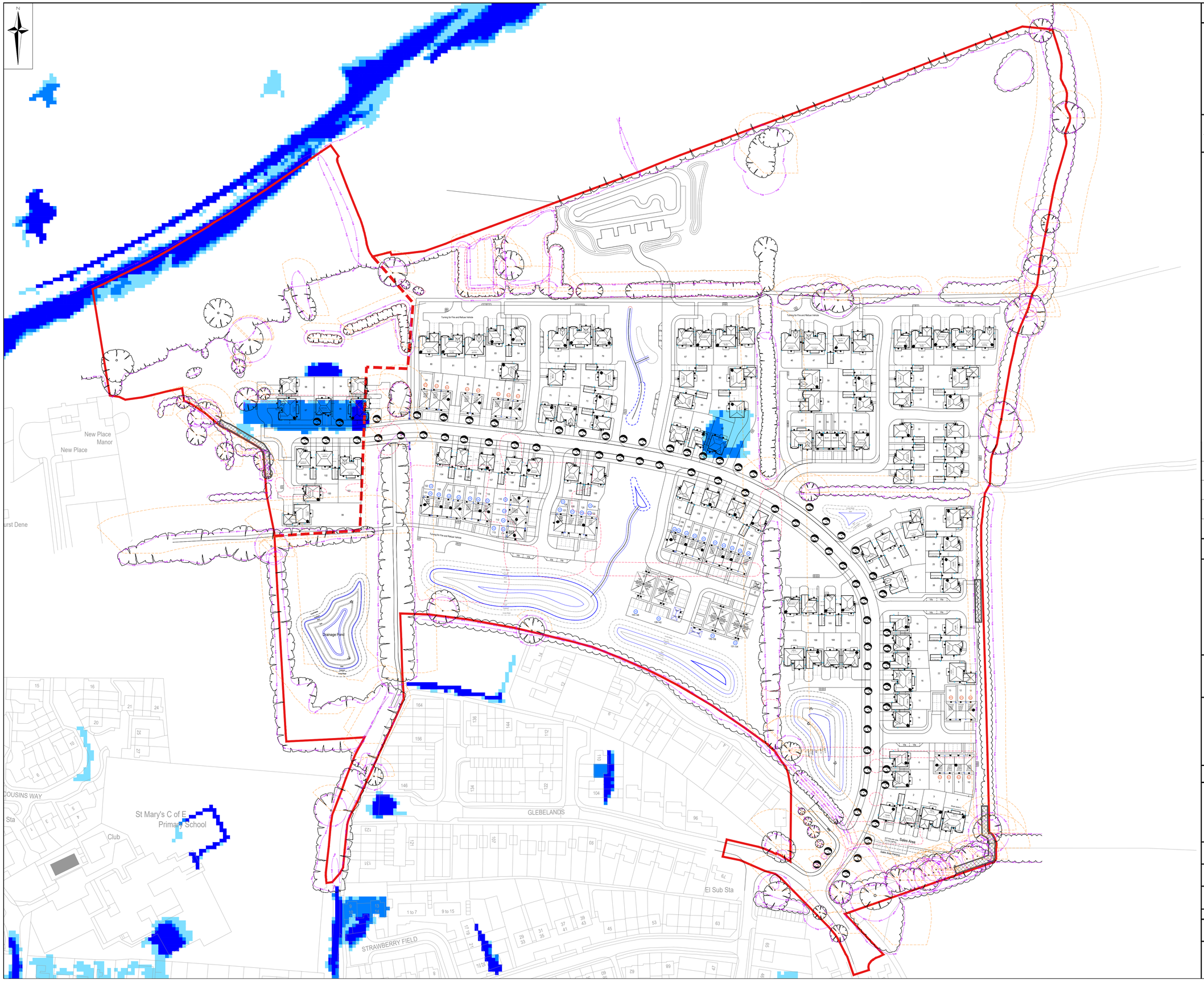
Project No.	Drawing File
890815	890815-RSK-ZZ-XX-DR-C-8308 Overland Flow Route Plan.dwg

Drawing No.

Project	Orig.	Vol./Sys.	Lev./Loc.	Type	Role	Draw. No.	Rev.
890815	RSK	ZZ	XX	DR	C	8308	P04

Scale
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File Location: Z:*-LDE (PROJECTS)\890815 - NEW PLACE FARM, PULBOROUGH\GRAPHIN\FRASTRUCTURE\DRAWINGS\4 - PLANNING\890815-RSK-ZZ-XX-DR-C-8308 OVERLAND FLOW ROUTE PLAN.DWG



RSK LDE LTD - Hydrology Drawing

Notes:

1. This drawing has been produced to planning/viability purposes only.
2. This drawing is indicative and subject to change following layout revisions
3. This drawing is to be read in conjunction with all other relevant drawings and reports.
4. Development Plan provided by the client
5. Topographic Survey provided by the client
6. All dimensions are in metres U.N.O
7. All levels in metres.
8. Do Not Scale from this drawing
9. The details provided on this drawing are subject to comments by all the relevant approving authorities. Until such time as all comments have been received and incorporated onto the drawings, all the information provided and costings, are used at Client's risk and no liability will be accepted by RSK. Scheme based on Client's site plan.

-

KEY

- REDLINE BOUNDARY
- 3.3% AEP SURFACE WATER EXTENT
- 1.0% AEP SURFACE WATER EXTENT
- 0.1% AEP SURFACE WATER EXTENT

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
01	07/07/2025	UPDATED LAYOUT	JW	CW	CW

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Client

BDW SOUTHERN COUNTIES

Project Title

NEW PLACE FARM,
PULBOROUGH

Status

WORK IN PROGRESS

Drawing Title

EA SURFACE WATER
FLOOD RISK OVERLAY

Drawn	Date	Checked	Date	Approved	Date
JW	07/07/2025	CW	07/07/2025	CW	07/07/2025

Scale	Orig Size	Dimensions	Revision
NTS			

Drawing File

681387-R1-RSK-A-ALL-P01.DWG

Project No.	Originator	Unit	Site Area	Series	Number	Sheet
681387	RSK		ALL	01	01	01

APPENDIX J
LLFA SUDS PROFORMA

Surface Water Drainage Proforma

West Sussex County Council (WSCC) as Lead Local Flood Authority recommends this proforma is completed and submitted to support any planning application for a major development. The information contained in this form will be used by WSCC officers in their role as 'statutory consultee' on surface water drainage. The proforma should accompany the site-specific Flood Risk Assessment and Drainage Strategy submitted as part of the planning application.

1. Site Details

No.	Requirement	Answer	Application Type
1.1	Address including postcode	New Place Farm, Pulborough, RH20 2GN	Outline & Full
1.2	OS grid reference (easting and northing)	505650 E, 119323 N	Outline & Full
1.3	Planning application reference		Outline & Full
1.4	Total site area (hectares)	16.298Ha	Outline & Full
1.5	Pre-development use	Mixture of hardstanding structures and areas of soft landscaping used to cultivate plants for New Place Nursery	Outline & Full
1.6	Proposed design life	170 dwellings, with access, green spaces and associated amenities.	Outline & Full
1.7	Have agreements in principle for discharge been provided (where applicable)? (YES/NO)		Outline & Full
1.8	Topographic Survey Plan showing existing site layout, site levels and drainage system	Appendix B - 681387-R1(1)-FRA	Outline & Full

2. Discharge Hierarchy/Methods of Discharge[1]

No.	Requirement	Answer	Application Type
2.1	Store rainwater for later use (reuse) (YES/NO)	NO	Full
2.2	Infiltration techniques such as soakaways, permeable paving, etc (YES/NO)	YES	Outline & Full
2.3	Hybrid (YES/NO)	YES	Outline & Full

[1] Runoff may be discharged via one or multiple methods.

No.	Requirement	Answer	Application Type
2.4	Attenuation with restricted discharge to watercourse (YES/NO)	YES	Outline & Full
2.5	Attenuation with restricted discharge to surface water sewer (YES/NO)	NO	Outline & Full
2.6	Attenuation with restricted discharge to combined sewer (YES/NO)	NO	Outline & Full

3. Calculation Inputs

No.	Requirement	Answer	Application Type
3.1	Area within site which is drained by SuDS[2] (hectares)	3.99Ha	Outline & Full
3.2	Impermeable area drained pre-development[3] (hectares)	1.40Ha	Outline & Full
3.3	Impermeable area drained post-development[3] (hectares)	3.99Ha	Outline & Full
3.4	Urban Creep (hectares)	0.10Ha	Outline & Full
3.5	Climate change factor applied (1 in 30 and 1 in 100) (percentage)	45%	Outline & Full

4. Infiltration Feasibility/Ground Investigations

No.	Requirement	Answer	Application Type
4.1	Has winter groundwater monitoring and infiltration been undertaken? (YES/NO)	YES	Outline & Full
4.2	Period of winter groundwater monitoring (from/to)	12 months	Outline & Full
4.3	Depth to highest recorded groundwater level (mAOD)	None present	Full
4.4	Infiltration rate	average rate of 2.12x10^-5 (not acceptable)	Outline & Full

[2] Impermeable area should be measured pre and post development. Impermeable surfaces include roofs, pavements, driveways and paths, where runoff is conveyed to the drainage system.

[3] 10% Urban Creep should be added to the volumes required for storage and not increase discharge rates.

No.	Requirement	Answer	Application Type
4.5	Depth of infiltration structure (mAOD)	n/a	Full
4.6	Safety factor used for sizing infiltration storage	n/a	Outline & Full

5. Calculation Outputs: Greenfield Runoff Rates[4]

No.	Requirement	Answer	Application Type
5.1	Qbar (l/s)	24.28	Outline & Full
5.2	1 in 1 year rainfall (l/s)	20.78	Outline & Full
5.3	1 in 30 year rainfall (l/s)	55.15	Outline & Full
5.4	1 in 100 year rainfall (l/s)	77.54	Outline & Full

6. Calculation Outputs: Brownfield Runoff Rates (including Urban Creep) (if applicable)

No.	Requirement	Answer	Application Type
6.1	1 in 1 year rainfall (l/s)	n/a	Outline & Full
6.2	1 in 30 year rainfall (l/s)	n/a	Outline & Full
6.3	1 in 100 year rainfall (l/s)	n/a	Outline & Full

7. Calculation Outputs: Volume Control/Infiltration Provision

No.	Requirement	Answer	Application Type
7.1	Infiltration (m^3)	n/a	Outline & Full
7.2	Attenuation (m^3)	5013	Outline & Full
7.3	Separate volume designated as long-term storage[5] (m^3)	0	Full
7.4	Total volume control (sum of inputs for 7.1 to 7.3) (m^3)	5103	Full

[4] Flows within long term storage areas should be infiltrated to the ground or discharged at low flow rate of maximum 2 litres per second per hectare (l/s/ha).

[5] In calculations and for the avoidance of doubt FEH shall be used FSR is not acceptable, and CV values must equal 1.

8. Calculation Outputs: Attenuation/Restricted Discharge

No.	Requirement		Answer	Application Type
8.1	Proposed discharge rate (critical storm)	1 in 1 (100%) AEP (m/s)	0.0226	Outline & Full
		1 in 30 (3.33%) AEP (m/s)	0.0226	Outline & Full
		1 in 30 (3.33%) AEP plus climate change (m/s)	0.0226	Outline & Full
		1 in 100 (1%) AEP (m/s)	0.0226	Outline & Full
		1 in 100 (1%) AEP plus climate change (m/s)	0.0226	Outline & Full
8.2	Calculations show critical storm durations (both by max height and max discharge) for 1 in 1, 1 in 30, 1 in 30 plus climate change, 1 in 100 and 1 in 100 year plus climate change allowance can be accommodated on site (YES/NO)		YES - Appendix H - 681387-R1(1)-FRA	Outline & Full
8.3	Has treatment of potential contaminants been considered? (YES/NO)		YES	Outline & Full
8.4	Demonstration of source control features with substantive evidence why these cannot be used if not (YES/NO)		YES	Full
8.5	If discharging into a watercourse, piped system or the sea, has the proposed drainage network been modelled against predicted top water levels for the 1 in 100 year storm event plus climate change allowance, within the existing system? (YES/NO)		YES	Full

9. Other Supporting Details

No.	Requirement	Answer	Application Type
9.1	Plan detailing location of groundwater monitoring and infiltration testing	n/a	Outline & Full
9.2	Detailed drainage design layout	YES - Appendix I - 681387-R1(1)-FRA - 890815-RSK-ZZ-XX-DR-C-8301 Rev P06 Site Drainage East & West	Full
9.3	Maintenance strategy	YES - Appendix K - 681387-R1(1)-FRA - SUDS Management Strategy Report	Full

No.	Requirement	Answer	Application Type
9.4	Detailed development layout	YES - Appendix D - 681387-R1(1)-FRA - 890815 - RSK-ZZ-XX-DR-C-8000 Rev P03 Site Layout	Full
9.5	Impermeable area plan	YES - Appendix I - 681387-R1(1)-FRA - 890815-RSK-ZZ-XX-DR-C-8305 Rev P04 Catchment Plan	Full
9.6	Phasing plan?	Not available at pesent	Full
9.7	If ground levels are being raised over 300mm above existing levels and is unavoidable, have detailed plans been provided, together with drainage proposals, to address any potential drainage related issues?	No	Full

The above form should be completed using evidence from information which should be appended to this form. The information being submitted should be proportionate to the site conditions, flood risks and magnitude of development. It should serve as a summary of the drainage proposals and should clearly show that the proposed discharge rate and volume as a result of development will not be increasing. Where there is an increase in discharge rate or volume, then the relevant section of this form must be completed with clear evidence demonstrating how the requirements will be met.

This form is completed using factual information and can be used as a summary of the surface water drainage strategy on this site.

Form completed by	Granville Ashworth
Qualification of person responsible for signing off this proforma	Senior Infrastructure Engineer
Company	RSK LDE
On behalf of (client's details)	BDW Southern Counties
Date	10.07.2025

Flood Risk Validation Checklist for Planning Applications

SITE NAME	New Place Farm, Pulborough
DATE	10/07/2025

1. Proforma

Description	**Document/Drawing Ref and Page No.** **APPLICANT TO COMPLETE**	**Submitted? (Yes/No)** **LPA TO CHECK**
Application only be validated by LPA if the LLFA surface water proforma is completed and attached	Appendix J - 681387-R1 (1)-FRA	YES

2. Site Surveys (if appropriate)

Description	**Document/Drawing Ref and Page No.** **APPLICANT TO COMPLETE**	**Submitted? (Yes/No)** **LPA TO CHECK**
Topographic survey	Appendix B - 681387-R1(1)-FRA	YES
Details of existing site layout, drainage, and catchment areas plus pre- and post-development impermeable areas	Section 2 - 681387-R1(1)-FRA Section 7 - 681387-R1(1)-FRA Appendix I - 681387-R1(1)-FRA	YES
Evidence of % increase for urban creep and how it has been applied to post-development calculations	Appendix I - 681387-R1(1)-FRA - 890815-RSK-ZZ-XX-DR-C-8305 Rev P04 Catchment P	YES
Ground investigation including groundwater level information (for seasonally high groundwater level), potential contamination and infiltration testing (to BRE365 or similar)	Section 3 and Appendix M - 681387-R1(1)-FRA GRM Development Solutions Ltd, August 2022 (GRM/P7298/F.2)	YES
Existing drainage scheme survey, e.g., CCTV or historic plans	n/a	
Survey of existing waterbodies, e.g., watercourses, ponds or springs and culverts or bridges	Appendix L - 681387-R1(1)-FRA	YES

3. Plans and Drawings

Description	**Document/Drawing Ref and Page No.** **APPLICANT TO COMPLETE**	**Submitted? (Yes/No)** **LPA TO CHECK**
Layout drawing including drainage scheme SuDS and other water features. Including invert levels, cover levels, conveyance systems any pipe gradients, flow directions and labels that match any drainage modelling calculations. Outfall locations, control devices, attenuation systems and water quality treatment features.	Appendix I - 681387-R1(1)-FRA 890815-RSK-ZZ-XX-DR-C-8302 Rev P06 Site Drainage East 890815-RSK-ZZ-XX-DR-C-8302 Rev P06 Site Drainage West 890815-RSK-ZZ-XX-DR-C-8308 Rev P04 Overland Flow Route 890815-RSK-ZZ-XX-DR-C-8305 Rev P04 Catchment Plan	YES

Description	Document/Drawing Ref and Page No. APPLICANT TO COMPLETE	Submitted? (Yes/No) LPA TO CHECK
High level construction management plan including phasing access arrangements and operational characteristics. Temporary drainage and water pollution including discharge points and flow controls should be included.	n/a	
Landscaping planting scheme for vegetated SuDS	n/a	
Maintenance plan and confirmation in principle of adopting authority for the lifetime of the development	Appendix K - 681387-R1(1)-FRA SUDS Management Strategy Report 890815-RSK-ZZ-XX-DR-C-8307 Rev P04 SUDS Management Plan	YES

4. Assessments

Description	Document/Drawing Ref and Page No. APPLICANT TO COMPLETE	Submitted? (Yes/No) LPA TO CHECK
Evidence that that the SuDS hierarchy and the 4 pillars have been met	Section 7.3.1 - 681387-R1(1)-FRA	YES
Full supporting calculations for the drainage design including design parameters using FEH and predevelopment greenfield runoff rates/volumes	Appendix G - 681387-R1(1)-FRA Appendix H - 681387-R1(1)-FRA	YES
Critical storm simulation results of the conveyance network by level and discharge for events 100% AEP, 3.33% AEP, 3.33% AEP plus climate change, 1% AEP and 1% AEP plus climate change	Appendix H - 681387-R1 (1)-FRA	YES
Evidence of calculations to support the sizing of storage features to accommodate the 3.33% AEP plus climate change and 1% AEP climate change critical storms	Appendix H - 681387-R1 (1)-FRA	YES
Evidence and drawing of where any flooding would occur during a 1% AEP plus climate change critical storm event would occur. Information should include extent, depth, and velocity of flooding, demonstrating that it would not leave the site boundary.	N/a - no flooding with SuDS drainage system	
Flood resistance and resilience measures 300mm above flood levels	Appendix I - 681387-R1(1)-FRA	YES
Drawing showing exceedance flows greater than 1% AEP plus climate change or if the drainage system is compromised	Appendix I - 681387-R1(1)-FRA 890815-RSK-ZZ-XX-DR-C-8308 Rev P04 Overland Flow Route	YES

5. Supplementary Evidence

Description	Document/Drawing Ref and Page No. APPLICANT TO COMPLETE	Submitted? (Yes/No) LPA TO CHECK
Confirmation of discharge location approval (in principal agreements from third parties if appropriate)	n/a	
Confirmation of any consents required	n/a	
Evidence of predevelopment discharge capacity analysis (where discharging from an existing pipe)	n/a	

APPENDIX K
SUDS MANAGEMENT STRATEGY



BDW Southern Counties

New Place Farm, Pulborough

Sustainable Drainage System (SuDS) Management Strategy

681387-R2(1)
July 2025

DNV ISO 9001 · ISO 14001 · ISO 45001
INVESTORS IN PEOPLE We invest in people Standard

LDE
CIVILS | STRUCTURES | HYDROLOGY
an RSK company

RSK GENERAL NOTES

Project No.: 681387-R2(1)

Site: New Place Farm, Pulborough

Title: Sustainable Drainage System (SuDS) Management Strategy

Client: BDW Southern Counties

Date: July 2025

Office: Hemel Hempstead

Status: Final

FRA Author	J Winfield	**Drainage Author**	G Ashworth
Signature		Signature	
Date:	10.07.2025	Date:	10.07.2025
Technical Reviewer	M Cheeseman	**Quality Reviewer**	C Whittingham
Signature		Signature	
Date:	10.07.2025	Date:	10.07.2025

Issue No	Version/Details	Date issued	Author	Reviewed by	Approved by
R1(0)	Draft	31.10.24	JW / GA	MC	CW
R1(1)	Final	10.07.25	JW / GA	MC	CW

RSK LDE Ltd (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.

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.

This work has been undertaken in accordance with the quality management system of RSK LDE Ltd.

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2 MAINTENANCE RESPONSIBILITIES 3
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APPENDICES
APPENDIX A EXAMPLE INSPECTION CHECKLIST

1 INTRODUCTION

This management strategy has been prepared by RSK Land and Development Engineering Ltd on behalf of BDW Southern Counties, to satisfy planning conditions related to new Place Farm, Pulborough, West Suusex (The Development).

The SUDS considered for the purposes of this statement, include drainage features that will be employed to reduce and manage surface water runoff from the development to a design return period of One hundred years plus climate change. This is required so that The Development will not increase the risk of flooding to the site and its environs. All drainage on site is taken to nearby surface water features. Such features include the following:

- Permeable paving;
- Infiltration / Detention Basins;
- Swales; and
- Filter strips and drains.

This document outlines the long-term maintenance of the proposed surface water system and will refer to the following documents, some of which provide further detail on the maintenance operations required:

- CIRIA Report C753, 'The SUDS Manual', 2015
- CIRIA Report C625, 'Model Agreements for Sustainable Water Management Systems', 2004; and
- Interpave, 'Permeable pavements: Guide to the Design, Construction and Maintenance of Concrete Block Permeable Pavements', ed. 4, 2006.

2 MAINTENANCE RESPONSIBILITIES

Responsibility for drainage within England and Wales rests with various bodies. For the Development, the drainage responsibilities will be divided between the following:

- **Private Landowner** – each Householder will be responsible for the maintenance of drainage features within individual property curtilages.
- **Communal Areas** - A Management company (to be confirmed) will be set up for the Development to maintain all permeable paving, stormwater attenuation tanks, detention basins, outfalls and any associated flow controls within communal areas. However, it should be noted that if, the Flood and Water Management Act 2010 is ever fully implemented this allows a surface water drainage system to be vested to the SUDS approving body (SAB) in this case West Sussex County Council. This would be reviewed at the time of any implementation of the act.

3 MAINTENANCE REGIME

As the maintenance of the communal SUDS features will be carried out via a Management Company, the form of agreement should include the required maintenance listed below. Should the maintenance be transferred at a later date to a public body, then the model agreement SUDS MA1 should be used, details of which can be found in the CIRIA guidance C625.

The following section describes the required maintenance for each feature in turn. The SUDS maintenance requirements listed below should be reviewed after the first 5 years, with a view to agreeing a new regime for the ongoing maintenance.

Notwithstanding the routine inspections and maintenance requirements, after severe storm events all features shall be inspected to clear debris and repair damaged structures or features. Records of the maintenance carried out shall be prepared by the Management Company.

3.1 Permeable Paving

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 reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required – once per 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 material.	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 installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three monthly 48h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

3.2 Detention Basins

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), as or 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 banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), the 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, outlet 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 and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

3.3 Swales

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove 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 when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspection 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 level	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of soil surface	As required
	Remove build up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

3.4 Attenuation Tanks

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, the annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of 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 actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

3.5 Soakaways

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year then annually
	Check soakaway to ensure emptying is occurring	Annually

3.6 Infiltration Basins

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter, debris and trash	Monthly
	Cut grass-for landscaped areas and access routes	Monthly (during growing season) or as required
	Cut grass-meadow 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
Occasional maintenance	Reseed areas of poor vegetation growth	Annually or as required
	Prune and trim trees and remove cuttings	As required
	Remove sediment from pre-treatment system when 50% full	As required
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realign the rip-rap	As required
	Repair or rehabilitate inlets, outlets and overflows	As required
	Rehabilitate infiltration surface using scarifying and spiking techniques if performance deteriorates	As required
	Relevel uneven surfaces and reinstate design levels	As required
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and pre-treatment systems for silty accumulation; establish appropriate silt removal frequencies	Half yearly
	Inspect infiltration surfaces for compaction and ponding	Monthly

3.7 Filter Strips

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the 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 filter strip surface to identify evidence of erosion, poor vegetation growth, compaction, ponding, sedimentation and contamination (e.g. oils)	Monthly (at start then half yearly)
	Check flow spreader and filter strip surface for even gradients	Monthly (at start then half yearly)
	Inspect gravel flow spreader upstream of filter strip for clogging	Monthly (at start then half yearly)
	Inspect silt accumulation rates and establish appropriate removal frequencies	Monthly (at start then 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 of the filter strip 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 at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

3.8 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 systems 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 398:2010	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

3.9 Operation and Maintenance Requirements for Trees

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly or as required
	Manage other vegetation and remove nuisance plants	Monthly
	Inspect inlets and outlets	Monthly
Occasional maintenance	Check tree health and manage tree appropriately	Annually
	Remove silt build-up from inlets and surface and replace mulch as necessary	Annually
	Water	As required
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly

3.10 Operation and Maintenance Requirements for Rainwater Harvesting Systems

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspection of the tank for debris and sediment build-up, inlets/outlets/withdrawal devices, overflow areas, pumps, filters	Annually (and following poor performance
	Cleaning of tank, inlets, outlets, gutters, withdrawal devices and roof drain filters of silts and other debris	Annually (and following poor performance
Occasional maintenance	Cleaning and/or replacement of any filters	Three monthly (or as required)
Remedial actions	Repair of overflow erosion damage or damage to tank	As required
	Pump repairs	As required

APPENDIX A
EXAMPLE INSPECTION CHECKLIST

General information			
Site ID			
Site location and co-ordinates (GIS if appropriate)			
Elements forming the SuDS scheme		Approved drawing reference	
Inspection frequency		Approved specification reference	
Type of development		Specific purpose of any parts of the scheme (e.g. biodiversity, wildlife and visual aspects)	

Inspection Date	Details	Y/N	Action required	Date completed	Details	Y/N	Action required	Date completed
General inspection items								
Is there any evidence of erosion, channelling, ponding (where not desirable) or other poor hydraulic performance?								
Is there any evidence of accidental spillages, oils, poor water quality, odours or nuisance insects?								
Have any health and safety risks been identified to either the public or maintenance operatives?								
Silt/Sediment accumulation								
Is there any sediment accumulation at inlets (or other defined accumulation zones such as the surface of filter drains or infiltration basins and within proprietary devices)? If yes, state depth (mm) and extent. Is removal required? If yes, state waste disposal requirements and confirm that all waste management requirements have been complied with (consult environmental regulator)								
Is surface clogging visible potentially problematic where water has to soak into the underlying								

Inspection Date	Details	Y/ N	Action required	Date completed	Details	Y/ N	Action required	Date completed
construction or ground (e.g. underdrained swale or infiltration basin)?								
Does permeable or porous surfacing require sweeping to remove silt?								
Is there evidence of litter accumulation in the system? If yes, is this a blockage risk?								
Is there any evidence of any other clogging or blockage of outlets or drainage paths?								
Is the vegetation condition satisfactory (density, weed growth, coverage etc)? (check against approved planting regime)								
Does any part of the system require weeding, pruning or mowing? (check against maintenance frequency state in approved design).								
Is there any evidence of invasive species becoming established? If yes, state action required								
Are any check dams or weirs in good condition?								
Is there any evidence of any accidental damage to the system (e.g. wheel ruts?)								

Inspection Date	Details	Y/ N	Action required	Date completed	Details	Y/ N	Action required	Date completed
Is there any evidence of cross connections or other unauthorised inflows?								
Is there any evidence of tampering with the flow control?								
Are there any other matters that could affect the performance of the system in relation to the design objectives for hydraulic, water quality, biodiversity and visual aspects?								
Other observations								
Information appended (e.g. photos)								
Continue as current Increase maintenance Decrease maintenance								
Proposed date for next inspection								

N

New Place Manor

New Place

Hurst Dene

NETWORK 2

NETWORK 4

NETWORK 3

NETWORK 1

Basin 5
Impermeable 0.065 Ha
Storage - 24m3

Network 2
NETWORK 2
Basin 4
1:3 Bank
Impermeable 0.757 Ha
Discharge 5.2l/s
Storage - 1,450m3

Network 3
NETWORK 3
Basin 3
1:3 Bank
Impermeable 1.188 Ha
Discharge 12.5 l/s
Storage - 1,460m3

Network 3
NETWORK 3
Basin 3A
1:3 Bank
Impermeable 1.083 Ha
Storage - 374m3

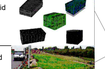
Network 1
NETWORK 1
Basin 1
1:3 Bank
Impermeable 0.970 Ha
Discharge 4.9 l/s
Storage - 1223m3

GLEBELANDS

STRAWBERRY FIELD

El Sub Sta

SuDS Components

Pervious surfaces	Pervious surfaces allow rainwater to infiltrate through the surface into an underlying storage layer, where water is stored before infiltration to the ground, reuse, or discharge to surface water. Porous surface replaces traditional impermeable surfaces.	
Area Control		
Conveyance Swales	Swales are broad, shallow channels covered by grass or other suitable vegetation. They are designed to convey and/or store runoff, and can infiltrate the water into the ground (if ground conditions allow).	
Modular Storage	Modular plastic geocellular systems with a high void ratio that can be used to create a below ground infiltration (soakaway) or storage structure.	
Filter strips	A vegetated/grassed area of gently sloping ground designed to drain water evenly off adjacent impermeable areas and filter out silt and other material.	
Regional Control		
Detention basin	Dry, vegetated surface basins that attenuate stormwater runoff by providing temporary storage and controlled release of detained runoff.	
Extended detention basins	Extended detention basins are normally dry, though they may have small permanent pools at the inlet and outlet. They are designed to detain a certain volume of runoff as well as providing water quality treatment.	
Ponds	Wet ponds are basins that have a permanent pool of water for water quality treatment and a shallow marsh. They provide temporary storage for additional storm runoff above the permanent water level. Wet ponds may provide amenity and wildlife benefits.	

CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:–

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

Notes:

1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings and specifications.
2. Topographical Survey and Levels from NJC Survey Ltd, Drawing Number S1572 Dated 18th March 2019
3. Layout based on Geoff Perrt Associates Drawing Layout Rev E dated June 2025.

Legend:

- Site Boundary
- Pipework and Manho
- Enhanced Swale
- Existing Ditch
- Proposed Porous Paving
- Proposed Cellular Storage
- Proposed Pond / Detention Basin
- Proposed Flow Control

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P04	30.06.2025	Updated to suit new site layout	LN	GXA	RD
P03	13.12..2024	Issued for PLANNING RESUBMISSION	LN	GXA	RD
P02	23.10.2024	Issued for PLANNING	LN	GXA	RD
P01	15.10.2024	Preliminary Issue	LN	GXA	RD

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Client
BARRATT DAVID WILSON (SOUTHERN COUNTIES)

Project Title
NEW PLACE FARM
PULBOROUGH
WEST SUSSEX

Status
PLANNING

Drawing Title
SUDS MANAGEMENT PLAN

Drawn	Date	Checked	Date	Approved	Date
LN	09.24	GXA	09.24	RD	09.24

Scale	Orig Size	Dimensions
1:1,000	A1	m

Project No.: 890815
Drawing File: 890815-RSK-ZZ-XX-DR-C-8307 SuDS Management Plan.dwg

Drawing No.

Project	Orig.	Vol./Sys.	Lev./Loc.	Type	Role	Draw. No.	Rev.
890815	RSK	ZZ	XX	DR	C	8307	P04

Scale 1:1000
0 10 20 30 40 50m

File Location: Z:\P-LDE (PROJECTS)\890815 - NEW PLACE FARM, PULBOROUGH\GRAPHIN\FRASTRUCTURE\DRAWINGS\8 - PLANNING\890815-RSK-ZZ-XX-DR-C-8307 SUDS MANAGEMENT PLAN.DWG

APPENDIX L
SITE VISIT NOTES AND PHOTOS

	Report No: 681387	PHOTOGRAPHIC LOG

Client name: Catesby Estates	**Site Location:** New Place Farm, Pulborough – Site Walkover

Photo No. 1	**Date:** 10.07.24

Description: Photo of the railway line that makes up the northwestern boundary of the site and the ditch where the surface water flow path is located.



Photo No. 2	**Date:** 10.07.24

Description: Photo showing the elevation differences between the site and the railway line (flow path) location.



	Report No: 681387	PHOTOGRAPHIC LOG

Client name: Catesby Estates	**Site Location:** New Place Farm, Pulborough – Site Walkover

Photo No. 3	**Date:** 10.07.24



Description: An overgrown surface water drainage channel located in the eastern part of the site that flows east to west.

Photo No. 4	**Date:** 10.07.24



Description: Current greenhouses on site with irrigation systems

	Report No: 681387	PHOTOGRAPHIC LOG

Client name: Catesby Estates	**Site Location:** New Place Farm, Pulborough – Site Walkover

Photo No. 5	**Date:** 10.07.24



Description: Current unused hatchling area with irrigation system

Photo No. 6	**Date:** 10.07.24



Description: Evidence of surface water overland flow running along foot paths throughout the site.

	Report No: 681387	PHOTOGRAPHIC LOG

Client name: Catesby Estates	**Site Location:** New Place Farm, Pulborough – Site Walkover

Photo No. 7	**Date:** 10.07.24



Description: Overgrown surface water drainage channel running through the centre of the site.

Photo No. 8	**Date:** 10.07.24



Description: Culvert linking the eastern surface water channel and main, central surface water channel.

	Report No: 681387	PHOTOGRAPHIC LOG

Client name: Catesby Estates	**Site Location:** New Place Farm, Pulborough – Site Walkover

Photo No. 9	**Date:** 10.07.24

Description: Local depression located alongside the footpath off Strawberry Field.



Photo No. 10	**Date:** 10.07.24

Description: Surface water drainage ditch that runs alongside the footpath from Strawberry Field.



	Report No: 681387	PHOTOGRAPHIC LOG

Client name: Catesby Estates	**Site Location:** New Place Farm, Pulborough – Site Walkover

Photo No. 11	**Date:** 10.07.24

Description: Man-made reservoir used to water plants within the plant nursery.



Photo No. 12	**Date:** 10.07.24

Description: Overgrown southern drainage ditch that runs along the site's southern boundary.



	Report No: 681387	PHOTOGRAPHIC LOG

Client name: Catesby Estates	**Site Location:** New Place Farm, Pulborough – Site Walkover

Photo No. 13	**Date:** 10.07.24



Description: Location of connection between the surface water ditch on the southern boundary to the main outfall ditch.

Photo No. 14	**Date:** 10.07.24



Description: Start of culvert from the main drainage ditch leaving the site.

	Report No: 681387	PHOTOGRAPHIC LOG

Client name: Catesby Estates	**Site Location:** New Place Farm, Pulborough – Site Walkover

Photo No. 15	**Date:** 10.07.24



Description: End of culvert leaving the site to flow into a surface water channel flowing south adjacent to the footpath.

Photo No. 16	**Date:** 10.07.24



Description: New Southern Water installation location next to the end of the culvert outfall. It is not known what the purpose of this structure is.

APPENDIX M
GRM DEVELOPMENT SOLUTIONS LTD SOAKAWAY TESTING REPORT

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Tel: 01283 551 249
Web: www.grm-uk.com

Our Ref: P7298 SA.2

Date: 6th April 2021

Steve O'Grady
Catesby Estates plc.
Catesby House
5b Tournament Court
Edgehill Drive
Warwick
CV23 6LG
By email only

Dear Steve,

Re: Land to the North East of Glebelands, Pulborough; Soakaway Testing Letter Report

GRM Development Solutions Ltd were commissioned by Catesby Estates (Client) to undertake soakaway testing at the above site in accordance with the methodology outlined within BRE 365 and BS5930:1999.

GRM Standard Limitations of Reporting are provided in Appendix A of this report. A Site Location and Boundary Plan is provided in Appendix B.

This letter report should be read in conjunction with the following documents, which provide further information on the background information and wider site setting:

- GRM Phase I Site Appraisal (Desk Study), Land to the North East of Glebelands, Pulborough, ref: GRM/P7298/DS.1_RevA, dated January 2016.
- GRM Soakaway Letter Report, Land to the North East of Glebelands, Pulborough, ref: GRM/P7298/SA.1, dated March 2016.
- GRM Phase II Site Appraisal Report, Land to the North East of Glebelands, Pulborough, ref: GRM/P7298/F.1, dated April 2016.
- GRM Gas Addendum Letter, Land to the North East of Glebelands, Pulborough, ref: GRM/P7298/GAL.1, dated July 2016.

Introduction

The phase II ground investigation and initial soakaway testing in 2016 on the southern half of the site revealed that the natural granular deposits underlying the site are potentially suitable for soakaway drainage. The previous GRM soakaway investigation undertook soakaway testing within

the southern fields in an area where a proposed surface water attenuation basin was to be situated. Since the completion of the 2016 work, the site area has been increased from approximately 4.7ha to 16.3ha, therefore further work has been undertaken to determine if soakaway drainage solutions are suitable for the new wider site area.

At the time of the recent fieldwork the site was an active nursery, therefore a combination of soakaway pits and soakaway boreholes (where access was restricted) have been used to assess the wider area. In addition to this, additional boreholes were placed next to some of the soakaway pits to attempt to find a correlating factor between the two different types of soakaway test.

Scope of Works

GRM attended site between the 22nd February to 26th February 2021 to advanced 19 windowless sample locations (WS101 to WS118; including WS112a) and eight trial pit soakaway locations (SA101 to WS108) to depths of between 1.0m below existing ground level (begl) to 3.0m begl. The test pits were filled with gravel and soakaway testing was then conducted during the following two weeks; between the 1st March to 10th March 2021.

Soakaway testing was undertaken within all exploratory hole locations with the exception of boreholes SH04, SH09, SH12, SH15, SH16, SH18, SH19, as these wells were selected for long term groundwater monitoring, which was to encompass six weekly visits lasting from 18th March to 29th March 2021.

Where exploratory holes were selected for soakaway testing, the depth of the borehole was advanced to 1.5m begl or refusal, whichever was shallower. Trial pits were filled with a gravel backfill and groundwater levels were recorded with both hand measurement and data loggers. Borehole soakaway rates were recorded only by hand measurement.

The exploratory hole location plan and exploratory hole logs are presented in Appendix C and Appendix D respectively.

Ground Conditions

The locations of the exploratory holes were positioned to provide a general coverage across the site. However, consideration has been given to the current usage of the site as an active nursery, in which extensive local water and gas utilities were known, and disturbance by the investigation had to be limited.

The following ground conditions were encountered during the most recent site investigation:

- Re-worked Topsoil
- Made Ground
- Head Deposits
- Hythe Formation

<u>Re-worked Topsoil</u>
Re-worked topsoil was encountered within the majority of exploratory holes (WS101, WS104, WS106, WS107, WS110 to WS113, WS115, WS116. WS118, SA101 to SA103 and SA108) to depths ranging between 0.1m and 0.4m below existing ground level (begl) with a general thickness of 0.1m with occasional holes recording deeper topsoil.

The re-worked topsoil was typically recorded as a gravelly sandy silt or silty sand and had likely been reworked due to the historical land use as a nursery.

Made Ground
The Made Ground was encountered where re-worked topsoil was not present in WS102, WS103, WS105, WS108, WS109, WS112a, WS114, WS117 and SA104 to SA107, and was found to depths ranging between 0.05m and 0.8m begl, with a general thickness of 0.3m.

Made ground was encountered as a brown sandy silt, silty sand, sand clay or a gravel of roadstone, and it is assumed that the made ground was also generated due to the historical land use as a nursery.

Head Deposits
The Head Deposits were recorded in all holes with the exception of WS107 and WS114 and were recorded as a very loose to loose silty sand, very soft to firm sandy silt or very soft to firm sandy clay.

Standard Penetration Test N-values generally ranged from 1 to 16 at 1m depth, 4 to 5 at 2m depth, and 4 at 3m depth, indicating a very low to medium strength at 1.0m begl and a low strength at 2m and 3m begl.

Hythe Formation
The Hythe Formation was identified typically below the head deposits in WS103, WS107 to WS110, WS112a to WS115, WS117, WS118, SA103, SA104, SA106 and SA108 and was recorded as a medium dense gravel or gravelly sand to an extremely weak to very weak sandstone. None of the exploratory holes fully penetrated this strata.

Standard Penetration Test N-values generally ranged from 17 to 50 (refusal) at 1m depth, 38 to 50 (refusal) at 2m depth, and 50 (refusal) at 3m depth. indicating a medium dense to very weak rock at 1m, very dense to weak rock at 2m and very weak rock at 3m.

Groundwater
Groundwater seepage was not observed in any of the exploratory holes, with the exception of SA108 which recorded slightly damp strata at 1.5m begl. The exploratory techniques used were rapid and may have masked small water seepages.

One groundwater monitoring visit have been conducted and the results of the monitoring are reported in Appendix E. In summary, standing water was recorded within WS110 at depths of 2.23m begl, all other locations did not record any groundwater.

It is considered that the groundwater observed during the site works in SA108 and recorded during the monitoring in WS110 are likely to be small pockets of water perched on impermeable lenses.

Long term monitoring of groundwater levels has not been conducted as part of this investigation and interpreted levels are approximate and may be dependent on seasonal variations.

Due to the lack of groundwater data for the site it has not been possible to accurately determine the groundwater flow direction beneath the site. However, the groundwater flow is considered to be to the south following the local topography.

Soakaway Testing

The soakaway tests were carried out in the Head deposits and Hythe Formation, across the site at twenty-one locations. A plan showing the approximate locations of the tests and the trial pit logs are presented in Appendix C.

In accordance with BRE Digest 265 three tests have been undertaken at each location where possible. Where insufficient permeability has been recorded, infiltration rates cannot be calculated. The infiltration rates have been calculated for the entire soil section tested, rather than for specific more permeable sections. In general, the Head Deposits were cohesive and the Hythe Formation was sand or sandstone at the base of the exploratory hole.

Soakaway reference	Soakaway geology	Calculated Infiltration rates (m/s)		
		Test 1	Test 2	Test 3
SA101	Head Deposits	1.01E-05	1.62E-05	1.71E-05
SA102	Head Deposits	8.49E-06	5.75E-06	5.20E-06
SA103	Head Deposits and Hythe Formation	1.53E-04	1.64E-04	1.53E-04
SA104	Head Deposits and Hythe Formation	1.36E-05	1.09E-05	6.96E-06
SA105	Head Deposits	1.57E-05	1.30E-05	8.29E-06
SA106	Head Deposits and Hythe Formation	2.09E-05	1.54E-05	1.21E-05
SA107	Head Deposits	6.68E-06	4.22E-06	4.26E-06
SA108*	Head Deposits and Hythe Formation	-	-	-
WS103	Head Deposits and Hythe Formation	3.00E-06	2.12E-06	1.72E-06
WS104*	Head Deposits	2.77E-07	-	-
WS105	Head Deposits	3.53E-06	5.25E-06	4.32E-06
WS106	Head Deposits	2.62E-06	1.94E-06	1.39E-06
WS108**	Head Deposits and Hythe Formation	9.73E-05	9.73E-05	9.73E-05
WS109	Head Deposits and Hythe Formation	3.40E-06	2.40E-06	2.55E-06
WS111*	Head Deposits	1.62E-07	-	-
WS112*	Head Deposits	5.6E-08	-	-
WS112a	Head Deposits and Hythe Formation	3.48E-06	2.18E-06	1.93E-06
WS113	Head Deposits and Hythe Formation	2.87E-06	2.49E-06	1.62E-06
WS114	Head Deposits and Hythe Formation	3.48E-06	1.93E-06	1.74E-06
WS115	Head Deposits and Hythe Formation	3.25E-06	2.48E-06	3.10E-06
WS118	Head Deposits and Hythe Formation	3.22E-07	2.85E-07	2.85E-07

*Insufficient infiltration in 24hrs to obtain reliable infiltration rate.
** Very fast and consistent infiltration across all three tests; potential fractured rock.

The results show great variability across the site with four locations (SA108, WS104, WS111 and WS112) not recording sufficient infiltration within 24 hours to calculate a reliable infiltration rate. Other test locations such as SA03 and WS108 recorded very good infiltration rates.

It is considered that the variability is due to the geology of the site, specifically the variable nature of the head deposits, with cohesive clays and silts being recorded, compared to the underlying Hythe Formation. Three of the four locations (WS104, WS111 and WS112) where an infiltration rate

could not be calculated, did not fully penetrate the head deposits, and were therefore soaking into cohesive silt.

SA08 also did not record sufficient infiltration to calculate an infiltration rate, this is likely to be due to SA08 recording groundwater at the base of the pit, anticipated to be because it is the lowest point on the site. It should however be noted that SA08 did record approximately 50% water loss over the 24 hour period.

It should also be noted, that four of the soakaway pits (SA01, SA02, SA05 and SA07) did not fully penetrate the Head Deposits and were therefore recorded to be soaking into the cohesive geology. However, these locations were able to complete three tests, all within 24hrs: potentially due to the larger surface area finding more suitable strata within the variable Head Deposits.

Comparable Results: Soakaway Pits and Borehole Infiltration Testing

Across four locations soakaway testing was undertaken in both trial pits and window sample boreholes, to attempt to determine the difference between the two different types of infiltration assessment.

The locations where the comparison testing was undertaken was:

- SA01 and WS104
- SA02 and WS106
- SA04 and WS108
- SA07 and WS113

SA01 and WS104
Whilst the logs are similar with head deposits of silt being recorded from 0.1m begl to 1.5m, the soakaway testing did vary significantly with the soakaway pit SA01 recording three tests; each within 24hours and WS104 taking greater than two days to complete a test. It is considered that this is potentially due to the variability of the head deposits, and the soakaway pits having a much larger surface area and therefore being more likely to encounter areas within the head deposits where infiltration is possible.

SA02 and WS106
The geology for SA02 and WS106 was similar to SA01 and WS104 with head deposits recording silt to 1.5m (WS106) and 1.55m (SA102). Both locations recorded three tests, with the soakaway pit SA02 generally recording a faster rate by an approximate factor of three. This is likely due to similar reasons as explained above; a larger surface area is more likely to find areas within the variable head deposits which have a greater permeability. The rates are displayed below for reference.

	m/s		Difference (WS106/SA02)
	SA02	WS106	
Test 1	8.49E-06	2.62E-06	0.31
Test 2	5.75E-06	1.94E-06	0.34
Test 3	5.20E-06	1.38E-06	0.27

SA04 and WS108
The logs at SA04 and WS108 both recorded Head Deposits as silt overlying very weak sandstone of the Hythe Formation from between 1.1m and 1.3m begl. However, while the logs were similar the

infiltration rates recorded differed considerably; both recorded three tests, but the rates recorded in WS108 were approximately ten times faster. It was noted by the technician undertaking the soakaway in WS108 that the water from surface to approximately 1.3m infiltrated in less than 5 minutes, then slowed after this point; this was repeated three times. This could be attributed to a weathered or fractured horizon of the sandstone being present in WS108 at approximately 1.3m begl and not within SA04; which would explain why the infiltration slowed after 1.3m begl. The results of the comparison are displayed below for reference.

	m/s		Difference (SA04/WS108)
	WS108	SA04	
Test 1	9.73E-05	1.36E-05	0.14
Test 2	9.73E-05	1.09E-05	0.11
Test 3	9.73E-05	6.96E-06	0.07

SA07 and WS113

The geology between the two holes was similar, however, as WS113 is also going to by used as a groundwater monitoring point, it was progressed to a depth of 2.0m where it refused on the sandstone horizon of the Hythe Formation. SA07 was progressed to 1.5m and was terminated in the head deposits.

Both locations recorded three tests with SA07 recording faster rates. This is likely to be attributed to a larger surface area within the pits finding soils within the head deposits with a greater permeability. The difference between the two rates is less than was recorded in SA02 and WS106, however this is potentially attributed to WS113 being deeper than SA07 and having encountered the Hythe Formation Sandstone; albeit only in a thickness of 0.1m.

	m/s		Difference (WS113/SA07)
	SA07	WS113	
Test 1	6.68E-06	2.87E-06	0.43
Test 2	4.22E-06	2.49E-06	0.59
Test 3	4.26E-06	1.62E-06	0.38

Conclusions

Soakaway Feasibility

The results are considered to indicate potentially but variably good performance in the Hythe Formation and a generally poor and variable performance in the Head Deposits. However, it should be noted that the soakaway pits situated within the Head Deposits did achieve three tests, albeit at rates that at times might not be feasible for the use of soakaways.

Due to the variation in performance of the shallow clays and silts of the Head Deposits, it is recommended that the deeper weathered or un-weathered sandstone rock be used if soakaway drainage is pursued, except for at SA08 where shallow groundwater will inhibit its use. It should also be noted that deeper soakaways may require breaking equipment and may encounter unobserved groundwater, so excessive penetration is not recommended.

Additionally, the site is situated on a slope which falls to the south, consideration will be required to ensure the use of soakaways does not lead to flooding of new or existing properties located downslope.

The results of the testing should be provided to the projects drainage engineer for design of the sites surface water drainage system. Large and linked infiltration systems are considered beneficial to reduce variability in infiltration performance.

The results of the groundwater monitoring will need to be considered in the drainage design. The monitoring data will be forwarded when complete.

Comparative testing

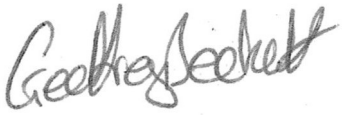
The variable head deposits made it difficult to make direct comparisons between the two types of infiltration testing. If it is assumed that the geology in the comparable testing is similar and consistent, and looking at the two locations where infiltration rates could be calculated (SA02/WS106 and SA07/WS113) the soakaway pits have shown to be two to three times faster.

However, as we know the Head Deposits are variable in nature, it is likely that a larger surface area has on these occasions encountered more favourable permeable strata, and similar results are not guaranteed if and when replicated within any drainage systems installed on site. As such relying on betterment on the falling head testing results though carrying out further BRE365 testing should not be relied upon in initial designs

We trust this is suitable for your current requirements, should you require any further information or need clarification of any of the points raised please do not hesitate to contact us.

Yours sincerely,
for GRM Development Solutions Ltd





George Salloway BSc (Hons) MSc, MIEnvSc
Senior Geoenvironmental Engineer

Geoff Beckett BSc (Hons), CGeol FGS
Director

Appendices:

Appendix A – GRM Standard Limitations of Reporting
Appendix B – Site Location and Boundary Plan
Appendix C – Exploratory Hole Location Plan
Appendix D – Exploratory Hole Logs
Appendix E – Groundwater Monitoring Results

APPENDIX A

GENERAL APPRAISAL COMMENTS

i INFORMATION SOURCES

Where available the following sources have been used for the identification and assessment of potential ground hazards:

- Relevant British Standards
- British Geological Survey (BGS) Geology Map Scale 1:10,000 for local area
- British Geological Survey (BGS) Geology Map Scale 1:50,000/1:63,320
- BGS Memoir
- BGS Borehole Records
- BGS online viewer: http://www.bgs.ac.uk/data/mapViewers/home.html
- Environment Agency Groundwater Vulnerability Maps
- Historical Ordnance Survey (OS) Maps
- Environmental Data Report
- Environment Agency Website: http://www.environment-agency.gov.uk/
- Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, UKWIR, 2010.
- Coal Authority Records / Coal Mining Report
- DEFRA/Environment Agency Contaminated Land publications and DoE Industry Profiles
- BRE Guide BR211 (2015), 'Radon: Guidance on protective measures for new buildings'
- HPA-RPD-033 (2007), 'Indicative Atlas of Radon in England and Wales'
- PHE-CRCE-032 (PHE, 2017), Radon in Homes in England: 2016 Data Report
- CIRIA C665 'Assessing risks posed by hazardous ground gases to buildings'
- BS8485:2015, 'Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'
- Other technical references used throughout this document are detailed in the text.

ii CONTAMINANTS OF CONCERN

The DoE Industry Profiles are normally used to assess likely contaminants from past land use and potential nearby industrial sources. For land uses where no profile is available, likely contaminants of concern are selected by GRM based on past experience of similar sites, a general screening suite of contaminants covered by CLEA and common contaminants from the Industry Profiles.

- Arsenic
- Cadmium
- Chromium
- Lead
- Mercury
- Selenium
- Copper
- Nickel
- Zinc
- Phenols
- cyanide (total)
- pH
- Water soluble sulphate
- PAH (polycyclic aromatic hydrocarbons)

Asbestos and PCBs are listed in the vast majority of profiles. PCBs are listed as the profiles expect electricity substations and switch boxes on all industrial sites. There is the potential for asbestos containing material to be mixed up with made ground, following any demolition works.

iii CONCEPTUAL MODEL METHODOLOGY

The consideration of contamination is based upon the principles of risk assessment, using the 'source-pathway-receptor' model in order to establish the presence, or potential presence, of a pollutant linkage.

To create a risk, contamination must have the potential to cause harm to susceptible targets or receptors such as humans, the water environment or the built environment. The potential for harm to occur requires three conditions to be satisfied to form a pollutant linkage:

- The presence of substances that may cause harm (SOURCE).
- The presence of a target which may be harmed (RECEPTOR).
- The existence of a plausible migration route between the source and the receptor (PATHWAY).

In the absence of a plausible pollutant linkage there is no risk. Where a potential linkage is identified in order for it not to pose a risk to the identified receptor it must be broken.

iv INTRUSIVE INVESTIGATION SAMPLING METHODOLOGY

The ground investigation (including fieldwork, sampling, monitoring and laboratory analyses) has been designed to identify and assess potential ground related problems and to allow cost effective solutions to be advised. It has been planned on the basis of the desk study, site inspection and the proposed development layout (where available). All fieldwork and soil descriptions were carried out in general accordance with relevant British Standards.

The exploratory holes have been positioned and advanced to depths to determine the general ground/groundwater/gas conditions below the site. A general grid pattern has been adopted, where possible, to provide sufficient information based on the current proposed layout scheme. Some holes have been targeted at particular hazards identified in the Phase I assessment. The resultant exploratory hole density is considered to be commensurate with the complexity of the site conditions and detail of information required for this phase of the investigation.

v GROUND GAS RISK ASSESSMENT METHODOLOGY

Gas monitoring programmes undertaken by GRM are designed to broadly comply with the recommendations outlined in CIRIA Report C665 'Assessing risks posed by hazardous ground gas to buildings' (2007) and BS8576 'Guidance on Investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs) (2013).

To assess the risks posed by ground gases such as radon, carbon dioxide and methane, the relevant current guidance has been used. For radon the site has been assessed following the guidelines in 'Radon: guidance on protective measures for new dwellings (BR211: 2015)'. For methane and carbon dioxide the primary guidance document used to determine if protection measures are required is *BS8485:2015 Code of practice for the design of protective measures from methane and carbon dioxide ground gases for new buildings*. This uses hazardous gas flow rates (Q_{hg}), which are gas concentrations multiplied by borehole flow rates, to derive a Gas Flow Rate (GSV) for the site. The gas regime is then determined based on the GSV and other limiting factors such as gas concentrations.

Where flow is not recorded during the monitoring a default flow rate of 0.1l/hr will be used in the assessment to produce a positive result.

vi HUMAN HEALTH RISK ASSESSMENT METHODOLOGY

Guidance contained in the Environment Agency's CLEA Reports has been used to assess the risks posed to human health.

For residential developments that include domestic gardens the default Tier 1 Assessment Criteria (TAC) for 'residential land with plant uptake' are used, i.e. a female with a start age class of one and an end age class of six. All pathways are considered including the consumption of home-grown vegetables.

For residential developments that do not include domestic gardens the default Tier 1 Assessment Criteria (TAC) for 'residential land without plant uptake' are used, i.e. a female with a start age class of one and an end age class of six. All pathways are considered except the consumption of home-grown vegetables. For commercial/industrial developments the default Tier 1 Assessment Criteria (TAC) for 'commercial/industrial' are used, i.e. a female with a start age class of sixteen and an end age class of eighteen. All pathways are considered except the consumption of home-grown vegetables.

The TAC used by GRM include Category 4 Screening Levels (C4SLs) published by DEFRA, values calculated by GRM using the CLEA v1.071 risk assessment, and values and Suitable for Use Levels (S4UL) developed by LQM/CIEH. The TAC used in the assessment are selected based on the lowest site specific SOM values returned as part of the chemical analysis.

Where soil chemical analysis results are found to exceed the TAC, Site-Specific Risk Assessments may be undertaken using the CLEA v1.071 risk assessment software using the age classes and pathways described above.

vii RISK TO SITE WORKERS – GENERAL COMMENTS

The risks to site workers are similar to those posed to site end users, although likely to be less severe due to the site workers' shorter exposure to the identified contamination. However, site workers (particularly groundworkers) are more likely to come into direct contact with contaminated soils due to the nature of their work. On this basis ground and construction workers should be provided with basic Personal Protective Equipment based on the site's general health and safety risk assessment, but including as a minimum safety footwear, gloves and overalls.

A site specific risk assessment should be carried out for all hazards identified within the ground investigation in accordance with current health and safety legislation. This assessment should identify any measures required to further reduce risks i.e. providing further Personal Protective Equipment, welfare facilities and if necessary preventing access to certain areas.

Demolition and dismantling of existing structures on the site must be carried out to a safe and acceptable standard, in accordance with current UK guidance and best practice. Whilst not ground related, asbestos and hazardous substances surveys should be conducted prior to any demolition.

Any unusual colours, odours and suspicious ground should be reported immediately to site management and then GRM.

Whilst this appraisal has considered the long-term effects of contamination, GRM can also help during the formulation of Health and Safety documentation, if required.

viii CONTROLLED WATERS RISK ASSESSMENT METHODOLOGY

Where the desk study and fieldwork do not reveal a potential source of contamination no leachate or groundwater testing will be performed. Where a potential source is identified the testing will comprise leachate testing on the material considered most likely to pose a risk, groundwater testing will be undertaken if water is present at shallow depth.

The UK Drinking Water Standards (UKDWS) or Environmental Quality Standards (EQS) are usually adopted for comparison with the leachate/groundwater test results. When the most sensitive receptor is considered to be the aquifer (groundwater) UKDWS will be adopted as the Initial Tier 1 screening values. Where the most sensitive receptor is a surface water feature the EQS values will be used as Initial Tier I Screening values.

ix CONSTRUCTION MATERIALS RISK ASSESSMENT METHODOLOGY

The 'screening levels' adopted for the assessment of risk to construction materials are taken from the following documents:

- UK Water Industry Research (UKWIR) Contamination thresholds for sub-surface water pipes, for the protection of buried pipes.
- Building Research Establishment (BRE) Special Digest SD1 (2005), 'Concrete in Aggressive Ground', for the protection of buried concrete.

x WASTE DISPOSAL, SITE WASTE MANAGEMENT PLANS AND MATERIAL MANAGEMENT PLANS

Under current Waste Management Regulations, waste soil materials produced from the site will require characterisation to enable it to be disposed of correctly.

The chemical analysis results included in this report should be provided to the relevant landfill operators to establish the characterisation of the waste, confirm its suitability for landfill disposal and provide estimated costings. If material is classified as hazardous, then the site will need to be registered with the Environment Agency prior to the movement of the waste. Depending on the receiving landfill's current permit, further chemical analysis, incorporating Waste Acceptance Criteria (WAC) leachate analysis, may be required.

All materials removed from the site will be classified as 'waste' and therefore must be removed by a suitably licensed carrier of waste. This applies whether or not the waste is contaminated. All waste removed to landfill will attract Landfill Tax.

The developer/builder is likely to be classed as the waste producer and therefore, has a duty of care to ensure that all waste is disposed of appropriately. This includes ensuring the waste carrier is licensed and disposes of the waste to a suitably licensed landfill site. They are also required to keep a paper trail from 'cradle to grave' including copies of the waste disposal tickets.

Efficient materials management on site is recommended as it can lead to significant cost savings when compared to the traditional side casting or single stockpile of arisings. GRM can assist in the production of Material Management Plans under the CL:AIRE Definition of Waste: Code of Practice. The DoWCoP enables:

- The direct transfer and re-use of clean naturally occurring soil materials between sites, and
- The re-use of both contaminated and uncontaminated materials on their site of origin and between sites within defined Cluster projects.

GRM can also undertake the role of Qualified Person and submit the DoW CoP project Declaration.

Likewise making the site as volume neutral as possible will reduce the costs of development. Whilst not a statutory requirement, Site Waste Management Plans allow better waste management practices, help to reduce the amount of waste produced and identify best environmental disposal options. Implementing a Site Waste Management Plan (SWMP) can reduce costs (increasing business profits) and maximise resource efficiency.

xi GEOTECHNICAL ASSESSMENT GENERAL COMMENTS

Where finished floor levels of proposed structures have not been provided by the Client, then for the purposes of initial assessment, GRM will assume that finished levels will not vary appreciably from the existing ground levels. If the depths of any underground engineering works (i.e. sewers, pumping stations

etc.) are unknown they will not be taken in to account in the assessment and it will be assumed that any such works will not compromise foundation or ground stability.

Should the development proposals or finished levels be different from these assumptions then the comments/recommendations in the Geotechnical Assessment may require revising.

It should be noted that the results of window sampling and/or cable percussive boreholes may not give a true indication of a soils actual engineering properties (i.e. stability, mass structure etc). GRM consider that that prior to development trial pitting should be undertaken to confirm the recommendations in the Geotechnical Assessment.

xii GEOTECHNICAL ASSESSMENT – ENGINEERING GROUND TREATMENT

Near surface soils have the potential to be disturbed by weathering and site traffic. Precautions should always be taken to avoid this, as excessive disturbance may leads to more onerous floor slab designs, road cap thickness and increased amounts of off-site disposal etc.

Near surface soils may need treatment or reinforcing to allow safe movement of construction plant and labour. An assessment by the contractor should be undertaken once the type of machinery/plant needed to complete the development is known.

xiii GEOTECHNICAL ASSESSMENT – EXCAVATIONS

Excavation instability (over-break) can result in damage to existing services or structures (e.g. foundations, roads or boundary walls/fences) both on and off-site, as well as increased foundation concrete costs. In order to minimise this, all excavations deeper than 1.2m deep (or any excavation within 1.5m of any existing structure or service) should be supported. Full support should be provided to the full depth of all near vertically sided excavations in made ground, soft and very soft clays and granular soils. A reduction to intermediate support should be acceptable within firm and stiffer natural clays.

Wherever possible, man entry into excavations should be prevented; however, where this is not possible, entry to, and time spent in, excavations should be kept to a minimum.

The build program should be tailored to reflect the impact that deep excavations through potentially unstable strata can have on adjacent properties, so that they are not undermined.

All excavations on site should be in accordance with HSE guidelines and stability should be practically maintained at all times. Reference should be made to HSE construction information sheet No. 8 (Revision 1) 'Safety in Excavations'.

Care should be taken to ensure that falls from excavation faces do not adversely affect the integrity of foundation concrete.

If contaminated water enters excavations it should be removed and transported to an appropriate treatment facility by a suitably licensed carrier before construction begins.

xiv GEOTECHNICAL ASSESSMENT – SUBSTRUCTURES

Where practicable, existing buried construction should be fully removed; however, if this is not practicable all new foundations should be carried down to fully penetrate it and it should be broken well away from all new structures.

There may be existing structures and/or infrastructure in close proximity to the proposed development. New build foundations may be constructed next to pavements with existing underground services beneath them, or excavations may be required near existing footings associated with adjacent properties. These potential hazards need to be taken into consideration when designing foundations and the groundworker needs to be made aware of their potential impact during the redevelopment works. Foundations close to existing underground services or buildings may require alternative foundation techniques (such as piling) to protect the integrity of these structures.

The contractor for the works should carry them out in such a fashion so as to not cause excessive overbreak, concrete usage or undermine existing buildings/roads/ services that are to be retained.

xv GEOTECHNICAL ASSESSMENT – SOAKAWAYS

Soakaway testing in trial pits by GRM is broadly carried out in accordance with BRE DG 365 (2016). The testing comprises the excavation of a test pit to a suitable depth, and the placement of water into the pit. The level of water present is then monitored over time. For borehole installations, the permeability testing (falling head/rising head) is undertaken in accordance with BS5930.

If it is decided to proceed with the use of soakaway drainage, then the following general points should be noted:

- Soakaways should not be placed so that water can be discharged through potentially contaminated made ground.
- The Environment Agency may require soakaways to be sealed systems such that only roof run off falls to soakaway.
- Interceptors are likely to be required for soakaways for highway drainage. The adopting authority for the highways should be consulted at the earliest opportunity regarding the use of soakaways for highways drainage.
- Consideration of site levels and slopes should be taken into account during the design.
- The construction of all soakaways should be in accordance with the current building regulations.
- Soakaways should not be placed within 5m of a proposed building.
- Placement of soakaways needs to be considered so as to avoid ponding of water down slope.
- The base of a soakaway should not be below the highest recorded water level.
- The Environment Agency prefer 1m of dry soil to be present between the base of a soakaway and the water table to provide attenuation for contamination.

xvi GEOTECHNICAL ASSESSMENT – FOUNDATIONS

If soft or hard spots are encountered during foundation excavation then they should be replaced with suitably compacted material or the footings deepened to suitable strata, to avoid differential settlement.

If strata of differing bearing character (e.g. sand and clay) are encountered at foundation levels within the excavations for a single plot then the excavation depths should be altered as appropriate to ensure the foundations rest on a single stratum, or strata that will not induce differential settlement. Where this is impractical then GRM should be contacted to assess a reinforced concrete detail or an alternative foundation solution (e.g. piles or vibro-replacement).

NOTES ON LIMITATIONS

General

GRM Development Solutions Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement had been executed, or with whom an assignment had been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from GRM Development Solutions Limited; a charge may be levied against such approval.

GRM Development Solutions Limited accepts no responsibility or liability for:

a) the consequences of this document being used for any purpose or project other than for which it was commissioned, and

b) the consequences of this document being used by any third party with whom an agreement has not been executed.

Phase I Environmental Audits/ Desk Studies

The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, GRM Development Solutions Limited reserves the right to review such information and as considered necessary and appropriate to modify the opinions accordingly. It should be noted that any risks identified in a Phase 1 report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Phase II Environmental Audits (Contamination Investigations)

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated with potential human targets, building materials, and controlled waters.

The amount of exploratory work and chemical testing undertaken has necessarily been restricted by the short timescale available, and the locations of exploratory holes have been restricted to the areas unoccupied by the building(s) on the site and by buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues need to be resolved.

For these reasons if costs have been included in relation to site remediation these must be considered as provisional only and must, in any event, be confirmed by a commercial adviser.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. Whilst exploratory testing is intended to gain an accurate representation of the site, the very nature of sampling and testing is such that it cannot ensure that all localised conditions are detected

The risk assessment and opinions provided take in to consideration, inter alia, currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

Phase II Geo-environmental Investigations (Combined Geotechnical and Contamination Investigations)

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions to provide a reasonable assessment of the environment risks together with engineering and development implications. If costs have been included in relation to site development a commercial adviser must confirm these.

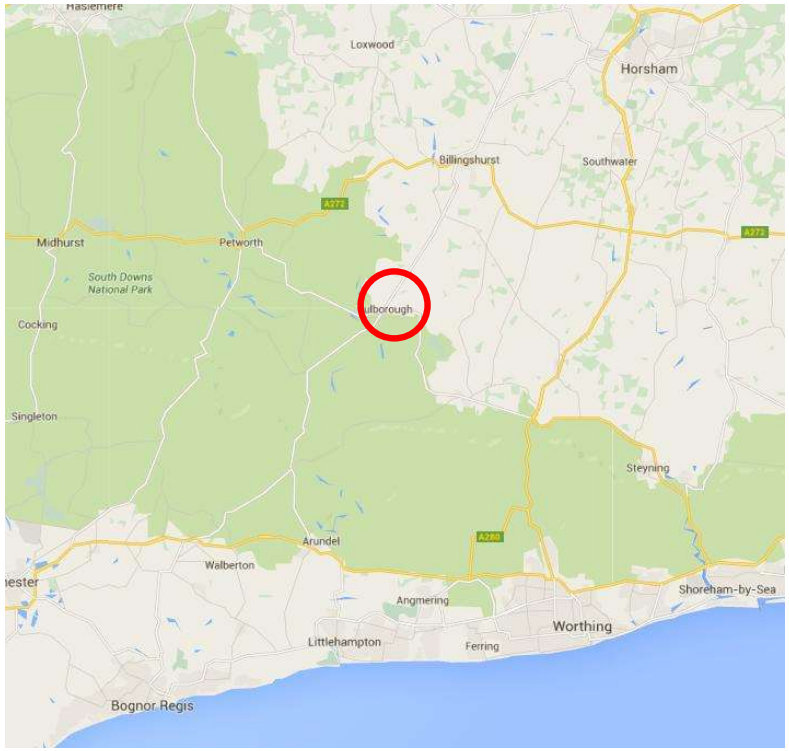
The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site for each of the exploratory holes. There may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

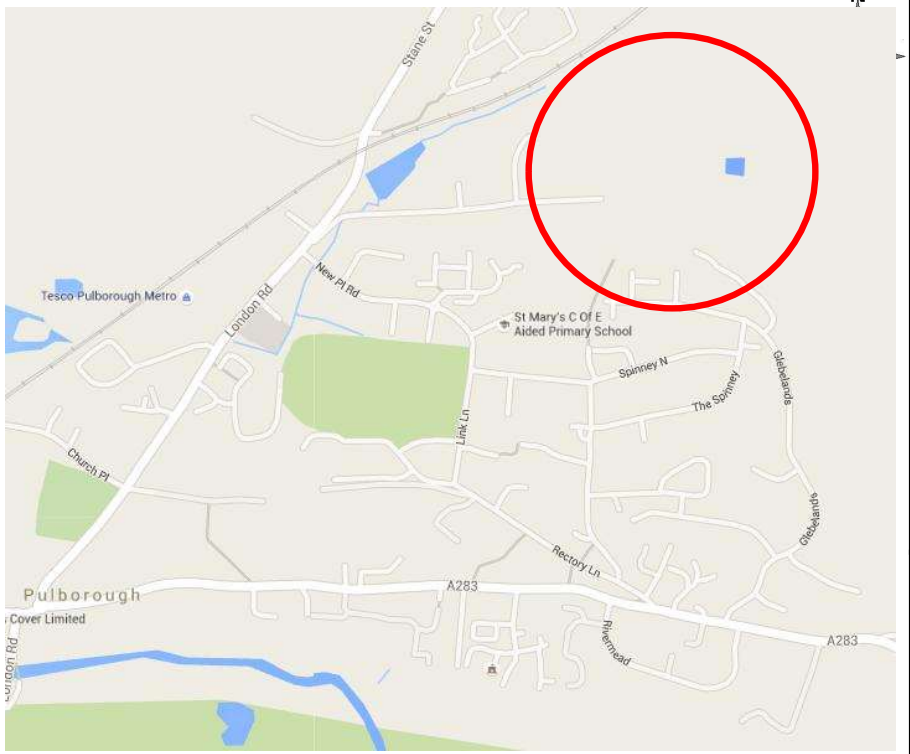
The comments made on groundwater conditions are based on observations made at the time the site work was conducted. It should be noted that groundwater levels will vary owing to seasonal, tidal and weather related effects.

The scope of the investigation was selected on the basis of the specific development proposed by the Client and may be inappropriate to another form of development or scheme.

The risk assessment and opinions provided take in to consideration, inter alia, currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

APPENDIX B







DO NOT SCALE

NOTES:

Approximate Site Boundary

Approximate Site Location

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CLIENT:

Catesby Estates Ltd

PROJECT:

Drovers Lane, Pulborough

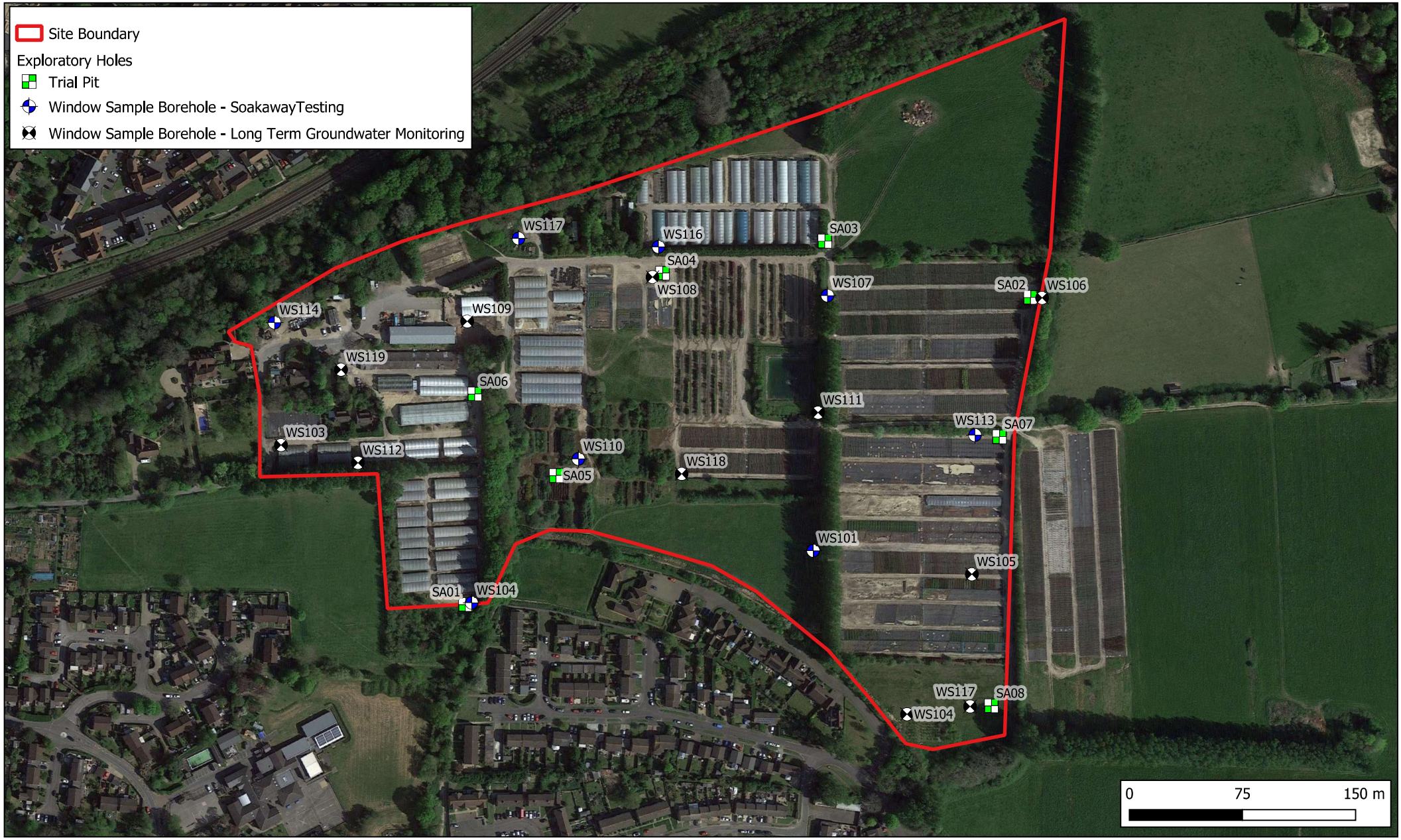
TITLE:

Site Location and Boundary Plan

SCALE@SIZE :	ISSUE:
NTS	Final
DESIGN/DRAWN :	DATE:
GS	March 2021
PROJECT No:	DRAWING No:
P7298	1

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APPENDIX C



NOTES:
NOTES

CLIENT: CATESBY ESTATES LTD

PROJECT: LAND OFF DROVERS LANE, PULBOROUGH

TITLE: EXPLORATORY HOLE LOCATION PLAN

PROJECT No: P7298

DATE: MAR 2021

DESIGN/DRAWN: AL

DRAWING NUMBER:

ISSUE: FINAL

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APPENDIX D

GRM Development Solutions Ltd
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Windowless Sample Borehole

Borehole No WS101
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505751 E 119190 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.20			Dark brown slightly silty slightly gravelly fine to coarse SAND. Gravel is medium to coarse and angular of mudstone and sandstone. Rootlets present. TOPSOIL
		0.50	D						Soft to firm, approximately low to medium strength, dark yellowish brown sandy CLAY. Sand is fine to medium. HEAD
		1.00		N=1 (0,0/0,0,1,0)		1.00			Very soft to soft, very low to low strength, light yellowish brown and occasionally light grey mottled slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and angular of sandstone. HEAD
		2.00		N=5 (1,1/1,1,1,2)					
									becoming very gravelly from 2.80m depth.
		3.00		N=4 (1,0/1,1,1,1)		3.00			End of Borehole at 3.000m

1 2 3 4

Crew: RGI Ltd **Logger:** AT **Weather:** Overcast and rain.

Equipment: Premier Tracker 110

Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal at 3.00m depth.

Groundwater Remarks:
No groundwater encountered during drilling.

General Remarks:
Borehole completed as a groundwater level monitoring well, and as a soakaway testing hole.

Hole Started: 22/02/2021 **Hole Complete:** 22/02/2021 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS102
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505524 E, 119156 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.20			Dark brown slightly gravelly silty fine to coarse sandy CLAY. Gravel is medium to coarse and angular of mixed lithology including sandstone and clinker. MADE GROUND
		0.50	D						Very soft, very low strength, dark yellowish brown slightly gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to coarse and angular of sandstone. HEAD
		1.00		N=3 (1,1/1,0,1,1)					*becoming very gravelly between 1.10m and 1.20m depth.*
									with a pocket of fine to medium silty sand encountered between 1.80m and 1.90m depth.
		2.00		N=4 (0,1/1,1,1,1)					
									becoming very stiff from 2.90m depth.
		3.00		50 (25 for 100mm/50 for 115mm)		3.00			End of Borehole at 3.000m

Crew: RGI Ltd **Logger:** AT **Weather:** Overcast and rain.

Equipment: Premier Tracker 110

Reason for termination of borehole: Borehole terminated at target depth of 3.00m begl.

Groundwater Remarks:
No groundwater encountered during drilling.

General Remarks:
Borehole completed as a groundwater level monitoring well, and as a soakaway testing hole. Hythe Formation anticipated below 3.0m begl.

Hole Started:	22/02/2021	Hole Complete:	22/02/2021	Version:	FINAL	Scale:	1:25

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Windowless Sample Borehole

Borehole No WS103
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505397 E 119261 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.10			Soft, orange brown, slightly sandy, slightly gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to rounded of quartzite and roadstone. MADE GROUND
		0.50 - 0.60	D						Firm, approximately medium strength, orange brown, slightly gravelly, sandy SILT. Sand is fine to coarse. Gravel is fine to coarse, sub-angular of sandstone. HEAD
		1.00 1.00	SPTLS S	N=50 (5,12/50 for 235mm)		1.10			Very weak, yellow brown, fine to coarse grained SANDSTONE. Recovered as a sandy gravel. HYTHE FORMATION
						1.30			End of Borehole at 1.300m

Crew: RGI Drilling. **Logger:** AL. **Weather:** Clear, dry

Equipment: Premier Compact 110.

Reason for termination of borehole: Refusal at 1.3m begl on sandstone.

Groundwater Remarks:
No groundwater encountered.

General Remarks:

Hole Started:	26/02/2021	Hole Complete:	26/02/2021	Version:	FINAL	Scale:	1:25

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Windowless Sample Borehole

Borehole No WS104
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505814 E 119083 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.10			Grass over soft, dark brown, clayey fine to medium silty SAND. Rootlets present. TOPSOIL
		0.60 - 0.70	D			0.60			Soft, approximately low strength, orange brown mottled grey, slightly gravelly, sandy SILT. Sand is fine to coarse. Gravel is fine to coarse, sub-angular of sandstone. HEAD
		1.00	S	N=13 (1,2/4,3,3,3)					Firm, medium strength, orange brown mottled grey, slightly gravelly, sandy SILT. Sand is fine to coarse. Gravel is fine to coarse, sub-angular of sandstone. HEAD
		1.30 - 1.40	D						
						1.50			End of Borehole at 1.500m

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Crew: RGI Drilling. **Logger:** AL. **Weather:** Clear, dry

Equipment: Premier Compact 110.

Reason for termination of borehole: Target depth achieved.

Groundwater Remarks:
No groundwater encountered.

General Remarks:

Hole Started:	26/02/2021	Hole Complete:	26/02/2021	Version:	FINAL	Scale:	1:25

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Windowless Sample Borehole

Borehole No WS105
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505856 E 119175 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.10			Soft, dark brown, slightly gravelly, sandy SILT. Sand is fine to coarse. Gravel is fine to coarse of sub-angular roadstone. MADE GROUND
		0.60 - 0.70	D						Soft, low strength, orange brown, sandy SILT with rare gravel. Sand is fine to coarse. Gravel is fine to medium of sub-angular sandstone. HEAD
		1.00	S	N=5 (1,1/1,2,1,1)					
		1.30 - 1.40	D						
						1.50			End of Borehole at 1.500m

1 2 3 4

Crew: RGI Drilling Ltd. **Logger:** AL. **Weather:** Clear, dry

Equipment: Premier Compact 110.

Reason for termination of borehole: Target depth achieved.

Groundwater Remarks:
No groundwater encountered.

General Remarks:

Hole Started: 26/02/2021 **Hole Complete:** 26/02/2021 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS106
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505902 E 119359 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.10			Grass over dark brown, slightly gravelly, sandy SILT. Sand is fine to coarse. Gravel is fine to medium of sandstone, roadstone and quartzite. Rootlets present. TOPSOIL
		0.60 - 0.70	D						Firm, medium strength, orange brown, slightly gravelly, sandy SILT. Sand is fine to coarse. Gravel is fine to coarse, sub-angular of sandstone. HEAD
		1.00	S	N=13 (2,2/2,3,4,4)					
		1.30 - 1.40	D			1.20			Firm, medium strength, slightly sandy, gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to angular of sandstone. HEAD
						1.50			End of Borehole at 1.500m

Crew: RGI Drilling Ltd. **Logger:** AL. **Weather:** Clear, dry

Equipment: Premier Compact 110.

Reason for termination of borehole: Target depth achieved.

Groundwater Remarks:
No groundwater encountered.

General Remarks:

Hole Started: 26/02/2021 **Hole Complete:** 26/02/2021 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS107
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates
505760 E
119360 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.25			Dark brown slightly gravelly silty fine to coarse SAND. Gravel is medium to coarse and angular of sandstone. TOPSOIL
		1.00		N=14 (2,2/2,2,3,7)					Medium dense light yellowish brown slightly gravelly silty fine to medium SAND. Gravel is fine to medium and angular of sandstone. HYTHE FORMATION
									with rare 0.01m to 0.03m clay pockets encountered between 0.50m and 1.50m depth.
									with an angular sandstone cobble encountered at 0.95m depth.
		1.60	D						
						1.80			
		1.90		50 (25 for 35mm/50 for 10mm)		1.90			Extremely weak SANDSTONE recovered as a light yellowish brown and grey slightly sandy fine to coarse and angular gravel of weak platy sandstone. HYTHE FORMATION
									End of Borehole at 1.900m

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Crew: RGI Ltd | **Logger:** AT | **Weather:** Overcast and rain.

Equipment: Premier Tracker 110

Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal at 1.90m depth.

Groundwater Remarks:
No groundwater encountered during drilling.

General Remarks:
Borehole completed as a groundwater level monitoring well, and as a soakaway testing hole.

Hole Started:	22/02/2021	**Hole Complete:**	22/02/2021	**Version:**	FINAL	**Scale:**	1:25

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Windowless Sample Borehole

Borehole No WS108
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates
505643 E
119373 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.10			Covering of fine to coarse GRAVEL of angular roadstone. MADE GROUND
		0.40 - 0.50	D						Soft, approximately low strength, orange brown, slightly gravelly, sandy SILT. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to angular sandstone. HEAD
		1.00	S	N=6 (3,2/1,1,2,2)					
		1.20 - 1.30	D						
						1.30			Very weak, yellow brown, fine to coarse grained SANDSTONE. Recovered as a silty, sandy GRAVEL. HYTHE FORMATION
						1.50			End of Borehole at 1.500m

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Crew: RGI Drilling Ltd. **Logger:** AL. **Weather:** Clear, dry.

Equipment: Premier Compact 110.

Reason for termination of borehole: Target depth achieved.

Groundwater Remarks:
No groundwater encountered.

General Remarks:

Hole Started:	26/02/2021	Hole Complete:	26/02/2021	Version:	FINAL	Scale:	1:25

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Windowless Sample Borehole

Borehole No WS109
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505520 E 119344 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.10			Soft, dark brown, slightly clayey, sandy SILT. Sand is fine to medium. MADE GROUND
		0.50 - 0.60	D						Firm, approximately medium strength, orange brown, slightly gravelly sandy SILT. Sand is fine to coarse. Gravel fine to coarse, sub-angular of sandstone. HEAD
		0.90 - 1.00	D			0.80			Very weak, orange to yellow brown, fine to coarse grained SANDSTONE. Recovered as a silty sandy GRAVEL. HYTHE FORMATION
		1.00	S	50 (2,5/50 for 195mm)		1.00			End of Borehole at 1.000m

Crew: RGI Drilling Ltd. **Logger:** AL. **Weather:** Clear, dry

Equipment: Premier Compact 110.

Reason for termination of borehole: Refusal at 1.0m begl on sandstone.

Groundwater Remarks:
No groundwater encountered.

General Remarks:

Hole Started: 26/02/2021 **Hole Complete:** 26/02/2021 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS110
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates
505595 E
119252 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.20			Dark brown slightly silty slightly gravelly fine to coarse SAND. Gravel is medium to coarse and angular of flint and quartzite. TOPSOIL
		0.60	D						Soft, low strength, light yellowish brown with occasional light grey mottling slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is medium to coarse and angular of sandstone. HEAD
		1.00		N=5 (1,1/2,1,1,1)					*becoming soft and slightly damp between 1.10m and 1.40m depth.*
						1.80			Very dense light yellowish brown slightly silty slightly gravelly fine to medium SAND. Gravel is medium to coarse and angular of sandstone. HYTHE FORMATION
		2.00 2.00	D	50 (7,11/50 for 160mm)		2.00			End of Borehole at 2.000m

1 2 3 4

Crew: RGI Ltd | **Logger:** AT | **Weather:** Overcast and rain.

Equipment: Premier Tracker 110

Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal at 2.00m depth.

Groundwater Remarks:
No groundwater encountered during drilling.

General Remarks:
Borehole completed as a groundwater level monitoring well, and as a soakaway testing hole.

Hole Started:	22/02/2021	Hole Complete:	22/02/2021	Version:	FINAL	Scale:	1:25

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Windowless Sample Borehole

Borehole No WS111
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates
505753 E
119281 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.10			Grass over dark brown, slightly clayey, silty fine to medium SAND. Rootlets present. MADE GROUND
		0.50 - 0.60	D						Firm, medium strength, orange brown, slightly gravelly, sandy SILT. Sand is fine to coarse. Gravel is fine to medium of angular to sub-angular sandstone. HEAD
		1.00	S	N=14 (1,2/3,4,3,4)					*... becoming gravelly below 1.0m begl with sub-angular sandstone.*
		1.30 - 1.40	D						
						1.50			End of Borehole at 1.500m

1
2
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Crew: RGI Drilling Ltd. **Logger:** AL. **Weather:** Clear, dry

Equipment: Premier Compact 110.

Reason for termination of borehole: Target depth achieved.

Groundwater Remarks:
No groundwater encountered.

General Remarks:

Hole Started:	26/02/2021	Hole Complete:	26/02/2021	Version:	FINAL	Scale:	1:25

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Windowless Sample Borehole

Borehole No WS112
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505447 E 119250 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.10			Grass over soft, low strength, dark brown, slightly clayey, silty fine to medium SAND. Rootlets present. TOPSOIL
		0.50 - 0.60	D						Soft, low strength, orange brown, slightly gravelly, sandy SILT. Sand is fine to coarse. Gravel is fine to medium, sub-angular of sandstone. HEAD
		1.00	S	N=7 (2,1/1,1,2,3)		1.10			Soft, low strength, orange brown, slightly sandy, gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular of sandstone HEAD
		1.40 - 1.50	D			1.50			End of Borehole at 1.500m

Crew: RGI Drilling Ltd. **Logger:** AL. **Weather:** Clear, dry.

Equipment: Premier Compact 110.

Reason for termination of borehole: Target depth achieved.

Groundwater Remarks:
No groundwater encountered.

General Remarks:

Hole Started: 26/02/2021 **Hole Complete:** 26/02/2021 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS112a
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates
505438 E
119310 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.10			Grass over dark brown, slightly clayey, silty fine to medium SAND. Rootlets present. TOPSOIL
									Soft, dark brown, slightly sandy, gravelly clayey SILT. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded brick, sandstone and quartzite. Occasional black carbonaceous material present. MADE GROUND
						0.80			Soft, low strength, orange brown, slightly gravelly, sandy SILT. Sand is fine to coarse. Gravel is fine to medium of sub-angular sandstone. HEAD
		1.00	S	N=7 (1,1/1,1,2,3)					
		1.50 - 1.60	D						
						1.80			Stiff, high strength, orange brown, slightly sandy, gravelly SILT with rare cobbles. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular of sandstone. HYTHE FORMATION
		2.00 2.00	SPTLS S	N=38 (2,2/6,7,9,16)					
						2.50			End of Borehole at 2.500m

1 2 3 4

Crew: RGI Drilling Ltd. **Logger:** AL. **Weather:** Clear, dry.

Equipment: Premier Compact 110.

Reason for termination of borehole: Target depth achieved.

Groundwater Remarks:
No groundwater encountered.

General Remarks:

Hole Started:	26/02/2021	Hole Complete:	26/02/2021	Version:	FINAL	Scale:	1:25

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Windowless Sample Borehole

Borehole No WS113
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505858 E 119268 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.30			Dark brown slightly silty very gravelly fine to coarse SAND. Gravel is medium to coarse and angular to subangular of mudstone and sandstone. TOPSOIL
		1.00		N=6 (1,0/1,0,1,4)					Soft, low strength, light yellowish brown and occasionally light grey mottled slightly gravelly sandy CLAY. Sand is medium to coarse. Gravel is medium to coarse and angular of weak sandstone. HEAD
									with rare orangish brown mottling noted from 0.80m depth.
									becoming soft from 1.10m depth.
									becoming very gravelly from 1.50m depth.
						1.90			
		2.00		50 (25 for 75mm/50 for 10mm)		2.00			Very dense light yellowish brown slightly silty gravelly fine to coarse SAND. Gravel is medium to coarse and angular of sandstone. HYTHE FORMATION
									End of Borehole at 2.000m

1 2 3 4

Crew: RGI Ltd **Logger:** AT **Weather:** Overcast and rain.

Equipment: Premier Tracker 110

Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal at 2.00m depth.

Groundwater Remarks:
No groundwater encountered during drilling.

General Remarks:
Borehole completed as a groundwater level monitoring well, and as a soakaway testing hole.

Hole Started:	22/02/2021	**Hole Complete:**	22/02/2021	**Version:**	FINAL	**Scale:**	1:25

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Windowless Sample Borehole

Borehole No WS114
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505393 E 119342 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.30			Soft, dark brown slightly silty slightly gravelly sandy CLAY. Gravel is medium to coarse and angular of sandstone. MADE GROUND
						0.40			Medium dense, dark reddish brown slightly sandy medium to coarse and angular GRAVEL of brick fragments. Sand is medium to coarse. MADE GROUND
		0.80 - 0.90	D						Very dense dark yellowish brown slightly gravelly silty fine to medium SAND. Gravel is fine to coarse and angular of sandstone. HYTHE FORMATION
		1.00 1.00	D	N=50 (2,7/50 for 265mm)					*becoming very gravelly from 1.35m depth.*
		1.50		50 (25 for 95mm/50 for 95mm)		1.50			End of Borehole at 1.500m

Crew: RGI Ltd **Logger:** AT **Weather:** Overcast and rain.

Equipment: Preier Tracker 110

Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal at 1.50m depth.

Groundwater Remarks:
No groundwater encountered during drilling.

General Remarks:
Borehole completed as a groundwater level monitoring well, and as a soakaway testing hole.

Hole Started:	22/02/2021	Hole Complete:	22/02/2021	Version:	FINAL	Scale:	1:25

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Windowless Sample Borehole

Borehole No WS115
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505855 E 119089 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.10			Grass over dark brown, clayey fine to medium SAND. Rootlets present. TOPSOIL
		0.30 - 0.40	D			0.50			Medium dense, orange brown, slightly gravelly, fine to coarse SAND. Gravel is fine to coarse of sub-rounded quartzite. HEAD
		1.00	S	N=16 (2,2/4,3,5,4)					Firm, medium strength, orange brown mottled grey, slightly gravelly, sandy SILT. Sand is fine to coarse. Gravel is fine to coarse, sub-angular of sandstone lithorelicts. HEAD
		1.20 - 1.30	D			1.20			Very weak, highly weathered yellow brown, fine to coarse grained SANDSTONE. Recovered as a silty sandy GRAVEL. HYTHE FORMATION
						1.50			End of Borehole at 1.500m

1 2 3 4

Crew: RGI Drilling. **Logger:** AL. **Weather:** Clear, dry

Equipment: Premier Compact 110.

Reason for termination of borehole: Target depth achieved.

Groundwater Remarks:
No groundwater encountered.

General Remarks:

Hole Started:	26/02/2021	Hole Complete:	26/02/2021	Version:	FINAL	Scale:	1:25

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Windowless Sample Borehole

Borehole No WS116
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505648 E 119393 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.10	D			0.30			Dark brown slightly silty slightly gravelly fine to medium SAND. Gravel is medium to coarse and angular of sandstone. TOPSOIL
						0.90			Loose light yellowish brown and occasionally light grey mottled slightly gravelly silty fine to medium SAND. Gravel is medium to coarse and angular of sandstone. HEAD
		1.00		N=6 (4,7/2,2,1,1)					Loose light yellowish brown and occasionally light grey mottled slightly silty very sandy fine to coarse and angular GRAVEL of weak platy sandstone. HEAD
		1.50	D						
									becoming orangish brown from 1.80m depth.
									becoming very dense from 1.90m depth.
		2.00		50 (6,12/50 for 135mm)		2.00			End of Borehole at 2.000m

Crew: RGI Ltd **Logger:** AT **Weather:** Overcast and rain.

Equipment: Premier Tracker 110

Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal at 2.00m depth.

Groundwater Remarks:
No groundwater encountered during drilling.

General Remarks:
Borehole completed as a groundwater level monitoring well, and as a soakaway testing hole. Hythe Formation anticipated below 2.0m begl.

Hole Started: 22/02/2021 **Hole Complete:** 22/02/2021 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS117
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates
505554 E
119397 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Samples/Tests: Type	Samples/Tests: Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.45			Dark brown slightly gravelly sandy CLAY. Gravel is fine to coarse and angular of mudstone and sandstone with brick fragments. MADE GROUND
		1.00		N=1 (2,1/0,0,0,1)		1.10			Soft to firm, low to medium strength, light yellowish brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse and angular of sandstone. HEAD *becoming orangish brown from 0.95m depth.*
						1.75			Very loose light yellowish brown slightly silty gravelly fine to coarse SAND. Gravel is fine to coarse and angular of sandstone. HEAD
		2.00		50 (25 for 130mm/50 for 150mm)		2.00			Extremely weak SANDSTONE recovered as a light yellowish brown and grey slightly sandy fine to coarse and angular gravel of weak platy sandstone. HYTHE FORMATION End of Borehole at 2.000m

1 2 3 4

Crew: RGI Ltd | **Logger:** AT | **Weather:** Overcast with rain.

Equipment: Premier Tracker 110

Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal at 2.00m depth.

Groundwater Remarks:
No groundwater encountered during drilling.

General Remarks:
Borehole completed as a groundwater level monitoring well, and as a soakaway testing hole.

Hole Started:	22/02/2021	**Hole Complete:**	22/02/2021	**Version:**	FINAL	**Scale:**	1:25

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Windowless Sample Borehole

Borehole No WS118
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505663 E 119242 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.50 - 0.60	D			0.10			Soft, dark brown, slightly clayey, sandy SILT. Sand is fine to medium. Rootlets present. TOPSOIL
		1.00	S	N=17 (2,1/3,3,5,6)		1.00			Firm, approximately medium strength, orange brown, slightly gravelly, sandy SILT. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular of sandstone. HEAD
		1.20 - 1.30	D						Stiff, high strength, orange brown to yellow brown, slightly sandy, gravelly SILT with rare cobbles. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular of sandstone. HYTHE FORMATION
						1.50			End of Borehole at 1.500m

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Crew: RGI Drilling Ltd. **Logger:** AL. **Weather:** Clear, dry

Equipment: Premier Compact 110.

Reason for termination of borehole: Target depth achieved.

Groundwater Remarks:
No groundwater encountered.

General Remarks:

Hole Started: 26/02/2021 **Hole Complete:** 26/02/2021 **Version:** FINAL **Scale:** 1:25

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Trial Pit Log

Trial Pit No SA01
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

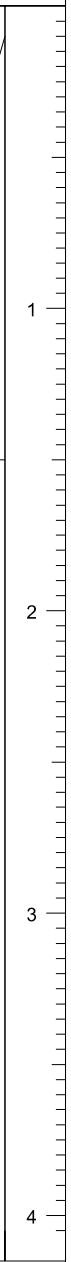
Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505520 E 119155 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			Grass over dark brown, silty, fine to medium SAND. Rootlets present. TOPSOIL
	0.40 - 0.50	D					Soft, approximately low strength, slightly gravelly, sandy SILT. Sand is fine to coarse. Gravel is fine to coarse, sub-angular of sandstone. HEAD
	1.10 - 1.20	D					
				1.50			End of Pit at 1.50m



Date Excavated: 25/02/2021
Date Backfilled: 25/02/2021
Shoring: None.
Stability: Stable at full depth.
Plant Used: 6t Mini Excavator.
Logged by: AL.

Groundwater Observations:
No groundwater encountered.

Trial Pit Dimensions (m):
0.45 × 1.65

Reason for termination of Trial Pit:
Target depth achieved.

General Remarks: Trial hole backfilled with gravel for undertaking soakaway testing. Slotted pipe installed to 1.5m begl.

Relative density is approximate and determined by observation only.

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No SA02
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505894 E 119359 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			Soft, dark brown, sandy SILT with patches of pea gravel. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded of quartzite. MADE GROUND
	0.40 - 0.50	D					Soft, approximately low strength, orange brown, sandy SILT with rare gravel. Sand is fine to coarse. Gravel is fine to coarse, sub-angular of sandstone. HEAD
				1.10			
	1.20 - 1.30	D					Soft, approximately low strength, orange brown slightly sandy, gravelly SILT with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel and cobbles are sub-angular of sandstone lithorelicts. HEAD
				1.55			End of Pit at 1.55m

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Date Excavated: 24/02/2021
Date Backfilled: 24/02/2021
Shoring: None.
Stability: Stable at full depth.
Plant Used: 6t Mini Excavator.
Logged by: AL.

Groundwater Observations:
No groundwater encountered.

Trial Pit Dimensions (m):
0.45 × 1.60

Reason for termination of Trial Pit:
Target depth achieved.

General Remarks: Trial hole backfilled with gravel for undertaking soakaway testing. Slotted pipe installed to 1.55m begl.

Relative density is approximate and determined by observation only.

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No SA03
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505758 E 119396 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.40			Grass over dark brown, slightly gravelly, sandy SILT. Sand is fine to coarse. Gravel is fine to medium of sandstone and quartzite. Roolets present. TOPSOIL
	0.50 - 0.60	D					Soft, approximately low strength, orange brown, sandy SILT with rare gravel. Sand is fine to coarse. Gravel is fine to coarse, sub-angular of sandstone. HEAD
				1.10			
	1.30 - 1.40	D					Very weak, yellow brown, fine to coarse grained SANDSTONE. Recovered as a silty sandy GRAVEL and COBBLES. HYTHE FORMATION
				1.50			End of Pit at 1.50m

1
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Date Excavated: 24/02/2021
Date Backfilled: 24/02/2021
Shoring: None.
Stability: Stable at full depth.
Plant Used: 6t Mini Excavator.
Logged by: AL.

Groundwater Observations:
No groundwater encountered.

Trial Pit Dimensions (m):
0.45
1.70

Reason for termination of Trial Pit:
Target depth achieved.

General Remarks: Trial hole backfilled with gravel for undertaking soakaway testing. Slotted pipe installed to 1.5m begl.

Relative density is approximate and determined by observation only.

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No SA04
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505649 E 119375 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			Covering of fine to coarse GRAVEL of angular roadstone. MADE GROUND
	0.50 - 0.60	D					Soft, approximately low strength, orange brown, slightly gravelly, sandy SILT. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to angular sandstone. HEAD
							... becoming very gravelly with occasional cobbles below 0.8m begl
	1.20 - 1.30	D		1.10			Very weak, yellow brown, fine to coarse grained SANDSTONE. Recovered as a silty, sandy GRAVEL with numerous cobbles. HYTHE FORMATION
				1.40			End of Pit at 1.40m

1
2
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4

Date Excavated: 25/02/2021
Date Backfilled: 25/02/2021
Shoring: None.
Stability: Stable at full depth.
Plant Used: 6t Mini Excavator.
Logged by: AL.

Groundwater Observations:
No groundwater encountered.

Trial Pit Dimensions (m):
0.45 × 1.60

Reason for termination of Trial Pit:
Refused on sandstone at 1.4m begl.

General Remarks: Trial hole backfilled with gravel for undertaking soakaway testing. Slotted pipe installed to 1.4m begl.

Relative density is approximate and determined by observation only.

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No SA05
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505579 E 119241 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			Soft, dark brown, slightly sandy, gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse of angular roadstone. MADE GROUND
	1.00 - 1.10	D					Soft, approximately low strength, slightly gravelly, sandy SILT. Sand is fine to coarse. Gravel is fine to coarse, sub-angular of sandstone. HEAD
				1.50			End of Pit at 1.50m

1
2
3
4

Date Excavated: 25/02/2021
Date Backfilled: 25/02/2021
Shoring: None.
Stability: Stable at full depth.
Plant Used: 6t Mini Excavator.
Logged by: AL.

Groundwater Observations:
No groundwater encountered.

Trial Pit Dimensions (m):
0.45 × 1.55

Reason for termination of Trial Pit:
Target depth achieved.

General Remarks: Trial hole backfilled with gravel for undertaking soakaway testing. Slotted pipe installed to 1.5m begl.

Relative density is approximate and determined by observation only.

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No SA06
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505526 E 119294 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			Medium dense, grey, silty gravelly fine to coarse SAND. Gravel is fine to coarse, angular of roadstone. MADE GROUND
	0.50 - 0.60	D					Soft, approximately low strength, orange brown, sandy SILT with rare gravel. Sand is fine to coarse. Gravel is fine to coarse, sub-angular of sandstone. HEAD
				1.10			Medium dense, yellow brown, silty gravelly fine to coarse SAND with occasional cobbles. Gravel is fine to coarse. Gravel and cobbles are sub-angular of sandstone. HYTHE FORMATION
	1.30 - 1.40	D					
				1.50			End of Pit at 1.50m

1
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4

Date Excavated: 25/02/2021
Date Backfilled: 25/02/2021
Shoring: None.
Stability: Stable at full depth.
Plant Used: 6t Mini Excavator.
Logged by: AL.

Groundwater Observations:
No groundwater encountered.

Trial Pit Dimensions (m):
0.45 × 1.80

Reason for termination of Trial Pit:
Target depth achieved.

General Remarks: Trial hole backfilled with gravel for undertaking soakaway testing. Slotted pipe installed to 1.5m begl.

Relative density is approximate and determined by observation only.

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No SA07
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505874 E 119267 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.05			Loose, dark brown, silty, gravelly SAND with pea gravel patched. Sand is fine to coarse, sub-rounded to rounded of quartzite. MADE GROUND
	0.50 - 0.60	D					Soft, approximately low strength, orange brown, sandy SILT with rare gravel. Sand is fine to coarse. Gravel is fine to coarse, sub-angular of sandstone. HEAD
	1.30 - 1.40	D		1.20			Soft, approximately low strength, orange brown, slightly gravelly sandy SILT with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel and cobbles are sub-angular of sandstone. HEAD
				1.50			End of Pit at 1.50m

1
2
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4

Date Excavated: 24/02/2021
Date Backfilled: 24/02/2021
Shoring: None.
Stability: Stable at full depth.
Plant Used: 6t Mini Excavator.
Logged by: AL.

Groundwater Observations:
No groundwater encountered.

Trial Pit Dimensions (m):
0.45 × 1.80

Reason for termination of Trial Pit:
Target depth achieved.

General Remarks: Trial hole backfilled with gravel for undertaking soakaway testing. Slotted pipe installed to 1.5m begl.

Relative density is approximate and determined by observation only.

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No SA08
Sheet 1 of 1

Site Name: Land to the north east of Glebelands, Pulborough

Ground Level (mAOD)

Client: Catesby Estates plc

GRM Project Ref: P7298

Coordinates 505860 E 119088 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20 - 0.30	D		0.10			Grass over soft dark brown, clayey, silty fine to medium SAND. Rootlets present. TOPSOIL
				0.50			Medium dense, orange brown, slightly gravelly, fine to coarse SAND. Gravel is fine to coarse of sub-rounded quartzite. HEAD
	0.60 - 0.70	D					Soft, approximately low strength, orange brown mottled grey, slightly gravelly, sandy SILT. Sand is fine to coarse. Gravel is fine to coarse, sub-angular of sandstone HEAD
	1.20 - 1.30	D		1.20			Very weak, highly weathered, yellow brown, fine to coarse grained SANDSTONE. Recovered as a silty sandy GRAVEL of sandstone. HYTHE FORMATION
▼				1.50			End of Pit at 1.50m

1
2
3
4

Date Excavated: 24/02/2021
Date Backfilled: 24/02/2021
Shoring: None.
Stability: Stable at full depth.
Plant Used: 6t Mini Excavator.
Logged by: AL.

Groundwater Observations:
Slight groundwater collecting at bottom of hole after completion.

Trial Pit Dimensions (m):
0.45 × 2.10

Reason for termination of Trial Pit:
Target depth achieved.

General Remarks: Trial hole backfilled with gravel for undertaking soakaway testing. Slotted pipe installed to 1.5m begl.

Relative density is approximate and determined by observation only.

Version: FINAL

Scale: 1:25

APPENDIX E

In-Situ Gas Monitoring Results

Project Name	Land Off Drovers Lane Pulborough
Project Number	7298
Client	Catesby Property Group
Date	18/03/2021
Weather	Cloudy
Atmospheric Pressure (mb)	1000
Presure Trend	Steady
Equipment	Gas Data LMSXi
Operator	Bryan Burgh

Ground Gas													
Well ID	Response Zone			Methane		CO2		Oxygen		Gas Flow		PID Reading	
	mbegl			%v/v		%v/v		%v/v		l/h		ppm	
ID	Top	Base	Strata	Peak	Steady	Peak	Steady	Low	Steady	Peak	Steady	Peak	Steady
WS101	0.50	3.00	NS	0.00	0.00	3.50	3.50	16.80	16.80	0.00	0.00	Not Recorded	
WS102	0.50	3.00	NS	0.00	0.00	7.30	7.30	10.10	10.10	-1.00	0.00	Not Recorded	
WS107	0.50	1.90	NS	0.00	0.00	3.70	3.70	17.80	17.80	-0.40	-0.10	Not Recorded	
WS110	0.50	2.25	NS	0.10	0.00	1.90	1.90	16.50	16.50	-0.10	0.00	Not Recorded	
WS113	0.50	2.35	NS	0.00	0.00	3.50	3.50	18.00	18.00	0.00	0.00	Not Recorded	
WS114	0.50	1.50	NS	0.00	0.00	1.30	1.30	18.30	18.30	0.00	0.00	Not Recorded	
WS116	0.50	2.00	NS	0.00	0.00	3.00	3.00	17.70	17.70	0.00	0.00	Not Recorded	
WS117	0.50	2.00	NS	0.00	0.00	4.70	4.70	15.50	15.50	0.30	0.00	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
Not Detected	3.00
Not Detected	3.00
Not Detected	1.94
2.23	2.35
Not Detected	2.18
Not Detected	1.52
Not Detected	2.34
Not Detected	2.30

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)		
N.D.	Not Detected	a	Methane => 1% v/v
N.R.	Not Recorded	b	Carbon Dioxide =>5% v/v
PID	Photo-Ionising Detector	MG	Made Ground
%	By volume	NS	Natural Strata

Ground Material Key

NS	Natural Strata

Key

Threshold gas concentration exceeded

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