AtkinsRéalis

# Drainage Strategy

Ministry of Justice (MoJ)

20 June 2025

377915_15380-ATR-RTC-XX-T-C-0004

# HMCTS READING TRIBUNALS COURT (SOVEREIGN HOUSE)

# Notice

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This document has 66 pages including the cover.

## Document history

Document title: Drainage Strategy

Document reference: 377915_15380-ATR-RTC-XX-T-C-0004

| Revision | Purpose description | Originated | Checked | Reviewed | Authorised | Date |
|---|---|---|---|---|---|---|
| P01 | Stage 3 Submission | KPL | GSS | AS | DA | 14/03/2025 |
| P02 | Update to address planning comments | KPL | GSS | AS | DA | 20/06/2025 |
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## Client signoff

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|---|---|
| **Client** | Ministry of Justice (MoJ) |
| **Project** | HMCTS READING TRIBUNALS COURT (SOVEREIGN HOUSE) |
| **Job number** | 100099718 |
| **Client signature/date** | |

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# Executive Summary

The Civil Engineering Drainage Strategy has been produced for the rehousing of the HMCTS Reading Tribunals Court to Sovereign House. The following report details the management of surface water and foul water drainage for the proposed development.

**Proposed Development**

It is proposed to retain the existing building structure and provide additional toilets and showers on the ground floor, first floor and second floors as part of the improvement works. It is also proposed to construct an external lift, ramps to the southwest and southeast of the building, and a Scottish and Southern Electricity Networks (SSEN) substation building adjacent to the existing building.

**Existing Drainage**

Surveys show that surface water runoff from the development discharge into a culverted watercourse referred to as the ‘Vastern Ditch’. Surface water runoff from the existing car park and external ancillary buildings drain to an existing surface water pipe which runs to the east of the site.

Existing foul water drainage from the development currently discharges into an existing Thames Water public sewer manhole located in the Vastern Road.

As the development site falls within a Flood Zone 2, a flood risk assessment (FRA) has been undertaken to understand the risk of flooding from various sources. The outcome of the FRA has determined the flooding risk to be low, with no mitigation measures required.

**Proposed Surface Water Strategy**

The proposed surface water drainage strategy involves maintaining existing drainage connections and routes, as well as the discharge into the Vasten Ditch. A localised diversion of the existing drainage pipe along the northern face of the building is proposed; the proposed diversion will facilitate the implementation of the proposed external lift.

It is proposed to manage the surface water runoff from the proposed ramps and substation building by controlling the surface water discharge via an online flow control chamber at a flow rate of 2l/sec which connects to the existing drainage network.

The proposed surface water drainage strategy is subject to agreement with the LLFA.

**Proposed Foul Water Strategy**

The redevelopment proposes additional WCs, washing basins and showers blocks on all floors in the northwest corner of building. It is proposed to discharge the foul water from these areas into the existing building foul drainage network through a new inspection chamber along the western side of the building.

Thames Water has confirmed that adequate capacity is available within the public sewer network to accept the additional loading.

# 1. Introduction

## 1.1 General

His Majesty's Courts and Tribunals Services (HMCTS) have purchased Sovereign House in Reading to rehouse the current Reading Tribunals Court. AtkinsRéalis has been commissioned to produce a drainage strategy relating to the drainage works for the development. This report has been submitted to support requirements for planning approval.

Sovereign House is located on the northern side of Vastern Road in Reading, less than 200m to the north of Reading Station. The postcode is RG1 8BT and the grid reference of the site is N 174060m, E 471601m. The site is bound by Vastern Road to the south, a residential complex and the River Thames to the north, an office building to the east and additional buildings to the west. Vehicle access is provided via Norman Place leading to a secure parking area (see Figure 1-1).

**Figure 1-1 - Site Location (Ref: Google Map, 2024)**

Sovereign House is currently used as commercial office space and the proposed conversion into a Tribunal Court will largely involve internal modifications. The existing toilet block, adjacent to the existing lift core, will be maintained. Additional toilets and showers are proposed on the ground floor, first floor and second floors, towards the northwestern side of the building (see Figure 1-2). The plant enclosure on the roof will also be enlarged to provide space for additional equipment

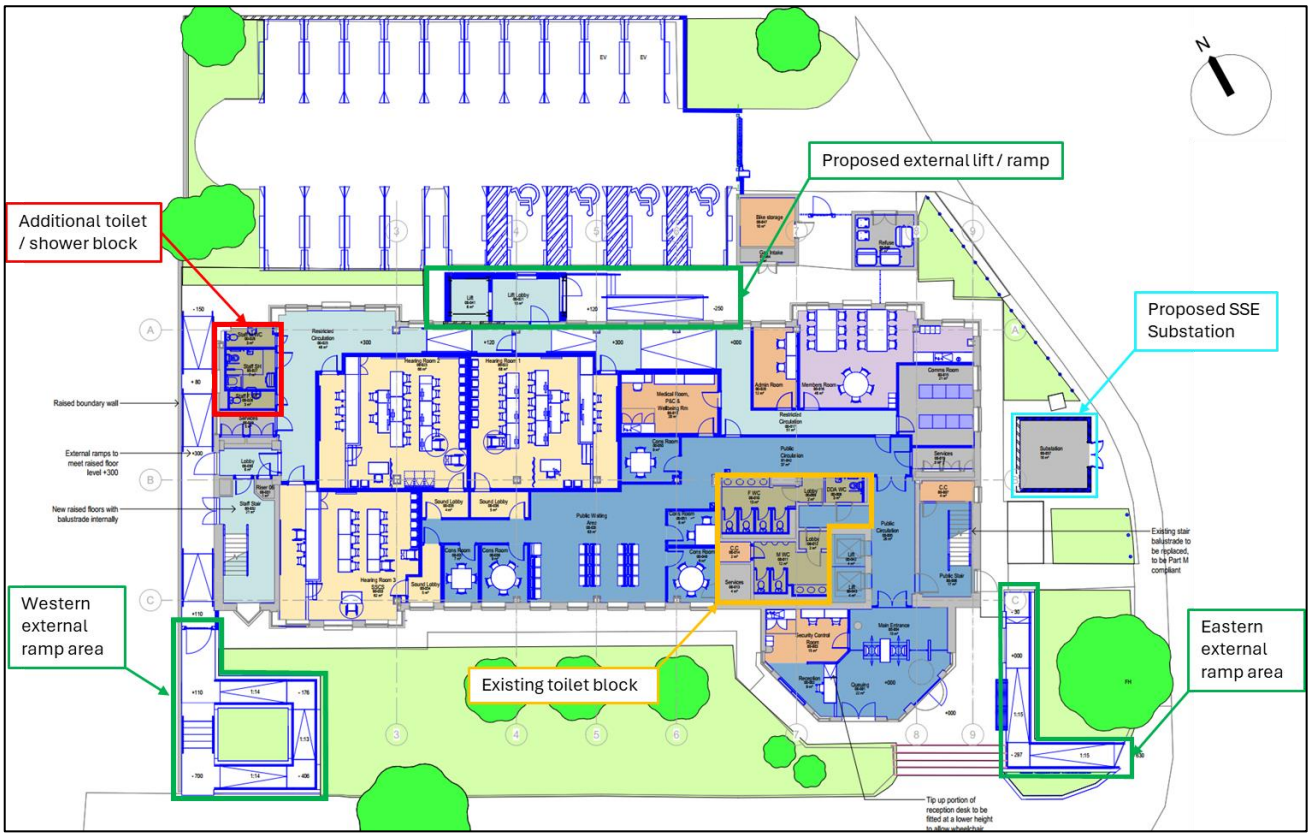



**Figure 1-2 - Proposed Ground Floor Internal Layout (Ref. Feiden+Mawson – 377915_15380-FMA-RTC-00-D-A-1100)**

Modifications to external areas outside the existing building footprint involve the addition of access ramps to the southeast (near the main entrance) and the southwest (to a new gated access) of the site. A new external lift is proposed on the north elevation of the building to provide accessibility to the upper floors. `A new external SSEN substation is proposed on the eastern side of the building, currently occupied by an area of landscaping.

# 1.2 Planning Legislation

The drainage strategy has been produced in accordance with the national and local polices and guidance listed below:

- National Planning Policy Framework (NPPF).
- National Planning Practice Guidance (NPPG).
- DEFRA Non-statutory Technical Standards for Sustainable Drainage Systems (2015).
- Reading Borough Council Local Plan (Adopted November 2019).
- Reading Borough Council Local Flood Risk Management Strategy (October 2015).

## 1.2.1 National Planning Policy Framework Guidance (NPPF)

The NPPF sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced. The most applicable policy to this drainage strategy is paragraph 173, which states:

*"173. When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment.*

*Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:*

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."*

### 1.2.2 National Planning Practice Guidance

The 'Flood risk and coastal change section' of the NPPG advises how to take account of and address the risks associated with flooding and coastal change in the planning process. Paragraphs 055 – 061 provide guidance on SuDS and their implementation. Paragraph 056 stipulates a preference for multi-functional SuDS that allow surface water to be discharged according to the following hierarchy of drainage options:

1. Into the ground (infiltration).
2. To a surface water body.
3. To a surface water sewer, highway drain, or another drainage system.
4. To a combined sewer.

### 1.2.3 Defra Non-Statutory Technical Standards for Sustainable Drainage systems

This document sets out non-statutory technical standards for sustainable drainage systems. It is used in conjunction with the National Planning Policy Framework and Planning Practice Guidance.

- *"S2 For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event."*
- *"S3 For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event."*
- *"S4 Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event."*

- *"S5 Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event."*

- *"S6 Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with S4 or S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk."*

- *"S7 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event."*

- *"S8 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development."*

- *"S9 The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property."*

- *"S10 Components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the design life of the development taking into account the requirement for reasonable levels of maintenance."*

- *"S11 The materials, including products, components, fittings or naturally occurring materials, which are specified by the designer must be of a suitable nature and quality for their intended use."*

- *"S12 Pumping should only be used to facilitate drainage for those parts of the site where it is not reasonably practicable to drain water by gravity."*

### 1.2.4 Reading Borough Council Local Plan

The site falls under the jurisdiction of Reading Borough Council as the both the Local Authority and the Lead Local Flood Authority (LLFA).

The Civils report has been written in line with policies detailed within the Reading Borough Local Plan with the most applicable provided below:

1. **Extract from 'Policy CC3: ADAPTATION TO CLIMATE CHANGE'**

*"All developments will demonstrate how they have been designed to incorporate measures to adapt to climate change. The following measures shall be incorporated into development:*

- *All development shall minimise the impact of surface water runoff from the development in the design of the drainage system, and where possible incorporate mitigation and resilience measures for any increases in river flooding levels as a result of climate change"*

2. **'Policy EN18: FLOODING AND SUSTAINABLE DRAINAGE SYSTEMS'**

*"Development will be directed to areas at lowest risk of flooding in the first instance, following the Sequential and Exceptions Test set out in the NPPF, and taking into account the effects of climate change. It will consider flooding*

*from all sources, including fluvial, surface water, groundwater and sewer flooding. Where development in areas at risk of flooding is necessary, it will not reduce the capacity of the flood plain to store floodwater, impede the flow of floodwater or in any way increase the risks to life and property arising from flooding. Wherever possible, development should be designed to reduce flood risk, both on- and off-site.*

*All major developments must incorporate sustainable drainage systems (SuDS) as appropriate and in line with the Government's Technical Standards. Smaller schemes are encouraged to incorporate SuDS, where possible. Runoff rates should aim to reflect greenfield conditions and, in any case, must be no greater than the existing conditions of the site. Schemes should ensure that the movement of water through vertical infiltration as well as horizontal run-off does not worsen contamination effects. Wherever possible, SuDS provision should maximise ecological benefits, link into the existing Green Network, incorporate tree planting and landscaping and avoid damage to existing significant trees, including through changes to the site hydrology. All new developments in areas of flood risk should give priority to SuDS."*

### 1.2.5 Reading Borough Council Pre-Planning Application Response

Following a pre-application consultation between the project design leads and Reading Borough Council (Ref. PL/24/1401 - Dec 2023), the proposed drainage strategy must ensure the following is met:

*"The proposed development would be required to be supported by a Sustainable Urban Drainage Strategy (SUDs) at validation stage."*

This report aims to meet the above requirement.

# 1.3 Existing Site

The existing site layout includes the office building consisting of 3 floors, external landscaping and an external car parking area. An external bin store, bike store and gas isolation building adjourn the main building to the north (see Figure 1-3). The internal building layout comprises of a reception, office staff spaces, a kitchen, sanitation facilities, stairs, lifts and MEP plant room on the roof. The site boundary measures approximately 0.24 ha.

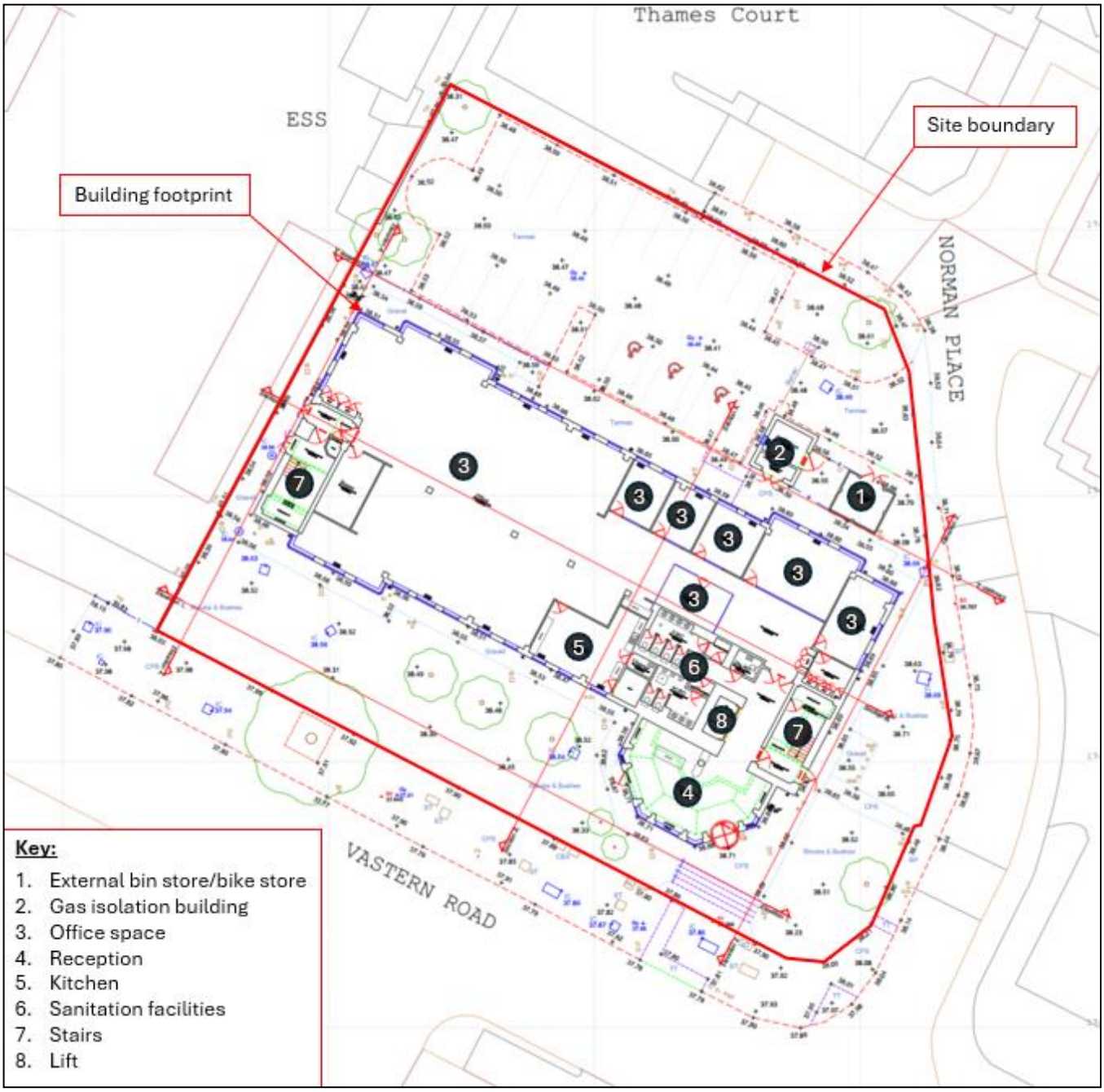



**Figure 1-3 - Existing Site Plan (Ref. Greenhatch Group - '34202A_01-07_PES')**

## 1.3.1 Topography

A topographical survey was carried out for the site with existing levels shown in the existing site plan drawing. The site is shown to be built up approximately 0.8m from the Vastern Road pavement to the building and is accessed via stairs and a ramp to the southeast. The building and immediate area is fairly flat with elevations ranging from 38.71 mAOD in the southeast to 38.48 mAOD to the northwest. See Appendix A for full details.

## 1.3.2 Existing Drainage

### 1.3.2.1 Public Sewer Records

Public sewer records from client record information show an existing Thames Water foul sewer network on the southern and eastern sides of the site (see Figure 1-4). A 150mm pipe runs from north to south beneath Norman Place, which connects to a 300mm dia. pipe running west to east within Vastern Road.

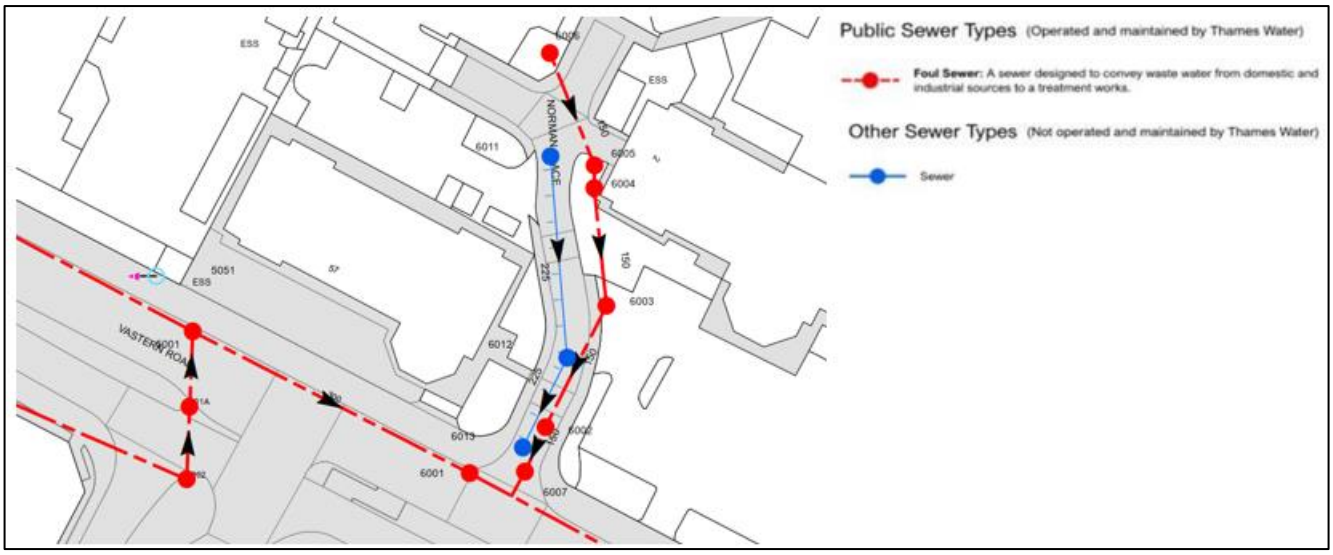



**Figure 1-4 - Thames Water Sewer Records (Ref. ALS/ALS Standard/2023_4773851)**

Another 225mm dia. sewer is shown running adjacent to the foul sewer beneath Normal Place, however, this is not understood to be operated or maintained by Thames Water. Cover and invert levels for the recorded manholes have been provided within the sewer records, a full version of which can be found in Appendix B.

### 1.3.2.2 Private Sewer Records

A CCTV survey undertaken on the existing private below ground drainage network within the site was obtained from the client record information, showing the connectivity of the drainage network (see Figure 1-5).

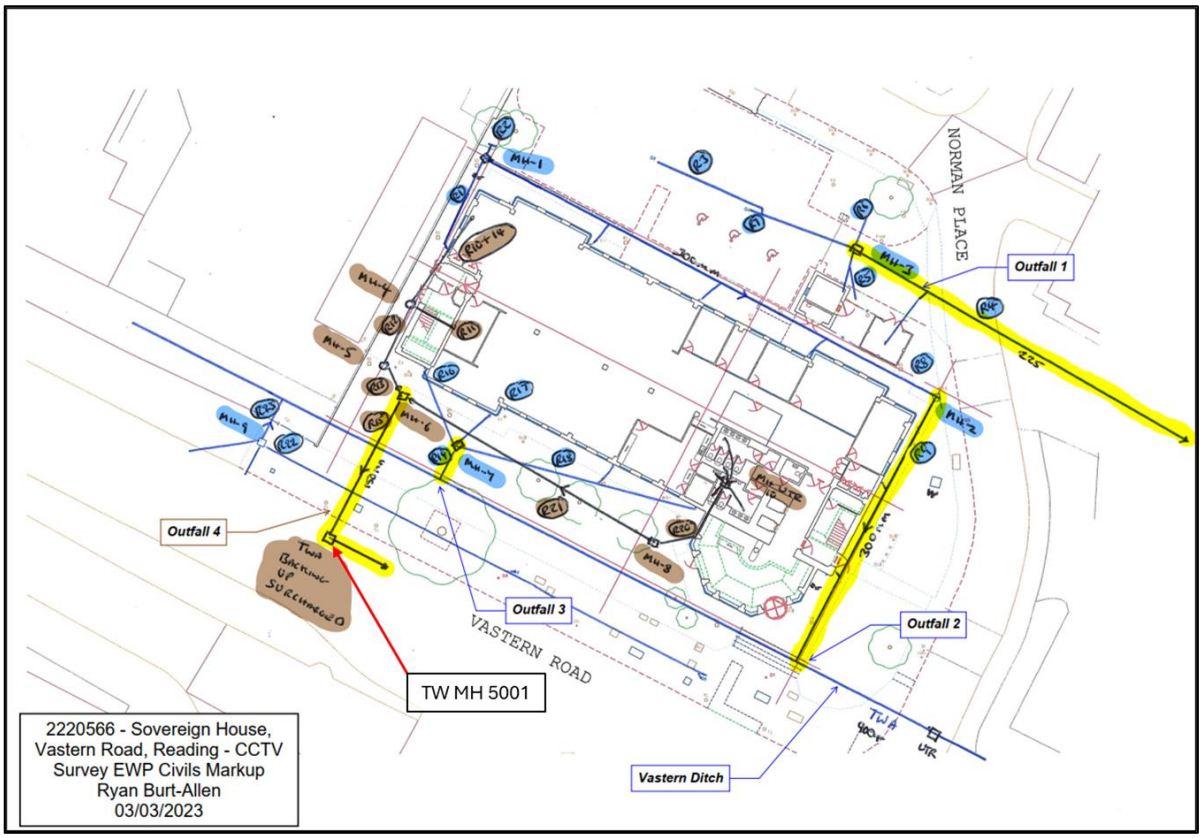



**Figure 1-5 - Site CCTV Survey Plan (Ref. EWP CCTV Survey)**

The CCTV survey indicates that the surface water drainage from the car park, external bike storage and bin store area discharges to an existing 225mm in diameter pipe (Outfall 1) located along the eastern section of the site. The rainwater pipes around the perimeter of the building are understood to discharge into buried pipes and outfall into the 'Vastern Ditch' (Outfall 2 & 3). From the Reading Borough Council Strategic Flood Risk Assessment, this is believed to be a culverted water course that discharges into the River Thames near the Caversham Lock and is understood to be a Reading Borough asset.

The foul water drainage from the building is shown as discharging into the Thames Water foul sewer within Vastern Road (manhole reference 5001 is believed to be where Outfall 4 connects).

In December 2024, a CCTV survey was undertaken by Vision Survey to determine and confirm the line, level, diameter and condition of the existing foul and surface water networks. The survey does not note any significant structural condition issues within the present network.

A complete survey of the drainage network was not possible due to obstructions encountered on site. Also, downstream surface outfall inverts to the Vastern Ditch have not been recorded. Where pipe and chamber inverts are unknown, assumptions have been made in the development of the proposed drainage strategy. Further confirmation of the existing drainage networks must be undertaken at the next design stage.

A full record of the CCTV survey information can be found in Appendix B.

## 1.3.3 Geology

A review of the site geology was undertaken based on the data available from the British Geological Survey (BGS) Geology Viewer mapping tool (see Figure 1-6). This shows the superficial and bedrock geology as indicated in Table 1-1.

**Table 1-1 - Site Geology Description**

| Geology Layer | Description |
|---|---|
| Superficial | Langley Silt Member - Clay and silt |
| Bedrock | Seaford Chalk Formation and Newhaven Chalk Formation - Chalk |

This superficial geology suggests that infiltration may not be possible given the lower rates of infiltration achievable in clay soils.

**Figure 1-6 - Superficial Geology of Site (Ref. BGS Geology Viewer Mapping Tool)**

## 1.3.4 Hydrogeology

A review of the British Geological Survey historical borehole records identifies no historical borehole logs area available within the immediate site boundary.

The nearest historical borehole record is SU77SW210 located approximately 57m from the site (see Figure 1-7). The record notes ground water to have been struck at 34.9 mAOD. Ground water was also noted to increase to 35.9 mAOD at borehole log SU77SW210. Due to the site's proximity to the River Thames, ground water levels are expected to be fairly high.

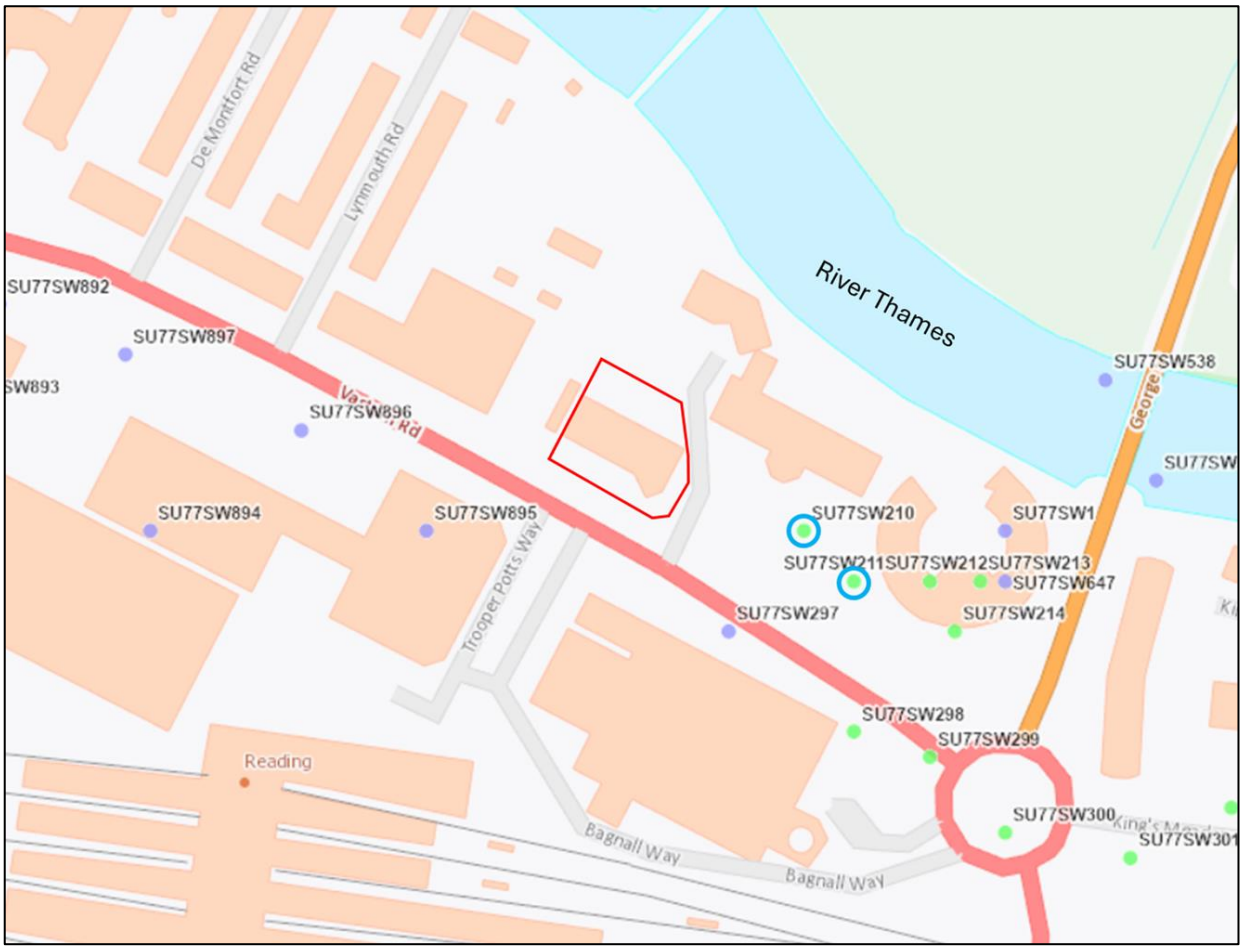



**Figure 1-7 - BGS GeoIndex Onshore Borehole Records Near Sovereign House**

The site is not located within a Source Protection Zone (SPZ).

# 2. Surface Water Drainage Strategy

## 2.1 Design Standards

The following design standards have been adopted in the development of the surface water design:

- The Building Regulations 2015 - Drainage and Waste Disposal - Approved Document H.
- BS EN 752:2017 - Drainage Sewer Systems Outside Buildings - Sewer System Management.
- BS EN 16933-2 - Drain and Sewer Systems Outside Buildings - Design (Hydraulic Design).
- Sewerage Sector Guidance - Appendix C, Version 2.3 – 2023.

## 2.2 Design Criteria

The surface water drainage system has been designed to the following design criteria, in accordance with the standards and guidance listed in Section 2.1 and the planning legislation in Section 1.2:

- The design is based on FEH 2022 rainfall point data at E: 471600, N: 174060.
- No surcharging in a 1 in 2-year storm event.
- No flooding in a 1 in 30-year storm event (plus 35% climate change).
- Controlled/no flooding for 1 in 100-year storm event (plus 40% climate change) and no flows to offsite areas.
- Minimum pipework self-cleaning velocity 1 m/s.

### 2.2.1 Climate Change

Climate change factors have been derived from the Environmental Agency's 'Climate change allowances for peak rainfall in England' for the Thames and South Chilterns Management Catchment. The allowances for the site are summarised below, based on a project lifetime of 50 years:

- 1 in 30-year storm event – Climate Change factor of 35% applied based on an upper end allowance.
- 1 in 100-year storm event – Climate Change factor of 40% applied based on an upper end allowance.

### 2.2.2 Hydraulic Design

Hydraulic modelling has been undertaken for the surface water drainage network using Causeway Flow V12.0 (Flow). The summary of the hydraulic design calculations is available in Appendix E.

The following design criteria in Table 2-1 was used within Flow to develop the hydraulic model.

**Table 2-1 - Flow Hydraulic Design Criteria**

| Design Rainfall Dataset Used | FEH2022 |
|---|---|
| Design Storm | 1 in 2-year event + 0% climate change (No surcharge) |
| Global Time of Entry (mins) | 5 |
| Max. Time of Concentration (mins) | 30 |
| Max. Rainfall (mm/hr) | 250 |
| PIMP (%) | 100 |

| | |
|---|---|
| Volumetric Runoff Coefficient (Cv) | 1.00 |
| Hydraulic Pipeline roughness (mm) | 0.6 |

The minimum size of a gravity surface water sewer is 100mm diameter. To provide a self-cleansing regime within the proposed surface water network, the minimum flow velocity shall be 1 m/s at pipe full flow.

The system has been designed not to flood the site in events up to and including a 1 in 30-year design storm. During events exceeding this threshold, consideration has been given to the flow paths of any water escaping from the system onto the site to ensure it is contained above ground temporarily.

## 2.3 Outfall Strategy

The viability of each of the outfall options from the NPPG hierarchy of drainage options was assessed as is summarised in Table 2-2.

**Table 2-2 - Drainage Hierarchy Evaluation**

| No. | Drainage Hierarchy | Evaluation Comments |
|---|---|---|
| 1 | Infiltration | Not Viable – The identified Langley Silt Member silt and clay soil superficial geology from the BGS online tool does not provide appropriate infiltration rates. No current proprietary treatment for existing drainage regime - additional treatment will be required to mitigate risk of contamination to groundwater. High groundwater levels are anticipated based on BGS borehole logs and proximity to the River Thames. |
| 2 | Discharge to surface waters | Not Viable – No direct existing outfall exists for the site to a surface water body. The site is located approximately 90m south from the River Thames. Discharge to the River Thames will not be viable without construction of new drainage infrastructure across privately owned land. |
| 3 | Discharge to surface water sewer, highway drain or another drainage system | Viable – The existing building is understood to drain into a private drainage network within the site and discharges into the Vastern Ditch via two outfall locations. The gullies in the car park area and external buildings drain to a northeastern outfall, which is then assumed to discharge to another surface water sewer.<br><br>The surface water drainage discharge regime to all of these outfalls are to remain. |
| 4 | Discharge to a combined sewer | Not viable – Public sewer records do not identify combined sewer assets within the proximity of the site. |

Based on the evaluation, the strategy shall be to discharge runoff into the Vastern Ditch with minimal interference to the existing surface water drainage regime.

No changes to the drainage network will be required to the existing car park area, external bike shed, and bin store. Hence, discharge to ‘Outfall 1’ to the east will remain unchanged.

Discharge of surface water from the building and external areas to 'Outfall 2' and 'Outfall 3' to the Vastern Ditch will remain. The proposed external lift shaft will have no impact on the downstream outfalls and will only require a minor diversion upstream of 'Outfall 2'.

## 2.4 SuDS Evaluation

A full suite of SuDS options has been evaluated for the surface water drainage management. The evaluation considered the following:

- Attenuation, amenity, biodiversity and treatment properties of each SuDS element.
- Planning legislation and guidance (as described in Section 1.2).
- Site spatial constraints.
- Existing roof type and drainage regime.

The results of the evaluation and proposed solution are summarised in Table 2-3.

**Table 2-3 - SuDS evaluation summary**

| SuDS Type | Evaluation Comments | Conclusion |
|---|---|---|
| Ponds | Site specific constraints, such as proximity to buildings and site use does not allow the use of ponds. | Not Viable |
| Pervious Pavement | The pavement areas around the building and car park are not being modified to maximise existing material reuse. | Not Viable |
| Wetlands | Site specific constraints, such as proximity to buildings and site use does not allow the use of wetlands. | Not Viable |
| Infiltration Systems | Ground conditions discussed in Section 1.3.3, the presence of superficial clay and chalk bedrock indicates the site is unsuitable for discharge via infiltration.<br><br>Pre-application response describes the potential risk of contaminants within the ground due to former industrial land use. | Not Viable |
| Proprietary Treatment Systems | Not deemed to be required to the surface water drainage system as the catchment consists of roof areas, pedestrian accessways, and a small car park. The pollution risk from the roof area and proposed hardstanding areas are considered low. | Not Viable |
| Filter Strips | Existing vegetated slopes are present along the southern and eastern sides of the building. Additional filter strips are unable to be proposed due to limited space. | Not Viable |
| Filter Drains | Insufficient space within the development. | Not Viable |
| Tree Pit Drainage | Planting of an additional tree is proposed within the development boundary. | Viable |

| | | |
|---|---|---|
| Bio Retention | Insufficient space within the development. | Not Viable |
| Green/Blue Roofs | The building modifications are largely internal, therefore green and blue roofs are not practical without significant architectural, structural and M&E changes. Roof type proposed for new substation will be unable to support green and blue roofs. | Not Viable |
| Dry/Wet Swales | Insufficient space within the development. The topography does not support flow in the direction of the drainage system. | Not Viable |
| Detention Basins | Insufficient space within the development. | Not Viable |
| Attenuation Tank | An attenuation tank is a viable option to provide sufficient attenuation to manage peak flows volumes for various rainfall return periods. | Viable |
| Rainwater Harvesting | Water butt rainwater harvesting can be used to capture and store runoff from rainwater downpipes. Rainwater can be reused as an alternative source to watering the landscape.<br><br>Alternative complex rainwater storage tanks and pumping are unsuitable for due to the existing infrastructure in place. | Viable |

## 2.5 Proposed Discharge Rates

As the proposed development seeks to reuse the existing building footprint and drainage network, the existing discharge rates will be maintained. Where additional impermeable areas are being added within the site (namely the access ramps and substation), these will be restricted to greenfield runoff rates prior to discharging into the existing below ground drainage network

The greenfield runoff rates and volumes for the 0.243 ha site have been accessed using the FEH methdology using FEH22 data (see Appendix C). This method has been used as it is more applicable to smaller catchments less than 50 ha in size. The HR Wallingford Greenfield Runoff tool has been with outputs shown in Table 2-4.

**Table 2-4 – Estimated greenfield runoff rates of 0.243 ha site for the design storm events**

| Annual Exceedance Probability (AEP) Event | Greenfield Rates (l/s) |
|---|---|
| 100% (1 in 1 year) | 0.16 l/s |
| $Q_{BAR}$(1 in ~2.3 year) | 0.19 l/s |
| 3.3% (1 in 30 year) | 0.44 l/s |
| 1% (1 in 100 year) | 0.61 l/s |

Based on the estimated greenfield rates, the $Q_{BAR}$ flow rate is considered to require a small flow restriction diameter, resulting in onerous maintenance requirements. Consequently, a practical minimum flow rate of 2 l/s is proposed, in

accordance with the UKSuDS.com guidance on minimum flow rates. This has been considered to reduce the risk of blockage and to avoid potentially creating a flood risk.

## 2.6 Storage Requirements

The storage requirements for the new external areas of development have been assessed via hydraulic modelling within Causeway Flow using the FEH22 dataset (see Table 2-5).

**Table 2-5 – The storage requirement for the design storm criteria for a non-infiltration-based solution**

| Annual Exceedance Probability (AEP) Event | Maximum Storage Requirements ($m^3$) | |
|---|---|---|
| | Southwestern Ramp Area | Southeastern Ramp Area & Substation |
| 50% (1 in 2 year) | <1 | <1 |
| 3.3% (1 in 30 year) | 1 | 2 |
| 1% (1 in 100 year) | 1 | 2 |

## 2.7 Proposed Drainage Solution

The proposed drainage strategy is to maintain the existing below ground drainage regime for the current building as best as possible. This involves maintaining the existing connections from the building to the private drainage network, from the private drainage to the existing outfalls into the Vastern Ditch, and from the car park area.

Where the external lift is proposed along the northern face of the building, a diversion of the existing below ground drainage system is required to avoid the lift's foundations. The existing drainage pipe will be routed around the lift footprint, connecting back into the existing pipe run alignment once the lift has been circumvented. As there are no additional impermeable areas contributing to this pipe along this diversion, the existing discharge rates remain the same.

Where external modifications to the site are proposed, there will be a change to the impermeable areas discharging into the private drainage network. These locations will be at the southwestern and southeastern access ramps, and at the substation on the eastern side of the site. These areas will drain to a buried drainage network which will connect into the existing private drainage network via flow control manholes, which will restrict the flow to 2l/s.

Hydraulic modelling of the proposed network indicates that attenuation volumes can be stored within the additional pipes and manholes, removing the requirement for an attenuation tank.

Given the presence of existing trees on the site, care is to be taken during the construction of the drainage network to ensure adequate protection of existing trees, along with their root network. Where drainage infrastructure is required within tree root protection areas, the excavations shall be carried out by hand to avoid cutting through roots and surpervised by a certified arboriculturalist.

See Appendix D for the surface water drainage drawings and Appendix E for the hydraulic calculations.

## 2.8 Water Quality

The water quality impact of the development has been assessed using the CIRIA SuDS Manual (C753) Simple Index Approach pollution hazard indices. The majority of the redevelopment can be classed as 'other roofs' and pedestrian areas. Therefore, the pollution hazard level is determined as 'Low' (Figure 2-1).

**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 |
| Other roofs (typically commercial/ industrial roofs) | Low | 0.3 | 0.2 (up to 0.8 where there is potential for metals to leach from the roof) | 0.05 |
| Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day | Low | 0.5 | 0.4 | 0.4 |
| Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1] | Medium | 0.7 | 0.6 | 0.7 |
| Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1] | High | 0.8[2] | 0.8[2] | 0.9[2] |

**Figure 2-1 - Pollution hazard indices from the CIRIA SuDS Manual report (C753)**

As the additional catchment draining to the drainage system will predominantly be from roof and pedestrian areas, pollution will be managed through catchpits installed upstream of the proposed flow control chambers to separate out any solid material.

## 2.9 Biodiversity and Amenity

It is proposed to retain some landscape features within the site to provide amenity space and encourage biodiversity on the site.

## 2.10 Exceedance Assessment

As discussed in Section 2.2, the drainage system has been designed so ensure there is no onsite or offsite flooding during a 100 year (plus 40% climate change event) rainfall event.

# 3. Foul Drainage Strategy

## 3.1 Design Standards

The following design standards have been adopted in the development of the foul water design:

- The Building Regulations 2015 - Drainage and Waste Disposal - Approved Document H.
- BS EN 752:2017 - Drainage Sewer Systems Outside Buildings - Sewer System Management.
- BS EN 12056-2:2000 Gravity drainage systems inside buildings. Sanitary pipework, layout and calculation.
- BS EN 16933-2 - Drain and Sewer Systems Outside Buildings - Design (Hydraulic Design).
- Sewerage Sector Guidance - Appendix C, Version 2.3 – 2023.

## 3.2 Design Criteria

The following design criteria has been adopted in the development of the foul water network with reference to the standards and guidance listed in Section 3.1, where applicable.

- Foul water flow will be derived using the Probability (Discharge Unit) method.
  - Discharge Units have been based on the information supplied by the MEP Engineers (BakerHicks).
- Where peak flow is < 1l/s, a pipe diameter of 100mm at a gradient of 1:40 can be used.
- Where peak flow is > 1l/s, a pipe diameter of 100mm at a gradient of 1:80 can be used where it is connected to at least one toilet. A pipe diameter of 150mm at a gradient of 1:150 can be used where it is connected to at least five toilets.
- Maximum allowed distance between manholes is 90m.
- Maximum allowed distance between inspection chambers to a manhole is 45m.
- Maximum allowed distance from rodding point to an inspection chamber is 45m.
- To provide a self-cleansing regime within gravity foul sewers, the minimum flow velocity should be 0.75 m per second at one-third design flow.

## 3.3 Outfall Strategy

The discharge hierarchy, as per Requirement H1 of The Building Regulations 2015, was assessed and is summarised in Table 3-1.

**Table 3-1 – Foul Water Discharge Heirarchy Evaluation**

| No. | Discharge Heirarchy | Evaluation Comments |
|---|---|---|
| 1. | Public Sewer | Not practical to have a direct connection from the building to the Thames Water sewer. |
| 2. | Private Sewer Communicating with a Public Sewer | Viable – There is an existing foul water network serving the building that can be connected into. |
| 3. | Septic Tank with Appropriate Secondary Treatment / Another Wastewater Treatment System | Not practical due to availability of a private sewer connection. |
| 4. | Cesspool | Not practical due to availability of a private sewer connection. |

## 3.4 Design Proposal

The existing toilet blocks are to remain and will continue discharging to the Thames Water sewer in Vastern Road via the existing drainage network. Additional flows are expected to contribute to the existing stacks from tea points on the ground floor via drain pumps.

The proposed addition of WCs, washing basins and showers on all floors in the northwest corner of the building will also contribute to the increase of flows. These proposed sanitary facilities are expected to discharge internally via two new soil vent pipes: SVP 1 & SVP 2 (see Figure 3-1). A kitchen sink on the second floor will also connect to these stacks.

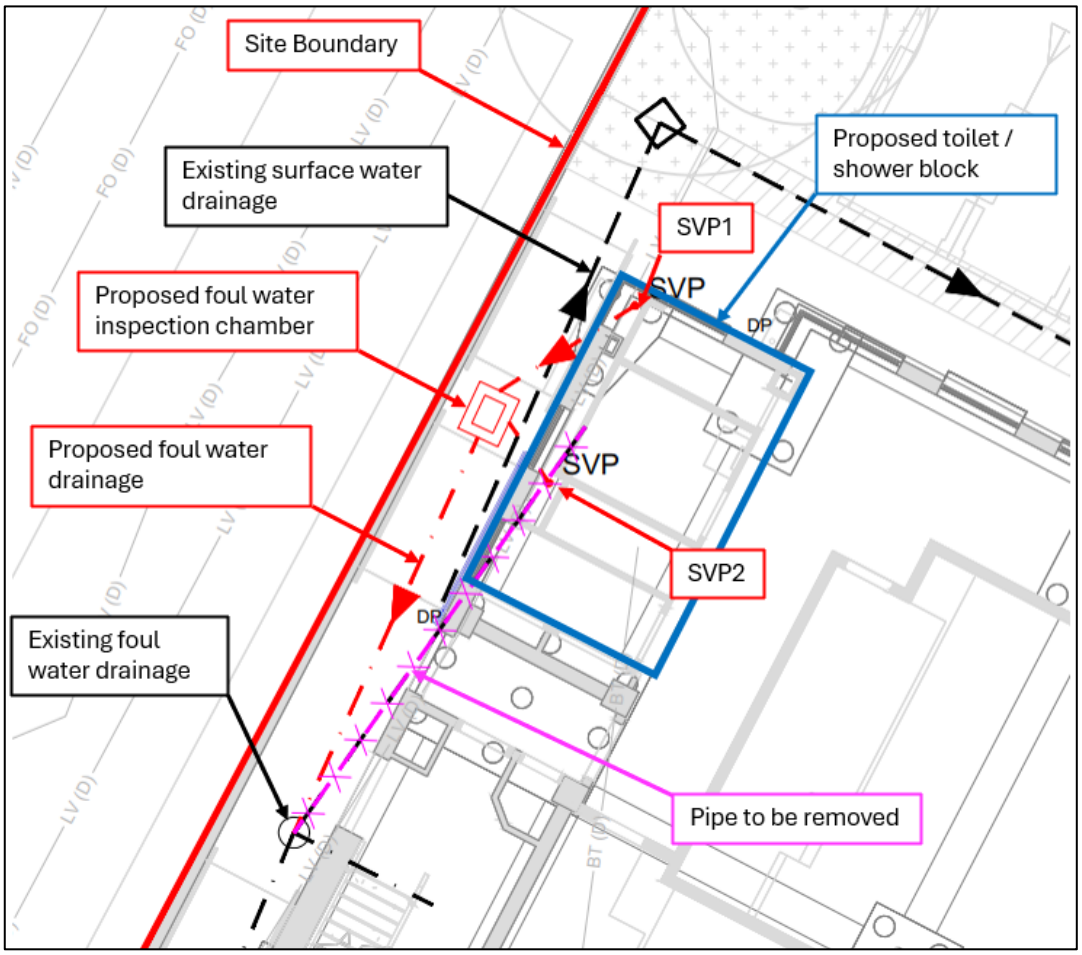



**Figure 3-1 - Proposed Foul Water Drainage**

The additional flow from the new stacks have been derived using the Discharge Unit (DU) method, in-line with The Building Regulations, Approved Document H and the methodology detailed in BS EN 12056-2 Based on the building usage, a typical frequency factor (K) 0.7 – 'frequent use' has been used for the calculation of the total flow rate. The results show an expected additional foul flow of 3.44l/s from the new stacks. An external foul pipe will be located at the base of each stack and will convey to the nearby existing inspection chamber.

See Appendix F for the full foul water drainage layout plan and Appendix G manhole schedule.

A pre-planning capacity check application was submitted to Thames Water (see Appendix I) who confirmed that sufficient capacity is available within the existing public sewer via manhole ref. SU7175001 to receive additional foul loading.

# 4. Maintenance

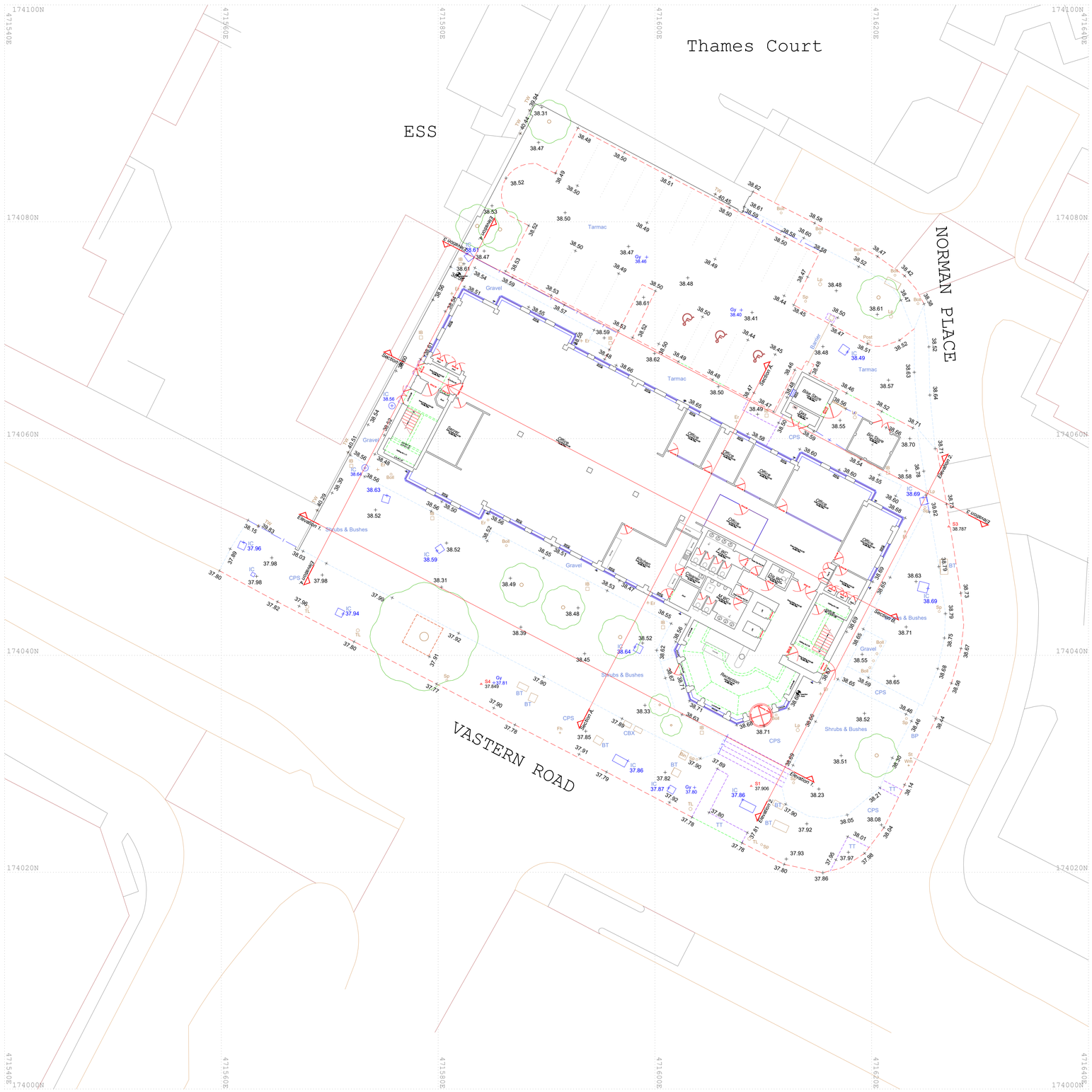
The maintenance of the proposed drainage systems is summarised below:

- Below ground drainage system - Litter, debris removal and periodical jetting. The surface water drainage has been designed for a self-cleansing velocity of 1 m/s and foul pipework in accordance will the minimum falls in BS EN 752:2017, allowing for the appliances connected.

# APPENDICES

# Appendix A. Topographical Survey

## A.1 Greenhatch Group - ‘34202A_01-07_PES’

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N

## Station Information:

| Station | Easting (m) | Northing (m) | Level (m) |
|---|---|---|---|
| S1 | 471608.885 | 174027.965 | 37.906 |
| S3 | 471627.108 | 174051.898 | 38.787 |
| S4 | 471583.973 | 174037.374 | 37.849 |

**OS Note:**

*The Ordnance Survey tile is to be used as a guide only.*

*OS Buildings* *Surveyed Buildings*

*This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36(15) via Global Navigational Satellite Systems (GNSS) and the O.S. Active Network (OS Net).*

*A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15GB & OSGM15GB transformation models.*

*The survey has been correlated to this point and a further one or more OSGB36(15) points established to create a true O.S. bearing for angle orientation.*

*No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.*

*Please refer to Survey Station Table to enable establishment of the on-site grid.*

## Building Survey Legend:

| | |
|---|---|
| SHt 1.00<br>HHt 2.12 | Sill Height from FFL.<br>Head Height from FFL. |
| SL 51.03m<br>HL 52.82m | Sill Level from defined datum.<br>Head Level from defined datum. |
| Susp CHt: 2.00<br>Struct CHt: 3.00 | Suspended Ceiling Height from FFL.<br>Structural Ceiling Height from FFL. |
| Susp Ceil: 30.00m<br>Struct Ceil: 31.00m | Suspended Ceiling Level from datum.<br>Structural Ceiling Level from datum. |
| IFL: 100.00m<br>+100.00m | Internal Floor Level (General).<br>Internal Floor Level (Specific). |
| Insertion Point | Insertion Point for overlay drawings of other floors or details. |

Incoming Services

Elec. Gas Water

## Topographical Survey Legend:

Buildings, Wall, Kerb line, Line marking, Drop kerb, Centre line, Overhead Cable, Concrete edge, Tarmac edge, Grass verge, Canopy/Overhang, Verge, Station and Name, Station Level, Tree / Bush / Sapling, Area of Undergrowth, Woodland, Ridge Level, Eaves Level, Flat Roof Level, Gate

Fence types: Dill, Interwoven, Iron Railings, Wire Mesh, Post & Rail, Post & Wire, Chain Link, Wooden Panels, Concrete Panels, Steel Palisade

| | | | | | |
|---|---|---|---|---|---|
| IC | Inspection chamber | BollI | Bollard | | |
| PInv | Pipe invert | IB | Illuminated bollard | | |
| Gy | Gully | Bin | Rubbish bin | | |
| Bg | Back gully | Vp | Vent pipe | | |
| Dp | Down pipe | Gsl | Ground light | | |
| Pipe | Pipe above ground | Lbox | Letter box | | |
| MH | Manhole | Ldr | Ladder | | |
| WL | Water level | Sty | Stile | | |
| Fl | Flood light | IFL | Internal floor level | | |
| Lp | Lamp post | THL | Threshold level | | |
| Tp | Telegraph post | Sp | Sign post | | |
| Ep | Electricity post | TH | Trishole | | |
| Tl | Traffic light | BH | Borehole | | |
| Bus | Bus stop | ELC | Electric | | |
| Sv | Stop valve | BT | British Telecom | | |
| St | Stop tap | CTbox | Control box | | |
| Er | Earth rod | TT | Tastite | | |
| Wm | Water meter | BP | Brick paved | | |
| Gas | Gas valve | CPS | Concrete paving slab | | |
| Av | Air valve | CVR | Cover | | |
| ICU | Unidentified inspection | IC | Inspection chamber | | |
| Wo | Wash out | Rwall | Retaining wall | | |
| Re | Rodding eye | UTL | Unable to lift | | |
| BB | Beltsha beacon | TCL | Tree canopy level | | |
| CTV | Cable tv | G | Girth | | |
| Mkr | Marker post | MG | Multi girth | | |
| Gmkr | Gas marker post | Stmp | Tree Stump | | |
| So | Soffit | CL | Cover level | | |
| | | IL | Invert level | | |

| Rev | Date | Description | Drawn | Q. Ref. |
|---|---|---|---|---|
| | | | | |

greenhatch group

- Topographical Surveys
- Site Engineering
- Utility / CCTV Surveys
- Bathymetric Surveys
- Measured Building Surveys
- 3D Laser Scanning
- 3D Revit & BIM Models
- Area, Lease & Fire Plans

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|---|---|---|
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CLIENT
**V7**

PROJECT
**Sovereign House, Vastern Road, Reading, RG1 8BT**

TITLE
**Existing Site Plan**

| SCALE | DATE |
|---|---|
| A1@ 1: 200 | 09.03.2022 |
| DRAWN | QUALITY REF |
| JP | GH13127 |

| | |
|---|---|
| Level datum | See notes |
| Grid orientation | See notes |
| Job number | 34202A |
| Drawing No. | Rev. |
| 34202_01_P | 0 |

Comments

*This plan should only be used for its original purpose. Greenhatch Group accepts no responsibility for this plan if supplied to any party other than the original client.*

*All dimensions should be checked on site prior to design and construction.*

*Some services may have been omitted due to parked vehicles.*

*Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.*

Notes:

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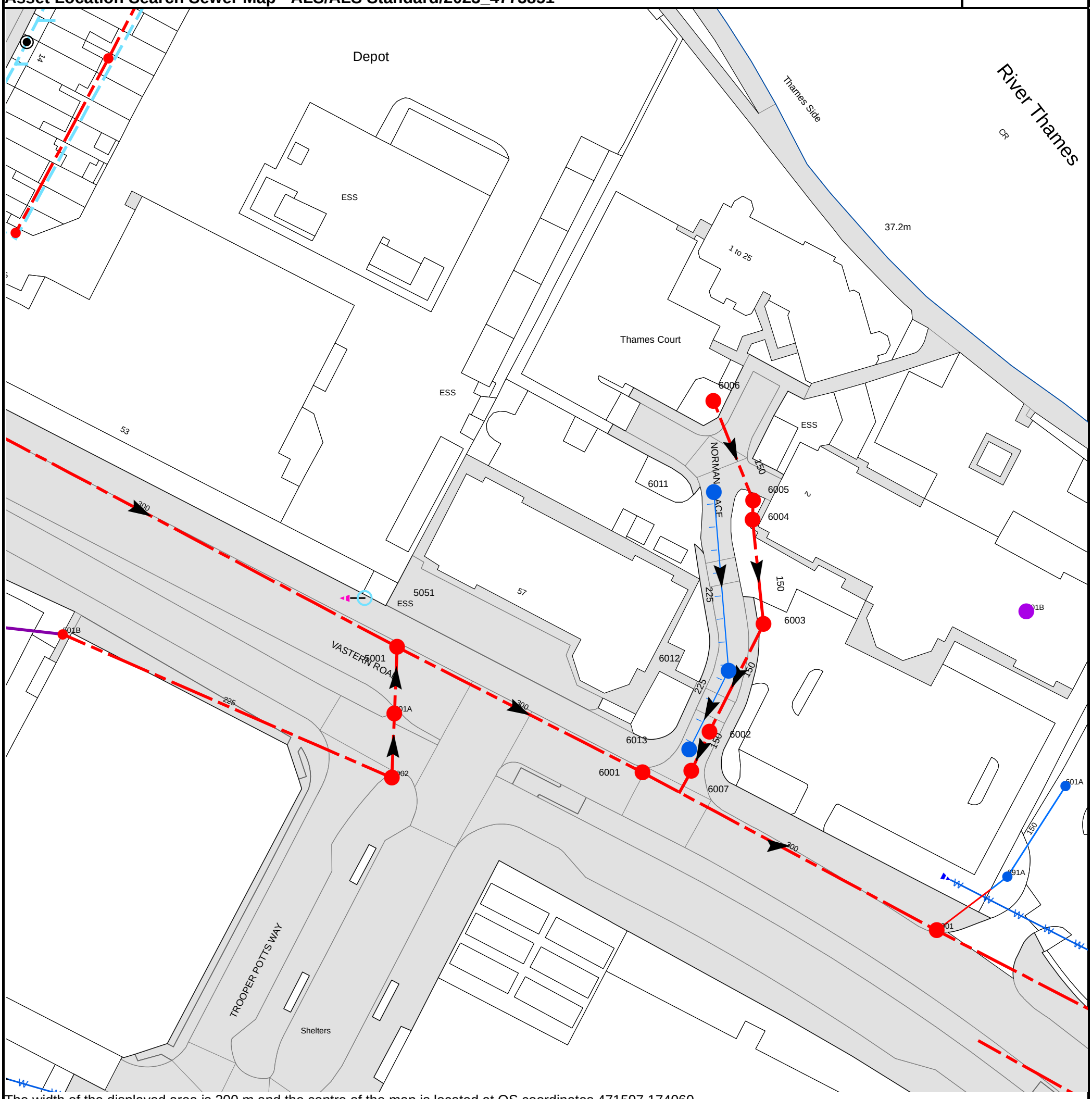
# Appendix B. Existing Utility Information

## B.1 Thames Water Public Sewer Records

## Asset Location Search Sewer Map - ALS/ALS Standard/2023_4773851




The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 471597,174060

**The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.**

Based on the Ordnance Survey Map (2020) with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

| Manhole Reference | Manhole Cover Level | Manhole Invert Level |
|---|---|---|
| 501B | n/a | n/a |
| 5051 | 37.83 | 36.87 |
| 5002 | 37.85 | 35.77 |
| 501A | n/a | n/a |
| 5001 | 37.82 | 35.09 |
| 6001 | 37.84 | 35.02 |
| 6013 | 37.99 | 36.73 |
| 6007 | 38.86 | 35.75 |
| 6002 | 38.24 | 35.9 |
| 6006 | 38.2 | 36.47 |
| 6011 | 38.72 | 36.91 |
| 6012 | 38.64 | 36.78 |
| 6004 | 38.65 | 36.25 |
| 6005 | 38.65 | 36.3 |
| 6003 | 38.62 | 36.06 |
| 6901 | 37.7 | 34.91 |
| 691A | n/a | n/a |
| 601B | n/a | n/a |
| 601A | n/a | n/a |
| 41NK | n/a | n/a |
| 51NL | n/a | n/a |

**The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.**

# Asset Location Search - Sewer Key

## Public Sewer Types (Operated and maintained by Thames Water)

**Foul Sewer:** A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

**Surface Water Sewer:** A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

**Combined Sewer:** A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

- Storm Sewer
- Sludge Sewer
- Foul Trunk Sewer
- Surface Trunk Sewer
- Combined Trunk Sewer
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Vacuum
- Thames Water Proposed
- Vent Pipe
- Gallery

## Other Sewer Types (Not operated and maintained by Thames Water)

- Sewer
- Culverted Watercourse
- Proposed
- Decommissioned Sewer
- Content of this drainage network is currently unknown
- Ownership of this drainage network is currently unknown

## Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

- Air Valve
- Meter
- Dam Chase
- Vent
- Fitting

## Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

- Ancillary
- Drop Pipe
- Control Valve
- Weir

## End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Inlet
- Outfall
- Undefined End

## Other Symbols

Symbols used on maps which do not fall under other general categories.

- Change of Characteristic Indicator
- Public / Private Pumping Station
- Invert Level
- Summit

## Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

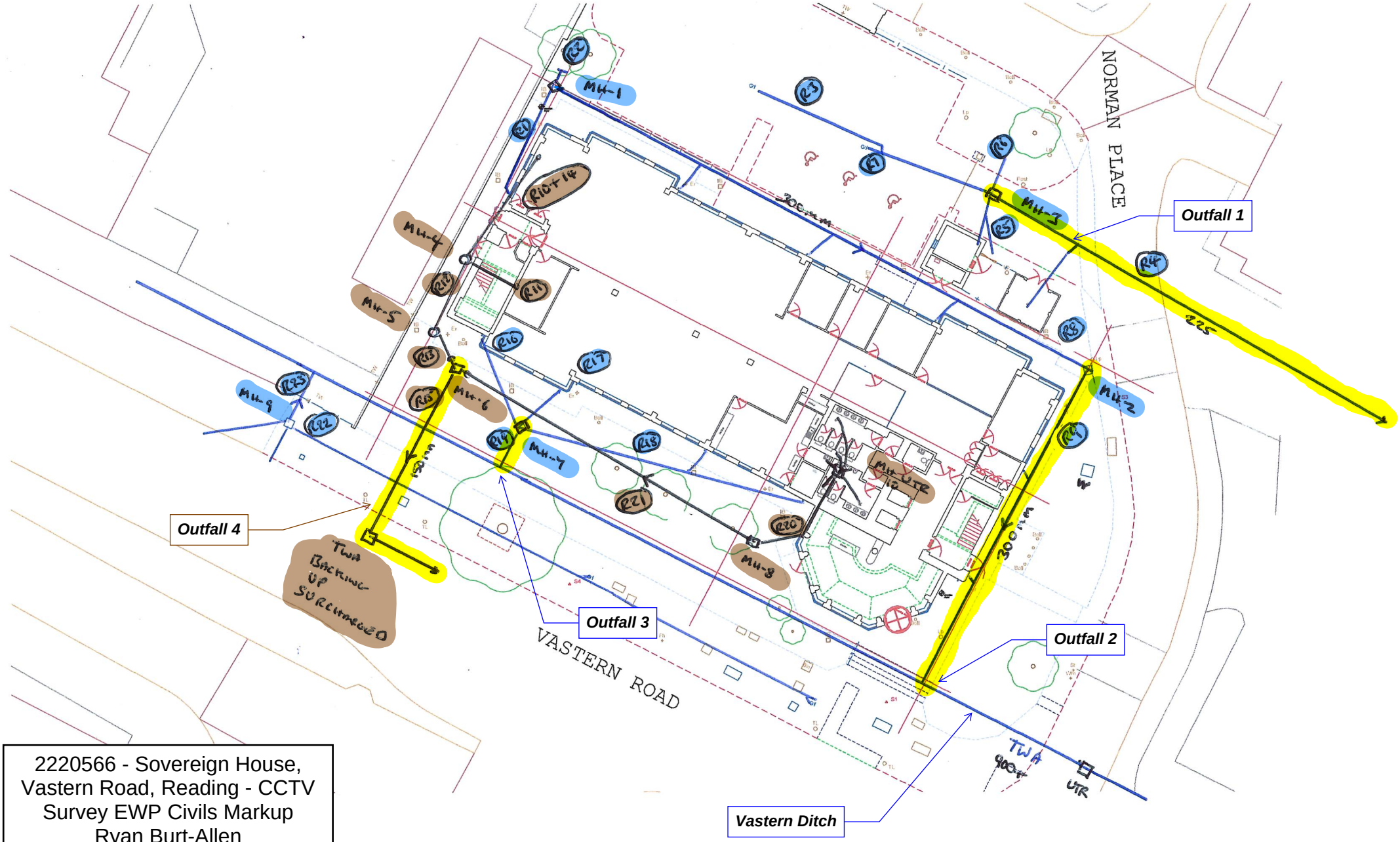
## Ducts or Crossings

- Casement — Ducts may contain high voltage cables. Please check with Thames Water.
- Conduit Bridge
- Subway
- Tunnel

**Notes:**

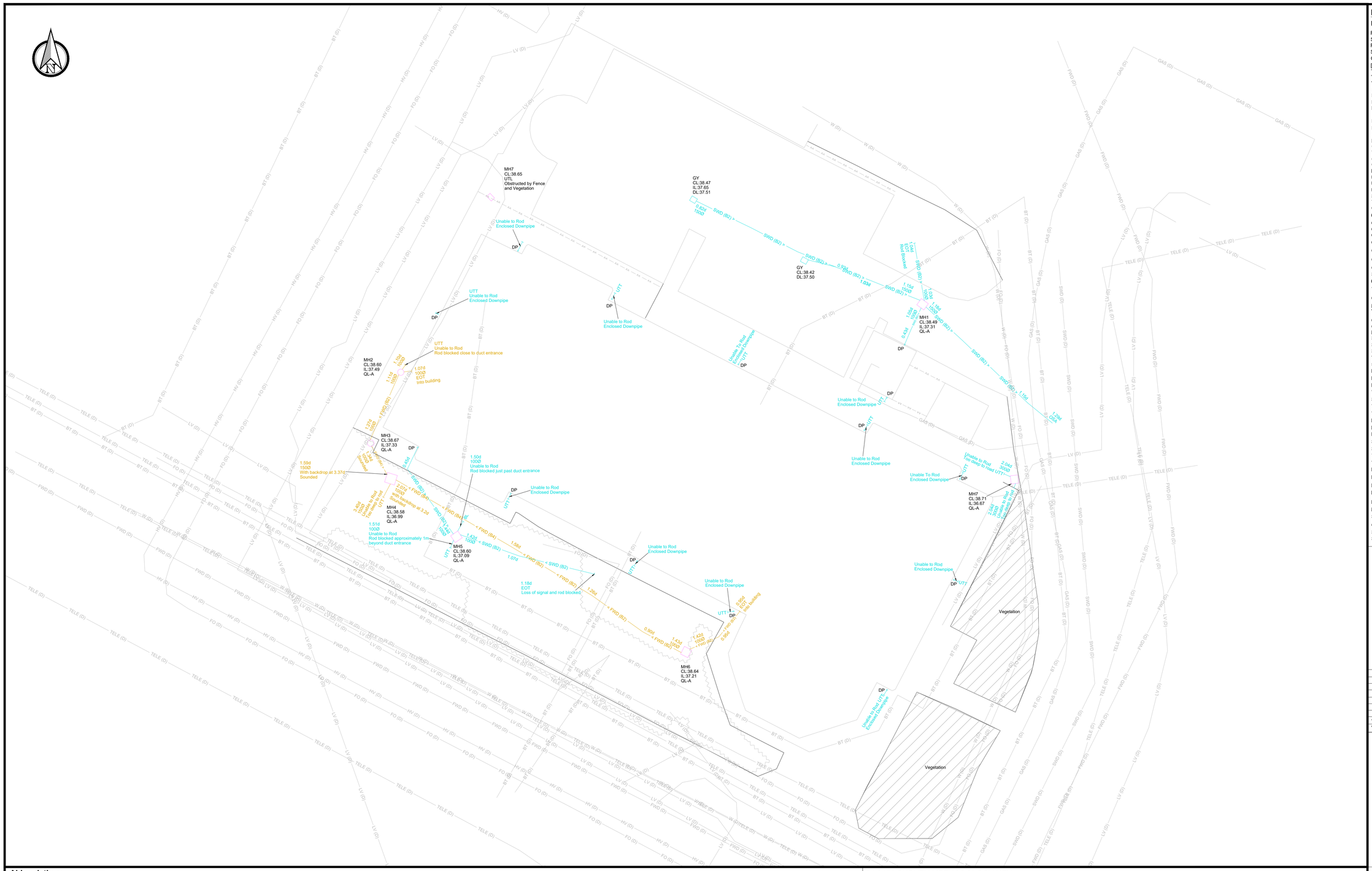
1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plan are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

## B.2 EWP CCTV Survey




2220566 - Sovereign House, Vastern Road, Reading - CCTV Survey EWP Civils Markup
Ryan Burt-Allen
03/03/2023

## B.3 Vision Sovereign House CCTV Survey




## Legend

### Utilities:

- FOUL WATER DRAINAGE* — FWD
- SURFACE WATER DRAINAGE* — SWD
- FOUL WATER RISING MAIN* — FWRM
- SURFACE WATER RISING MAIN* — SWRM
- COMBINED SEWER* — CS
- [* FLOW DIRECTION DENOTED BY ARROW (>) or (<) IF KNOWN ]
- TELECOMMUNICATIONS (BT) — BT
- TELECOMMUNICATIONS (CATV) — CATV
- TELECOMMUNICATIONS (OTHER) — TELE
- FIBRE OPTIC — FO
- ELECTRIC (UNKNOWN) — E
- LOW VOLTAGE — LV
- HIGH VOLTAGE — HV
- TRAFFIC SENSOR — TS
- EXTRA HIGH VOLTAGE — EHV
- EARTH — EA
- WATER — W
- HOT WATER — HW
- CHILLED WATER — CW
- WASHED WATER — WW
- GAS — GAS
- OIL/FUEL — OF
- EMPTY DUCT — DUCT
- UNKNOWN UTILITY — U
- UNKNOWN METALLIC — U-MET
- UNKNOWN NON-METALLIC — U-N-MET
- SERVICE ABANDONED — AB
- TYPE D SURVEY (X = Utility) — X (D)
- CHAMBER

### GPR:

- GPR SCAN AREA — GPR SCAN AREA
- GPR TARGET — GPR
- GPR POSSIBLE TARGET — GPR
- GPR ANOMALY
- GPR REBAR
- GPR BURIED FEATURE
- GPR POSSIBLE UNDERGROUND STRUCTURES

### Obstructions:

- VEGETATION
- OBSTRUCTION
- NO ACCESS

### Topographical:

- CHANNEL
- GULLY
- MANHOLE/INSPECTION COVER
- SCAR
- STREET FURNITURE
- SURVEY BOUNDARY — SURVEY BOUNDARY
- **Topographical background shown in grey for reference**
- BUILDING
- BUILDING OVERHANG
- BUILDING STRUCTURE
- WALL
- STREET FURNITURE
- TREE
- VEGETATION
- KERB TOP
- KERB BOTTOM
- DROP KERB
- SURFACE CHANGE
- SCAR
- YELLOW PAINT LINE
- WHITE PAINT LINE
- BANK TOP
- BANK BOTTOM
- RAMP
- FENCE
- BARRIER
- MISCELLANEOUS
- STEPS
- GATE
- SPOT LEVEL — 99.52
- SURVEY STATION — STN 1000 Easting 2000 Northing 100.00 Height

| Ver | Date | Comments | Drn | Chk | Aprv |
|---|---|---|---|---|---|
| 1.0 | 10.12.24 | Issued For Information | PM | TD | SG |

VISION
Engineering a Shared Vision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Penkridge, Stafford
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01785 450274


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## Abbreviations

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2X1/100 DUCT CONFIGURATION & SIZE IN MILLIMETRES | BL | BLOCKED | CP | CATCH PIT | ER | EARTH ROD | JNT | STRAIGHT JOINT | MKR | MARKER POST | OSA | OUTSIDE SURVEY AREA | RS | ROAD SIGN | WO | WASHOUT VALVE |
| | BO | BOLLARD | DL | DEPTH LEVEL | FB | FLOWER BED | IC | INSPECTION COVER | MH | MANHOLE | OT | OBSTRUCTED TRACE | SA | SOAK AWAY | WV | WATER VALVE |
| | CCTV | CCTV CAMERA | DP | DRAINPIPE (DOWNPIPE) | FH | FIRE HYDRANT | IL | INVERT LEVEL | NL | NOT LOCATED | PE | POLYETHYLENE | SL | SENSOR LOOP | UD | UNKNOWN DIAMETER |
| 0.50d DEPTH IN METRES | CC | CONTROL CABINET | EG | EXITS GROUND | FUH | FUEL HYDRANT | LCP | LATTICE POLE | NV | NOT VISIBLE ON SITE | PO | POLE | TL | TRAFFIC LIGHT | UTL | UNABLE TO LIFT |
| | CL | COVER LEVEL | EOT | END OF TRACE | GV | GAS VALVE | LH | LAMP HOLE | NVP | NO VISIBLE PIPE | RE | RODDING EYE | TP | TELEGRAPH POLE | UTS | UNABLE TO SURVEY |
| BH BORE HOLE | CO | COLUMN | EP | ELECTRIC POLE | GY | GULLY | LP | LAMP POST | NVS | NO VISIBLE SERVICE | RI | DUCT/PIPE RISER | VP | VENT PIPE | UTT | UNABLE TO TRACE |

### WARNING

A range of detection methods were used to obtain any underground data indicated in this drawing. Variations in ground conditions can affect the quality of the data and therefore no guarantee can be given that all services (live or redundant) have been shown.

Trial holes must be taken to determine actual position and depth of services. HS(G)47 Booklet from the Heath and Safety Executive - Avoiding Danger from Buried Services - should be consulted before commencing excavation work.


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## Notes

1. This survey has been orientated to British National Grid system.
2. Type D Statutory Record survey is shown in grey received from Apogee on 04/12/24.
3. This drawing should be read in conjunction with information compiled in pit schedules VIS-10300-pit schedules-V1.0
4. All utility diameters are in mm & all other dimensions are in m unless stated.
5. Where services are illustrated as a single line, they may represent multiple pipes/ducts - see accompanying text.
6. If outside ducts are shown for duct clusters the lines represent the middle of the top, outer ducts in the cluster.
7. Taped depths at manholes are approximate and are provided to the top of pipes, middle of ducts/cables and invert levels of drainage unless stated. Depths are recorded at the time of the survey.
8. Unloaded or perfectly balanced electric cables may not be detectable using EML methods.
9. The correct identification of the utility types cannot be 100% guaranteed, therefore these should be independently verified prior to use in any design/building works.
10. Where possible, the ownership of inspection covers has been derived from information on the covers or from cable tags. This does not necessarily mean that they use or are the sole users of the apparatus.
11. Dimensions should not be scaled. All dimensions should be checked onsite before proceeding with any works.
12. A number of technologies were used to obtain the information shown on this drawing. Varying ground conditions can affect the performance of these systems therefore 100% detection is not always guaranteed. Always exercise caution when excavating. *See HSG-47*
13. For Solid models - GPR Targets and Unknown Utility diameters are displayed with thickness of 50mm for visualisation purposes only, real size is unknown.
14. This drawing may contain Ordnance Mastermap and Raster data. OS Copyright Acknowledgement. Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown Copyright and database right. Licence Number [number here].

| | Quality level (P) GPR Post Processing | Location Accuracy Horizontal | Location Accuracy Vertical | Supporting data |
|---|---|---|---|---|
| **Desktop utility records search** | QL-D | Undefined | Undefined | -- |
| **Site reconnaissance** | QL-C | Undefined | Undefined | A segment of utility whose location is demonstrated by visual reference to street furniture, topographical features or evidence of previous street works (reinstatement scar) |
| **Detection** | QL-B4 | Undefined | Undefined | A utility segment which is suspected to exist but has not been detected and is therefore shown as an assumed route |
| | QL-B3 | ±500mm | Undefined (No reliable depth measurement possible) | Horizontal location only of the utility detected by one of the geophysical techniques used |
| | QL-B3P | | | |
| | QL-B2<br>QL-B2P | ±250mm or ±40% of detected depth whichever is greater | ±40% of detected depth | Horizontal and vertical location of the utility detected by one of the geophysical techniques used |
| | QL-B1<br>QL-B1P | ±150mm or ±15% of detected depth whichever is greater | ±15% of detected depth | Horizontal and vertical location of the utility detected by multiple geophysical techniques used |
| **Verification** | QL-A | ±50mm | ±50mm | Horizontal and vertical location of the top and/or bottom of the utility. |

## PAS128 SURVEY METHODOLOGY KEY

THIS SURVEY HAS BEEN CARRIED OUT IN ACCORDANCE WITH THE PAS128 SPECIFICATION FOR UNDERGROUND UTILITY DETECTION, VERIFICATION & LOCATION. THE SPECIFICATION ALLOWS FOR A RANGE OF TECHNIQUES AND METHODS OF VARYING INTENSITY TO BE DEPLOYED. THE COLOUR CODED SCHEME INDICATES WHERE DIFFERENT SURVEY METHODOLOGIES HAVE BEEN USED ON SITE NB: PLEASE SEE ACCOMPANYING REPORT FOR FULL DETAILS.

- M4P - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 0.5m INTERVALS. GPR SURVEY GRID AT 0.5m INTERVALS OR HIGH DENSITY ARRAY. POST PROCESSING OF GPR DATA.
- M3P - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 1m INTERVALS. GPR SURVEY GRID AT 1m INTERVALS OR HIGH DENSITY ARRAY. POST PROCESSING OF GPR DATA.
- M2P - EML SEARCH TRANSECT AT 5m INTERVALS - TRACED AT 2m INTERVALS. GPR SURVEY GRID AT 2m INTERVALS OR HIGH DENSITY ARRAY. POST PROCESSING OF GPR DATA.
- M2 - EML SEARCH TRANSECT AT 5m INTERVALS - TRACED AT 2m INTERVALS. GPR SURVEY GRID AT 2m INTERVALS. GPR MARK-UP ON SITE.
- M1P - EML SEARCH TRANSECT AT 10m INTERVALS - TRACED AT 5m INTERVALS. GPR SURVEY AS APPROPRIATE. POST PROCESSING OF GPR DATA.
- M1 - EML SEARCH TRANSECT AT 10m INTERVALS - TRACED AT 5m INTERVALS. GPR SURVEY AS APPROPRIATE. GPR MARK-UP ON SITE

Client:
BakerHicks

Site:
Sovereign House

Drawing Title:
Sovereign House CCTV Drainage Survey

| Survey By: | Drawn By: | Checked By: | Approved By: |
|---|---|---|---|
| xx | PM | TD | SG |

| Sheet No: | Scale: | Date Drawn: |
|---|---|---|
| 1 of 1 | 1:150@A1 | 10/12/24 |

| Drawing No: | Version: |
|---|---|
| VIS-10300-DWG-001 | V1.0 |


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# Appendix C. Greenfield Runoff Calculations

# Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

| | |
|---|---|
| Calculated by: | Ka Po Leung |
| Site name: | HMCTS Reading |
| Site location: | RG1 8BT |

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

## Site Details

| | |
|---|---|
| Latitude: | 51.46089° N |
| Longitude: | 0.97075° W |
| Reference: | 2507798659 |
| Date: | Jan 30 2025 11:56 |

## Runoff estimation approach

FEH Statistical

## Site characteristics

Total site area (ha): 0.243

## Methodology

| | |
|---|---|
| $Q_{MED}$ estimation method: | Calculate from BFI and SAAR |
| BFI and SPR method: | Specify BFI manually |
| HOST class: | N/A |
| BFI / BFIHOST: | 0.802 |
| $Q_{MED}$ (l/s): | |
| $Q_{BAR}$ / $Q_{MED}$ factor: | 1.14 |

## Hydrological characteristics

| | Default | Edited |
|---|---|---|
| SAAR (mm): | 645 | 645 |
| Hydrological region: | 6 | 6 |
| Growth curve factor 1 year: | 0.85 | 0.85 |
| Growth curve factor 30 years: | 2.3 | 2.3 |
| Growth curve factor 100 years: | 3.19 | 3.19 |
| Growth curve factor 200 years: | 3.74 | 3.74 |

## Notes

### (1) Is $Q_{BAR}$ < 2.0 l/s/ha?

When $Q_{BAR}$ is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

### (2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

### (3) Is SPR/SPRHOST ≤ 0.3?

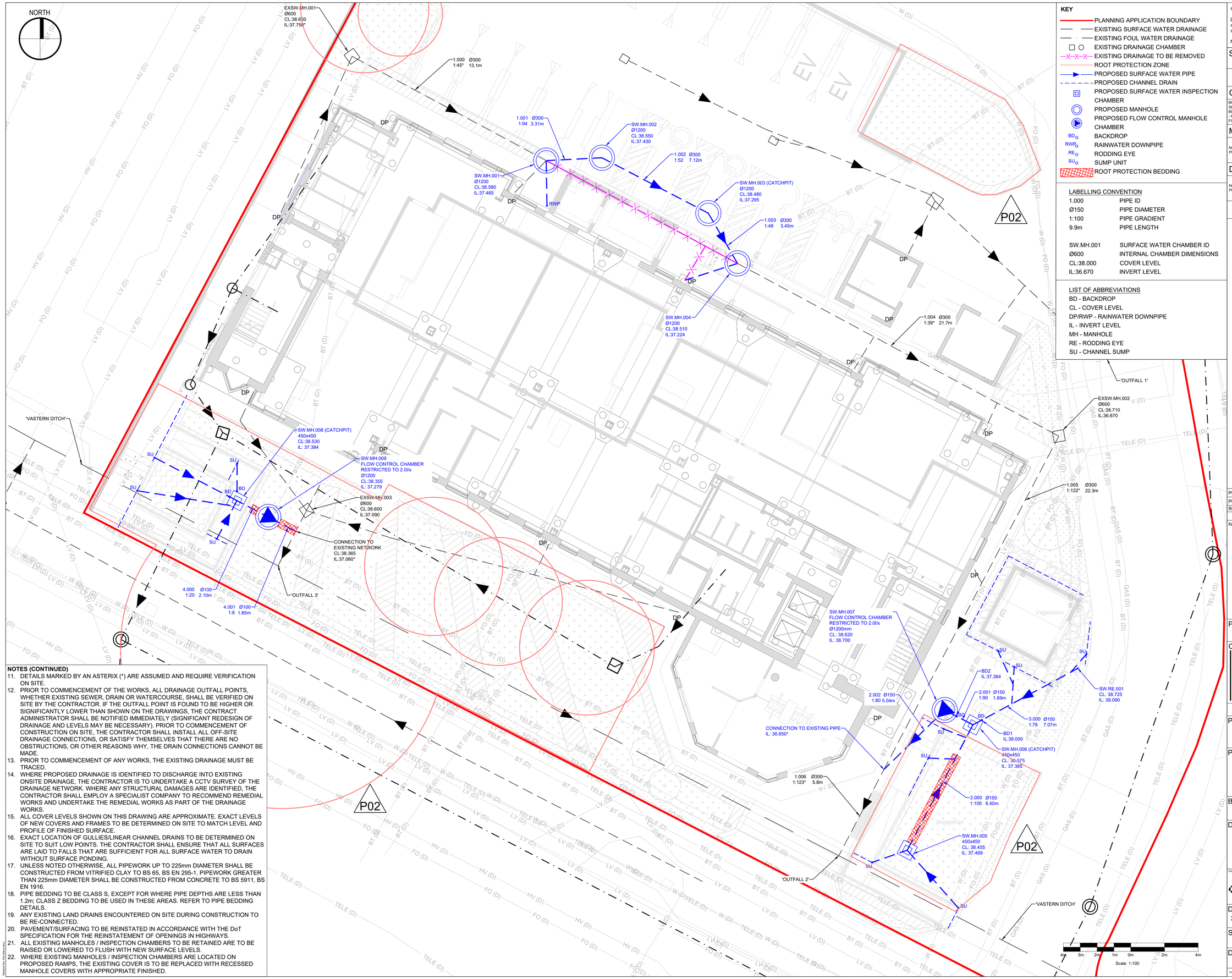
Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

## Greenfield runoff rates

| | Default | Edited |
|---|---|---|
| $Q_{BAR}$ (l/s): | | 0.19 |
| 1 in 1 year (l/s): | | 0.16 |
| 1 in 30 years (l/s): | | 0.44 |
| 1 in 100 year (l/s): | | 0.61 |
| 1 in 200 years (l/s): | | 0.72 |

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

# Appendix D. Proposed Surface Water Drainage Layout




**KEY**

- PLANNING APPLICATION BOUNDARY
- EXISTING SURFACE WATER DRAINAGE
- EXISTING FOUL WATER DRAINAGE
- EXISTING DRAINAGE CHAMBER
- EXISTING DRAINAGE TO BE REMOVED
- ROOT PROTECTION ZONE
- PROPOSED SURFACE WATER PIPE
- PROPOSED CHANNEL DRAIN
- PROPOSED SURFACE WATER INSPECTION CHAMBER
- PROPOSED MANHOLE
- PROPOSED FLOW CONTROL MANHOLE CHAMBER
- BD BACKDROP
- RWP RAINWATER DOWNPIPE
- RE RODDING EYE
- SU SUMP UNIT
- ROOT PROTECTION BEDDING

LABELLING CONVENTION

| | |
|---|---|
| 1.000 | PIPE ID |
| Ø150 | PIPE DIAMETER |
| 1:100 | PIPE GRADIENT |
| 9.9m | PIPE LENGTH |
| SW.MH.001 | SURFACE WATER CHAMBER ID |
| Ø600 | INTERNAL CHAMBER DIMENSIONS |
| CL:38.000 | COVER LEVEL |
| IL:36.670 | INVERT LEVEL |

LIST OF ABBREVIATIONS

BD - BACKDROP
CL - COVER LEVEL
DP/RWP - RAINWATER DOWNPIPE
IL - INVERT LEVEL
MH - MANHOLE
RE - RODDING EYE
SU - CHANNEL SUMP

**NOTES (CONTINUED)**

11. DETAILS MARKED BY AN ASTERIX (*) ARE ASSUMED AND REQUIRE VERIFICATION ON SITE.
12. PRIOR TO COMMENCEMENT OF THE WORKS, ALL DRAINAGE OUTFALL POINTS, WHETHER EXISTING SEWER, DRAIN OR WATERCOURSE, SHALL BE VERIFIED ON SITE BY THE CONTRACTOR. IF THE OUTFALL POINT IS FOUND TO BE HIGHER OR SIGNIFICANTLY LOWER THAN SHOWN ON THE DRAWINGS, THE CONTRACT ADMINISTRATOR SHALL BE NOTIFIED IMMEDIATELY (SIGNIFICANT REDESIGN OF DRAINAGE AND LEVELS MAY BE NECESSARY). PRIOR TO COMMENCEMENT OF CONSTRUCTION ON SITE, THE CONTRACTOR SHALL INSTALL ALL OFF-SITE DRAINAGE CONNECTIONS, OR SATISFY THEMSELVES THAT THERE ARE NO OBSTRUCTIONS, OR OTHER REASONS WHY, THE DRAIN CONNECTIONS CANNOT BE MADE.
13. PRIOR TO COMMENCEMENT OF ANY WORKS, THE EXISTING DRAINAGE MUST BE TRACED.
14. WHERE PROPOSED DRAINAGE IS IDENTIFIED TO DISCHARGE INTO EXISTING ONSITE DRAINAGE, THE CONTRACTOR IS TO UNDERTAKE A CCTV SURVEY OF THE DRAINAGE NETWORK. WHERE ANY STRUCTURAL DAMAGES ARE IDENTIFIED, THE CONTRACTOR SHALL EMPLOY A SPECIALIST COMPANY TO RECOMMEND REMEDIAL WORKS AND UNDERTAKE THE REMEDIAL WORKS AS PART OF THE DRAINAGE WORKS.
15. ALL COVER LEVELS SHOWN ON THIS DRAWING ARE APPROXIMATE. EXACT LEVELS OF NEW COVERS AND FRAMES TO BE DETERMINED ON SITE TO MATCH LEVEL AND PROFILE OF FINISHED SURFACE.
16. EXACT LOCATION OF GULLIES/LINEAR CHANNEL DRAINS TO BE DETERMINED ON SITE TO SUIT LOW POINTS. THE CONTRACTOR SHALL ENSURE THAT ALL SURFACES ARE LAID TO FALLS THAT ARE SUFFICIENT FOR ALL SURFACE WATER TO DRAIN WITHOUT SURFACE PONDING.
17. UNLESS NOTED OTHERWISE, ALL PIPEWORK UP TO 225mm DIAMETER SHALL BE CONSTRUCTED FROM VITRIFIED CLAY TO BS 65, BS EN 295-1. PIPEWORK GREATER THAN 225mm DIAMETER SHALL BE CONSTRUCTED FROM CONCRETE TO BS 5911, BS EN 1916.
18. PIPE BEDDING TO BE CLASS S, EXCEPT FOR WHERE PIPE DEPTHS ARE LESS THAN 1.2m; CLASS Z BEDDING TO BE USED IN THESE AREAS. REFER TO PIPE BEDDING DETAILS.
19. ANY EXISTING LAND DRAINS ENCOUNTERED ON SITE DURING CONSTRUCTION TO BE RE-CONNECTED.
20. PAVEMENT/SURFACING TO BE REINSTATED IN ACCORDANCE WITH THE DoT SPECIFICATION FOR THE REINSTATEMENT OF OPENINGS IN HIGHWAYS.
21. ALL EXISTING MANHOLES / INSPECTION CHAMBERS TO BE RETAINED ARE TO BE RAISED OR LOWERED TO FLUSH WITH NEW SURFACE LEVELS.
22. WHERE EXISTING MANHOLES / INSPECTION CHAMBERS ARE LOCATED ON PROPOSED RAMPS, THE EXISTING COVER IS TO BE REPLACED WITH RECESSED MANHOLE COVERS WITH APPROPRIATE FINISHED.

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Do not scale from drawings. Verify all dimensions on site prior to construction. This drawing is to be read in conjunction with all relevant documents and drawings. Report all discrepancies to MoJ immediately.

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## SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:

### CONSTRUCTION

BURIED SERVICES INCLUDING POSSIBILITY OF UNCHARTED SERVICES - REFER TO SERVICE PLANS AND USE CABLE AVOID TOOLS PRIOR TO DIGGING. POTENTIAL OF BURIED CONTAMINATION INCLUDED ASBESTOS. LOW RISK OF UNEXPLODED ORDINANCE - KEEP WATCH DURING GROUND WORKS. IF IN DOUBT, STOP WORK AND ASK.
FOR ALL PROJECT AND BUILDING RISKS REFER TO PROJECT & DESIGN RISK REGISTER.

### MAINTENANCE/CLEANING

NO SIGNIFICANT RISK IDENTIFIED. FOR ALL PROJECT AND BUILDING RISKS REFER TO PROJECT & DESIGN RISK REGISTER.

### DECOMMISSIONING/DEMOLITION

NO SIGNIFICANT RISK IDENTIFIED. FOR ALL PROJECT AND BUILDING RISKS REFER TO PROJECT & DESIGN RISK REGISTER.

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement

**NOTES**

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL PROJECT DRAWINGS AND SPECIFICATIONS.
2. ALL CO-ORDINATES ARE IN METRES (m) UNLESS OTHERWISE STATED.
3. ALL DRAINAGE WORKS TO BE DESIGNED IN ACCORDANCE WITH MOJ STANDARDS STD/Z/DG/053 AND STD/X/SPEC/010.
4. EXISTING DRAINAGE INFORMATION HAS BEEN TAKEN FROM THE FOLLOWING SOURCES:
   - 4.1. THAMES WATER PUBLIC SEWER RECORDS "ASSET LOCATION SEARCH SEWER MAP" (ALS/ALS STANDARD/2023_4773851)
   - 4.2. CCTV SURVEY MARKUP DRAWING "2220566 - SOVEREIGN HOUSE, VASTERN ROAD, READING - CCTV SURVEY EWP CIVILS MARKUP"
   - 4.3. VISION SURVEY DRAWING 'SOVEREIGN HOUSE CCTV DRAINAGE SURVEY' (VIS-10300-DWG-001-V1.0)
5. THE POSITION OF BURIED SERVICES SHOWN ON THE PLAN ARE AS DETERMINED FROM VISION SURVEY DRAWING 'SOVEREIGN HOUSE CCTV DRAINAGE SURVEY' (DOC REF: VIS-10300-DWG-001-V1.0).
6. ALL UTILITY APPARATUS MUST BE VERIFIED INOPERATIVE BEFORE CARRYING OUT WORK OR EXCAVATIONS IN THE VICINITY.
7. FOR FOUNDATIONAL PLAN REFER TO STRUCTUAL DRAWING 377915_15380-ATR-RTC-00-D-S-0002.
8. FOR ARCHITECTURAL SITE LAYOUT REFER TO 377915_15380-FMA-RTC-ZZ-D-A-1099.
9. FOR DRAINAGE STANDARD DETAILS SEE DRAWING 377915_15380-ATR-RTC-XX-D-C-0021 TO 0023.
10. FOR MANHOLE SCHEDULE REFER TO DRAWING 377915_15380-ATR-RTC-XX-D-C-0011.

| Rev | Issued by | Issued to | Date | Description |
|---|---|---|---|---|
| P02 | ATR | MOJ | 20/06/25 | TREE RPA UPDATES |
| P01 | ATR | MOJ | 14/03/25 | RIBA STAGE 3 |

Key Plan

NOT APPLICABLE

Project Status
RIBA STAGE 3

Client
Ministry of Justice

Project
HMCTS READING TRIBUNALS COURT (SOVEREIGN HOUSE) REFURBISHMENT PROJECT

Ministry of Justice, 102 Petty France, London, SW1H 9AJ

Project Description / Site
HMCTS READING TRIBUNAL COURT (SOVEREIGN HOUSE)

Project Address
SOVEREIGN HOUSE, VASTERN ROAD, READING, RG1 8BT

Building Type
TRIBUNAL COURT

Drawing Title
SURFACE WATER DRAINAGE LAYOUT

Originator Logo
AtkinsRéalis

| | | |
|---|---|---|
| Drawn By: KPL | Date: 24/02/2025 | |
| Checked By: GSS | Date: 24/02/2025 | |
| Approved By: AS | Date: 13/03/2025 | |

Drawing Number
377915_15380-ATR-RTC-XX-D-C-0001

| Sheet No. | Scale | Orig. Sheet Size | Rev. |
|---|---|---|---|
| 1 of 1 | 1:100 | @ A1 | P02 |

Data Security Classification
OFFICIAL

Suitability
S4(3)

File Path:

Distribution Box: 2402 [Mono/Mac]

# Appendix E. Hydraulic Model Calculations

## E.1 Surface Water Network

## Design Settings

| | | | | | |
|---|---|---|---|---|---|
| Rainfall Methodology | FEH-22 | Maximum Time of Concentration (mins) | 30.00 | Preferred Cover Depth (m) | 0.900 |
| Return Period (years) | 2 | Maximum Rainfall (mm/hr) | 250.0 | Include Intermediate Ground | ✓ |
| Additional Flow (%) | 0 | Minimum Velocity (m/s) | 1.00 | Enforce best practice design rules | ✓ |
| CV | 1.000 | Connection Type | Level Soffits | | |
| Time of Entry (mins) | 5.00 | Minimum Backdrop Height (m) | 0.500 | | |

## Nodes

| Name | Area (ha) | T of E (mins) | Cover Level (m) | Diameter (mm) | Width (mm) |
|---|---|---|---|---|---|
| EXSW.MH.001 | 0.013 | 5.00 | 38.650 | 600 | |
| SW.MH.001 | 0.017 | 5.00 | 38.580 | 1200 | |
| SW.MH.002 | | | 38.550 | 1200 | |
| SW.MH.003 | | | 38.480 | 1200 | |
| SW.MH.004 | 0.016 | 5.00 | 38.510 | 1200 | |
| EXSW.MH.002 | 0.022 | 5.00 | 38.710 | 600 | |
| SW.MH.005 | 0.002 | 5.00 | 38.455 | 450 | 450 |
| RE | | 5.00 | 38.725 | | |
| SW.MH.006 | 0.006 | 5.00 | 38.575 | 450 | 450 |
| SW.MH.007 | | | 38.620 | 1200 | |
| PROP CONNECTION 1 | | | 38.669 | | |
| OUTFALL 2 | | | 38.480 | 1200 | |
| SW.MH.008 | 0.005 | 5.00 | 38.530 | 450 | 450 |
| SW.MH.009 | | | 38.355 | 1200 | |
| PROP CONNECTION 2 | | | 38.365 | | |

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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 | EXSW.MH.001 | SW.MH.001 | 13.095 | 0.600 | 37.750 | 37.465 | 0.285 | 45.9 | 300 | 5.09 | 49.2 |
| 1.001 | SW.MH.001 | SW.MH.002 | 3.311 | 0.600 | 37.465 | 37.430 | 0.035 | 94.6 | 300 | 5.13 | 49.1 |
| 1.002 | SW.MH.002 | SW.MH.003 | 7.120 | 0.600 | 37.430 | 37.295 | 0.135 | 52.7 | 300 | 5.18 | 48.9 |
| 1.003 | SW.MH.003 | SW.MH.004 | 3.448 | 0.600 | 37.295 | 37.224 | 0.071 | 48.6 | 300 | 5.21 | 48.8 |
| 1.004 | SW.MH.004 | EXSW.MH.002 | 21.651 | 0.600 | 37.224 | 36.670 | 0.554 | 39.1 | 300 | 5.35 | 48.3 |
| 1.005 | EXSW.MH.002 | PROP CONNECTION 1 | 21.268 | 0.600 | 36.670 | 36.500 | 0.170 | 125.1 | 300 | 5.60 | 47.4 |
| 2.000 | SW.MH.005 | SW.MH.006 | 8.403 | 0.600 | 37.469 | 37.385 | 0.084 | 100.0 | 150 | 5.14 | 49.1 |
| 3.000 | RE | SW.MH.006 | 7.071 | 0.600 | 38.090 | 38.000 | 0.090 | 78.6 | 150 | 5.10 | 49.2 |
| 2.001 | SW.MH.006 | SW.MH.007 | 1.888 | 0.600 | 37.385 | 37.364 | 0.021 | 90.0 | 150 | 5.17 | 49.0 |
| 2.002 | SW.MH.007 | PROP CONNECTION 1 | 4.038 | 0.600 | 36.700 | 36.650 | 0.050 | 80.0 | 150 | 5.23 | 48.7 |
| 1.006 | PROP CONNECTION 1 | OUTFALL 2 | 7.052 | 0.600 | 36.500 | 36.443 | 0.057 | 123.0 | 300 | 5.69 | 47.1 |
| 4.000 | SW.MH.008 | SW.MH.009 | 2.107 | 0.600 | 37.384 | 37.279 | 0.105 | 20.0 | 100 | 5.02 | 49.5 |
| 4.001 | SW.MH.009 | PROP CONNECTION 2 | 1.837 | 0.600 | 37.279 | 37.060 | 0.219 | 8.4 | 100 | 5.03 | 49.5 |

| Name | US Node | DS Node | Vel (m/s) | Cap (l/s) | Flow (l/s) | US Depth (m) | DS Depth (m) | Pro Depth (mm) | Pro Velocity (m/s) |
|---|---|---|---|---|---|---|---|---|---|
| 1.000 | EXSW.MH.001 | SW.MH.001 | 2.325 | 164.4 | 2.3 | 0.600 | 0.815 | 25 | 0.844 |
| 1.001 | SW.MH.001 | SW.MH.002 | 1.616 | 114.3 | 5.3 | 0.815 | 0.820 | 44 | 0.834 |
| 1.002 | SW.MH.002 | SW.MH.003 | 2.169 | 153.3 | 5.3 | 0.820 | 0.885 | 38 | 1.026 |
| 1.003 | SW.MH.003 | SW.MH.004 | 2.261 | 159.8 | 5.3 | 0.885 | 0.986 | 37 | 1.059 |
| 1.004 | SW.MH.004 | EXSW.MH.002 | 2.522 | 178.3 | 8.0 | 0.986 | 1.740 | 43 | 1.294 |
| 1.005 | EXSW.MH.002 | PROP CONNECTION 1 | 1.404 | 99.2 | 11.6 | 1.740 | 1.869 | 69 | 0.948 |
| 2.000 | SW.MH.005 | SW.MH.006 | 1.005 | 17.8 | 0.4 | 0.836 | 1.040 | 15 | 0.397 |
| 3.000 | RE | SW.MH.006 | 1.135 | 20.1 | 0.0 | 0.485 | 0.425 | 0 | 0.000 |
| 2.001 | SW.MH.006 | SW.MH.007 | 1.060 | 18.7 | 1.4 | 1.040 | 1.106 | 28 | 0.624 |
| 2.002 | SW.MH.007 | PROP CONNECTION 1 | 1.125 | 19.9 | 1.4 | 1.770 | 1.869 | 27 | 0.654 |
| 1.006 | PROP CONNECTION 1 | OUTFALL 2 | 1.416 | 100.1 | 12.9 | 1.869 | 1.737 | 72 | 0.984 |
| 4.000 | SW.MH.008 | SW.MH.009 | 1.734 | 13.6 | 0.9 | 1.046 | 0.976 | 18 | 0.982 |
| 4.001 | SW.MH.009 | PROP CONNECTION 2 | 2.685 | 21.1 | 0.9 | 0.976 | 1.205 | 14 | 1.346 |

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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 | 13.095 | 45.9 | 300 | Proposed SW | 38.650 | 37.750 | 0.600 | 38.580 | 37.465 | 0.815 |
| 1.001 | 3.311 | 94.6 | 300 | Proposed SW | 38.580 | 37.465 | 0.815 | 38.550 | 37.430 | 0.820 |
| 1.002 | 7.120 | 52.7 | 300 | Proposed SW | 38.550 | 37.430 | 0.820 | 38.480 | 37.295 | 0.885 |
| 1.003 | 3.448 | 48.6 | 300 | Proposed SW | 38.480 | 37.295 | 0.885 | 38.510 | 37.224 | 0.986 |
| 1.004 | 21.651 | 39.1 | 300 | Proposed SW | 38.510 | 37.224 | 0.986 | 38.710 | 36.670 | 1.740 |
| 1.005 | 21.268 | 125.1 | 300 | Proposed SW | 38.710 | 36.670 | 1.740 | 38.669 | 36.500 | 1.869 |
| 2.000 | 8.403 | 100.0 | 150 | Proposed SW | 38.455 | 37.469 | 0.836 | 38.575 | 37.385 | 1.040 |
| 3.000 | 7.071 | 78.6 | 150 | Proposed SW | 38.725 | 38.090 | 0.485 | 38.575 | 38.000 | 0.425 |
| 2.001 | 1.888 | 90.0 | 150 | Proposed SW | 38.575 | 37.385 | 1.040 | 38.620 | 37.364 | 1.106 |
| 2.002 | 4.038 | 80.0 | 150 | Proposed SW | 38.620 | 36.700 | 1.770 | 38.669 | 36.650 | 1.869 |
| 1.006 | 7.052 | 123.0 | 300 | Proposed SW | 38.669 | 36.500 | 1.869 | 38.480 | 36.443 | 1.737 |
| 4.000 | 2.107 | 20.0 | 100 | Proposed SW | 38.530 | 37.384 | 1.046 | 38.355 | 37.279 | 0.976 |
| 4.001 | 1.837 | 8.4 | 100 | Proposed SW | 38.355 | 37.279 | 0.976 | 38.365 | 37.060 | 1.205 |

| Link | US Node | Dia (mm) | Width (mm) | Node Type | DS Node | Dia (mm) | Width (mm) | Node Type |
|---|---|---|---|---|---|---|---|---|
| 1.000 | EXSW.MH.001 | 600 | | Manhole | SW.MH.001 | 1200 | | Manhole |
| 1.001 | SW.MH.001 | 1200 | | Manhole | SW.MH.002 | 1200 | | Manhole |
| 1.002 | SW.MH.002 | 1200 | | Manhole | SW.MH.003 | 1200 | | Manhole |
| 1.003 | SW.MH.003 | 1200 | | Manhole | SW.MH.004 | 1200 | | Manhole |
| 1.004 | SW.MH.004 | 1200 | | Manhole | EXSW.MH.002 | 600 | | Manhole |
| 1.005 | EXSW.MH.002 | 600 | | Manhole | PROP CONNECTION 1 | | | Junction |
| 2.000 | SW.MH.005 | 450 | 450 | Manhole | SW.MH.006 | 450 | 450 | Manhole |
| 3.000 | RE | | | Junction | SW.MH.006 | 450 | 450 | Manhole |
| 2.001 | SW.MH.006 | 450 | 450 | Manhole | SW.MH.007 | 1200 | | Manhole |
| 2.002 | SW.MH.007 | 1200 | | Manhole | PROP CONNECTION 1 | | | Junction |
| 1.006 | PROP CONNECTION 1 | | | Junction | OUTFALL 2 | 1200 | | Manhole |
| 4.000 | SW.MH.008 | 450 | 450 | Manhole | SW.MH.009 | 1200 | | Manhole |
| 4.001 | SW.MH.009 | 1200 | | Manhole | PROP CONNECTION 2 | | | Junction |

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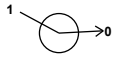
## Manhole Schedule

| Node | CL (m) | Depth (m) | Dia (mm) | Width (mm) | Connections | Link | IL (m) | Dia (mm) |
|---|---|---|---|---|---|---|---|---|
| EXSW.MH.001 | 38.650 | 0.900 | 600 | | | | | |
| | | | | | 0 | 1.000 | 37.750 | 300 |
| SW.MH.001 | 38.580 | 1.115 | 1200 | | 1 | 1.000 | 37.465 | 300 |
| | | | | |  | | | |
| | | | | | 0 | 1.001 | 37.465 | 300 |
| SW.MH.002 | 38.550 | 1.120 | 1200 | | 1 | 1.001 | 37.430 | 300 |
| | | | | | | | | |
| | | | | | 0 | 1.002 | 37.430 | 300 |
| SW.MH.003 | 38.480 | 1.185 | 1200 | | 1 | 1.002 | 37.295 | 300 |
| | | | | | | | | |
| | | | | | 0 | 1.003 | 37.295 | 300 |
| SW.MH.004 | 38.510 | 1.286 | 1200 | | 1 | 1.003 | 37.224 | 300 |
| | | | | | | | | |
| | | | | | 0 | 1.004 | 37.224 | 300 |
| EXSW.MH.002 | 38.710 | 2.040 | 600 | | 1 | 1.004 | 36.670 | 300 |
| | | | | | | | | |
| | | | | | 0 | 1.005 | 36.670 | 300 |
| SW.MH.005 | 38.455 | 0.986 | 450 | 450 | | | | |
| | | | | | 0 | 2.000 | 37.469 | 150 |
| RE | 38.725 | 0.635 | | | | | | |
| | | | | | 0 | 3.000 | 38.090 | 150 |

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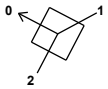
## Manhole Schedule

| Node | CL (m) | Depth (m) | Dia (mm) | Width (mm) | Connections | | Link | IL (m) | Dia (mm) |
|---|---|---|---|---|---|---|---|---|---|
| SW.MH.006 | 38.575 | 1.190 | 450 | 450 |  | 1 | 3.000 | 38.000 | 150 |
| | | | | | | 2 | 2.000 | 37.385 | 150 |
| | | | | | | 0 | 2.001 | 37.385 | 150 |
| SW.MH.007 | 38.620 | 1.920 | 1200 | | | 1 | 2.001 | 37.364 | 150 |
| | | | | | | 0 | 2.002 | 36.700 | 150 |
| PROP CONNECTION 1 | 38.669 | 2.169 | | | | 1 | 2.002 | 36.650 | 150 |
| | | | | | | 2 | 1.005 | 36.500 | 300 |
| | | | | | | 0 | 1.006 | 36.500 | 300 |
| OUTFALL 2 | 38.480 | 2.037 | 1200 | | | 1 | 1.006 | 36.443 | 300 |
| SW.MH.008 | 38.530 | 1.146 | 450 | 450 | | | | | |
| | | | | | | 0 | 4.000 | 37.384 | 100 |
| SW.MH.009 | 38.355 | 1.076 | 1200 | | | 1 | 4.000 | 37.279 | 100 |
| | | | | | | 0 | 4.001 | 37.279 | 100 |
| PROP CONNECTION 2 | 38.365 | 1.305 | | | | 1 | 4.001 | 37.060 | 100 |

## Simulation Settings

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rainfall Methodology | FEH-22 | Analysis Speed | Normal | Starting Level (m) | | 100 year (l/s) | 0.4 |
| Rainfall Events | Singular | Skip Steady State | x | Check Discharge Rate(s) | ✓ | Check Discharge Volume | x |
| Summer CV | 0.750 | Drain Down Time (mins) | 240 | 2 year (l/s) | 0.1 | | |
| Winter CV | 0.840 | Additional Storage (m³/ha) | 0.0 | 30 year (l/s) | 0.3 | | |

**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 %) | Return Period (years) | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) |
|---|---|---|---|---|---|---|---|
| 2 | 0 | 0 | 0 | 100 | 40 | 0 | 0 |
| 30 | 35 | 0 | 0 | | | | |

## Pre-development Discharge Rate

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Site Makeup | Greenfield | BFIHost | 0.802 | Growth Factor 100 year | 2.48 | Q 30 year (l/s) | 0.3 |
| Greenfield Method | FEH | Region | 1 | Betterment (%) | 0 | Q 100 year (l/s) | 0.4 |
| Positively Drained Area (ha) | 0.234 | QBar/QMed conversion factor | 1.111 | QMed | 0.2 | | |
| SAAR (mm) | 638 | Growth Factor 1 year | 0.85 | QBar | 0.2 | | |
| Host | 1 | Growth Factor 30 year | 1.95 | Q 1 year (l/s) | 0.1 | | |

## Node SW.MH.009 Online Hydro-Brake® Control

| | | | |
|---|---|---|---|
| Flap Valve | x | Objective | (HE) Minimise upstream storage |
| Downstream Link | 4.001 | Sump Available | ✓ |
| Replaces Downstream Link | ✓ | Product Number | CTL-SHE-0075-2000-0500-2000 |
| Invert Level (m) | 37.279 | Min Outlet Diameter (m) | 0.100 |
| Design Depth (m) | 0.500 | Min Node Diameter (mm) | 0 |
| Design Flow (l/s) | 2.0 | | |

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## Node SW.MH.007 Online Hydro-Brake® Control

| | | | |
|---|---|---|---|
| Flap Valve | x | Objective | (HE) Minimise upstream storage |
| Downstream Link | 2.002 | Sump Available | ✓ |
| Replaces Downstream Link | ✓ | Product Number | CTL-SHE-0064-2000-1200-2000 |
| Invert Level (m) | 36.700 | Min Outlet Diameter (m) | 0.100 |
| Design Depth (m) | 1.200 | Min Node Diameter (mm) | 1200 |
| Design Flow (l/s) | 2.0 | | |

## Rainfall

| Event | Peak Intensity (mm/hr) | Average Intensity (mm/hr) | Event | Peak Intensity (mm/hr) | Average Intensity (mm/hr) |
|---|---|---|---|---|---|
| 2 year 15 minute summer | 98.952 | 28.000 | 2 year 1440 minute winter | 3.520 | 1.404 |
| 2 year 15 minute winter | 69.440 | 28.000 | 30 year +35% CC 15 minute summer | 410.900 | 116.270 |
| 2 year 30 minute summer | 63.321 | 17.918 | 30 year +35% CC 15 minute winter | 288.351 | 116.270 |
| 2 year 30 minute winter | 44.436 | 17.918 | 30 year +35% CC 30 minute summer | 267.413 | 75.669 |
| 2 year 60 minute summer | 41.847 | 11.059 | 30 year +35% CC 30 minute winter | 187.658 | 75.669 |
| 2 year 60 minute winter | 27.802 | 11.059 | 30 year +35% CC 60 minute summer | 178.457 | 47.161 |
| 2 year 120 minute summer | 30.005 | 7.929 | 30 year +35% CC 60 minute winter | 118.563 | 47.161 |
| 2 year 120 minute winter | 19.935 | 7.929 | 30 year +35% CC 120 minute summer | 107.637 | 28.445 |
| 2 year 180 minute summer | 24.377 | 6.273 | 30 year +35% CC 120 minute winter | 71.512 | 28.445 |
| 2 year 180 minute winter | 15.846 | 6.273 | 30 year +35% CC 180 minute summer | 81.277 | 20.915 |
| 2 year 240 minute summer | 19.802 | 5.233 | 30 year +35% CC 180 minute winter | 52.832 | 20.915 |
| 2 year 240 minute winter | 13.156 | 5.233 | 30 year +35% CC 240 minute summer | 63.311 | 16.731 |
| 2 year 360 minute summer | 15.436 | 3.972 | 30 year +35% CC 240 minute winter | 42.062 | 16.731 |
| 2 year 360 minute winter | 10.034 | 3.972 | 30 year +35% CC 360 minute summer | 47.126 | 12.127 |
| 2 year 480 minute summer | 12.230 | 3.232 | 30 year +35% CC 360 minute winter | 30.633 | 12.127 |
| 2 year 480 minute winter | 8.126 | 3.232 | 30 year +35% CC 480 minute summer | 36.302 | 9.593 |
| 2 year 600 minute summer | 10.024 | 2.742 | 30 year +35% CC 480 minute winter | 24.118 | 9.593 |
| 2 year 600 minute winter | 6.849 | 2.742 | 30 year +35% CC 600 minute summer | 29.164 | 7.977 |
| 2 year 720 minute summer | 8.921 | 2.391 | 30 year +35% CC 600 minute winter | 19.927 | 7.977 |
| 2 year 720 minute winter | 5.996 | 2.391 | 30 year +35% CC 720 minute summer | 25.559 | 6.850 |
| 2 year 960 minute summer | 7.286 | 1.918 | 30 year +35% CC 720 minute winter | 17.177 | 6.850 |
| 2 year 960 minute winter | 4.826 | 1.918 | 30 year +35% CC 960 minute summer | 20.406 | 5.373 |
| 2 year 1440 minute summer | 5.238 | 1.404 | 30 year +35% CC 960 minute winter | 13.517 | 5.373 |

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## Rainfall

| Event | Peak Intensity (mm/hr) | Average Intensity (mm/hr) | Event | Peak Intensity (mm/hr) | Average Intensity (mm/hr) |
|---|---|---|---|---|---|
| 30 year +35% CC 1440 minute summer | 14.218 | 3.811 | 100 year +40% CC 240 minute winter | 55.237 | 21.972 |
| 30 year +35% CC 1440 minute winter | 9.555 | 3.811 | 100 year +40% CC 360 minute summer | 61.433 | 15.809 |
| 100 year +40% CC 15 minute summer | 554.159 | 156.808 | 100 year +40% CC 360 minute winter | 39.933 | 15.809 |
| 100 year +40% CC 15 minute winter | 388.883 | 156.808 | 100 year +40% CC 480 minute summer | 47.182 | 12.469 |
| 100 year +40% CC 30 minute summer | 364.578 | 103.163 | 100 year +40% CC 480 minute winter | 31.346 | 12.469 |
| 100 year +40% CC 30 minute winter | 255.844 | 103.163 | 100 year +40% CC 600 minute summer | 37.833 | 10.348 |
| 100 year +40% CC 60 minute summer | 244.148 | 64.521 | 100 year +40% CC 600 minute winter | 25.849 | 10.348 |
| 100 year +40% CC 60 minute winter | 162.206 | 64.521 | 100 year +40% CC 720 minute summer | 33.106 | 8.873 |
| 100 year +40% CC 120 minute summer | 143.503 | 37.924 | 100 year +40% CC 720 minute winter | 22.250 | 8.873 |
| 100 year +40% CC 120 minute winter | 95.340 | 37.924 | 100 year +40% CC 960 minute summer | 26.353 | 6.939 |
| 100 year +40% CC 180 minute summer | 107.327 | 27.619 | 100 year +40% CC 960 minute winter | 17.457 | 6.939 |
| 100 year +40% CC 180 minute winter | 69.765 | 27.619 | 100 year +40% CC 1440 minute summer | 18.258 | 4.893 |
| 100 year +40% CC 240 minute summer | 83.141 | 21.972 | 100 year +40% CC 1440 minute winter | 12.271 | 4.893 |

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**Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%**

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Status |
|---|---|---|---|---|---|---|---|
| 15 minute winter | EXSW.MH.001 | 10 | 37.771 | 0.021 | 1.7 | 0.0061 | OK |
| 15 minute winter | SW.MH.001 | 10 | 37.506 | 0.040 | 3.9 | 0.0458 | OK |
| 15 minute winter | SW.MH.002 | 10 | 37.464 | 0.034 | 3.8 | 0.0380 | OK |
| 15 minute winter | SW.MH.003 | 11 | 37.329 | 0.034 | 3.8 | 0.0384 | OK |
| 15 minute winter | SW.MH.004 | 11 | 37.261 | 0.037 | 5.7 | 0.0415 | OK |
| 15 minute winter | EXSW.MH.002 | 11 | 36.729 | 0.059 | 8.4 | 0.0167 | OK |
| 15 minute winter | SW.MH.005 | 10 | 37.482 | 0.013 | 0.3 | 0.0026 | OK |
| 15 minute summer | RE | 1 | 38.090 | 0.000 | 0.0 | 0.0000 | OK |
| 15 minute winter | SW.MH.006 | 10 | 37.410 | 0.025 | 1.1 | 0.0052 | OK |
| 15 minute winter | SW.MH.007 | 11 | 36.757 | 0.057 | 1.0 | 0.0649 | OK |
| 15 minute winter | PROP CONNECTION 1 | 11 | 36.564 | 0.064 | 9.4 | 0.0000 | OK |
| 15 minute winter | OUTFALL 2 | 11 | 36.505 | 0.062 | 9.4 | 0.0000 | OK |
| 15 minute winter | SW.MH.008 | 11 | 37.398 | 0.014 | 0.6 | 0.0029 | OK |
| 15 minute winter | SW.MH.009 | 11 | 37.317 | 0.038 | 0.6 | 0.0427 | OK |
| 15 minute summer | PROP CONNECTION 2 | 1 | 37.060 | 0.000 | 0.6 | 0.0000 | OK |

| US Node | Link | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|---|---|---|---|---|---|---|
| EXSW.MH.001 | 1.000 | 1.7 | 0.440 | 0.010 | 0.0516 | |
| SW.MH.001 | 1.001 | 3.8 | 0.766 | 0.033 | 0.0165 | |
| SW.MH.002 | 1.002 | 3.8 | 0.873 | 0.025 | 0.0307 | |
| SW.MH.003 | 1.003 | 3.8 | 0.816 | 0.024 | 0.0160 | |
| SW.MH.004 | 1.004 | 5.7 | 0.794 | 0.032 | 0.1586 | |
| EXSW.MH.002 | 1.005 | 8.4 | 0.812 | 0.085 | 0.2208 | |
| SW.MH.005 | 2.000 | 0.3 | 0.195 | 0.014 | 0.0112 | |
| RE | 3.000 | 0.0 | 0.000 | 0.000 | 0.0000 | |
| SW.MH.006 | 2.001 | 1.0 | 0.534 | 0.053 | 0.0035 | |
| SW.MH.007 | Hydro-Brake® | 1.0 | | | | |
| PROP CONNECTION 1 | 1.006 | 9.4 | 0.877 | 0.094 | 0.0755 | 4.4 |
| | | | | | | |
| SW.MH.008 | 4.000 | 0.6 | 0.674 | 0.044 | 0.0036 | |
| SW.MH.009 | Hydro-Brake® | 0.6 | | | | 0.3 |

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

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Status |
|---|---|---|---|---|---|---|---|
| 15 minute winter | EXSW.MH.001 | 10 | 37.792 | 0.042 | 6.9 | 0.0118 | OK |
| 15 minute winter | SW.MH.001 | 10 | 37.550 | 0.085 | 15.8 | 0.0966 | OK |
| 15 minute winter | SW.MH.002 | 10 | 37.500 | 0.070 | 15.7 | 0.0792 | OK |
| 15 minute winter | SW.MH.003 | 10 | 37.369 | 0.074 | 15.6 | 0.0835 | OK |
| 15 minute winter | SW.MH.004 | 10 | 37.298 | 0.074 | 24.0 | 0.0833 | OK |
| 15 minute winter | EXSW.MH.002 | 10 | 36.797 | 0.127 | 35.4 | 0.0359 | OK |
| 15 minute winter | SW.MH.005 | 10 | 37.494 | 0.025 | 1.1 | 0.0051 | OK |
| 15 minute summer | RE | 1 | 38.090 | 0.000 | 0.0 | 0.0000 | OK |
| 15 minute winter | SW.MH.006 | 10 | 37.440 | 0.055 | 4.3 | 0.0112 | OK |
| 15 minute winter | SW.MH.007 | 14 | 37.423 | 0.723 | 4.2 | 0.8175 | SURCHARGED |
| 15 minute winter | PROP CONNECTION 1 | 11 | 36.634 | 0.134 | 36.7 | 0.0000 | OK |
| 15 minute winter | OUTFALL 2 | 11 | 36.568 | 0.125 | 37.0 | 0.0000 | OK |
| 15 minute winter | SW.MH.008 | 12 | 37.429 | 0.045 | 2.6 | 0.0091 | OK |
| 15 minute winter | SW.MH.009 | 12 | 37.435 | 0.156 | 2.6 | 0.1763 | SURCHARGED |
| 15 minute summer | PROP CONNECTION 2 | 1 | 37.060 | 0.000 | 2.0 | 0.0000 | OK |

| US Node | Link | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|---|---|---|---|---|---|---|
| EXSW.MH.001 | 1.000 | 6.9 | 0.632 | 0.042 | 0.1465 | |
| SW.MH.001 | 1.001 | 15.7 | 1.087 | 0.137 | 0.0480 | |
| SW.MH.002 | 1.002 | 15.6 | 1.206 | 0.102 | 0.0923 | |
| SW.MH.003 | 1.003 | 15.5 | 1.159 | 0.097 | 0.0463 | |
| SW.MH.004 | 1.004 | 23.9 | 1.159 | 0.134 | 0.4511 | |
| EXSW.MH.002 | 1.005 | 35.0 | 1.197 | 0.353 | 0.6228 | |
| SW.MH.005 | 2.000 | 1.1 | 0.283 | 0.060 | 0.0328 | |
| RE | 3.000 | 0.0 | 0.000 | 0.000 | 0.0000 | |
| SW.MH.006 | 2.001 | 4.2 | 0.780 | 0.224 | 0.0102 | |
| SW.MH.007 | Hydro-Brake® | 1.8 | | | | |
| PROP CONNECTION 1 | 1.006 | 37.0 | 1.269 | 0.370 | 0.2056 | 18.6 |
| | | | | | | |
| SW.MH.008 | 4.000 | 2.6 | 0.771 | 0.192 | 0.0107 | |
| SW.MH.009 | Hydro-Brake® | 2.0 | | | | 1.2 |

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**Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%**

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Status |
|---|---|---|---|---|---|---|---|
| 15 minute winter | EXSW.MH.001 | 10 | 37.798 | 0.048 | 9.3 | 0.0136 | OK |
| 15 minute winter | SW.MH.001 | 10 | 37.566 | 0.101 | 21.3 | 0.1140 | OK |
| 15 minute winter | SW.MH.002 | 10 | 37.513 | 0.083 | 21.1 | 0.0935 | OK |
| 15 minute winter | SW.MH.003 | 10 | 37.383 | 0.088 | 21.0 | 0.0993 | OK |
| 15 minute winter | SW.MH.004 | 10 | 37.309 | 0.085 | 32.3 | 0.0967 | OK |
| 15 minute winter | EXSW.MH.002 | 10 | 36.821 | 0.151 | 47.8 | 0.0429 | OK |
| 15 minute winter | SW.MH.005 | 14 | 37.565 | 0.096 | 2.2 | 0.0195 | OK |
| 15 minute summer | RE | 1 | 38.090 | 0.000 | 0.0 | 0.0000 | OK |
| 15 minute winter | SW.MH.006 | 15 | 37.569 | 0.184 | 5.7 | 0.0374 | SURCHARGED |
| 15 minute winter | SW.MH.007 | 15 | 37.569 | 0.869 | 5.6 | 0.9832 | SURCHARGED |
| 15 minute winter | PROP CONNECTION 1 | 11 | 36.659 | 0.159 | 48.7 | 0.0000 | OK |
| 15 minute winter | OUTFALL 2 | 11 | 36.590 | 0.147 | 49.1 | 0.0000 | OK |
| 15 minute winter | SW.MH.008 | 13 | 37.557 | 0.173 | 3.6 | 0.0351 | SURCHARGED |
| 15 minute winter | SW.MH.009 | 13 | 37.553 | 0.274 | 2.8 | 0.3098 | SURCHARGED |
| 15 minute summer | PROP CONNECTION 2 | 1 | 37.060 | 0.000 | 2.0 | 0.0000 | OK |

| US Node | Link | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|---|---|---|---|---|---|---|
| EXSW.MH.001 | 1.000 | 9.2 | 0.680 | 0.056 | 0.1835 | |
| SW.MH.001 | 1.001 | 21.1 | 1.160 | 0.185 | 0.0605 | |
| SW.MH.002 | 1.002 | 21.0 | 1.278 | 0.137 | 0.1172 | |
| SW.MH.003 | 1.003 | 20.9 | 1.243 | 0.131 | 0.0580 | |
| SW.MH.004 | 1.004 | 32.1 | 1.241 | 0.180 | 0.5648 | |
| EXSW.MH.002 | 1.005 | 47.1 | 1.288 | 0.474 | 0.7777 | |
| SW.MH.005 | 2.000 | 1.4 | 0.295 | 0.077 | 0.1240 | |
| RE | 3.000 | 0.0 | 0.000 | 0.000 | 0.0000 | |
| SW.MH.006 | 2.001 | 5.6 | 0.840 | 0.298 | 0.0332 | |
| SW.MH.007 | Hydro-Brake® | 1.8 | | | | |
| PROP CONNECTION 1 | 1.006 | 49.1 | 1.362 | 0.490 | 0.2541 | 25.0 |
| | | | | | | |
| SW.MH.008 | 4.000 | 3.1 | 0.771 | 0.231 | 0.0165 | |
| SW.MH.009 | Hydro-Brake® | 2.0 | | | | 1.6 |

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## E.2 Foul Water Network

## Design Settings

| | | | | | |
|---|---|---|---|---|---|
| Frequency of use (kDU) | 0.70 | Additional Flow (%) | 0 | Preferred Cover Depth (m) | 0.900 |
| Flow per dwelling per day (l/day) | 0 | Minimum Velocity (m/s) | 0.75 | Include Intermediate Ground | ✓ |
| Domestic Flow (l/s/ha) | 0.0 | Connection Type | Level Soffits | | |
| Industrial Flow (l/s/ha) | 0.0 | Minimum Backdrop Height (m) | 0.500 | | |

## Nodes

| Name | Units | Cover Level (m) | Diameter (mm) | Width (mm) |
|---|---|---|---|---|
| EXFW.MH.003 | 54.3 | 38.640 | 600 | 600 |
| FW.MH.001 | 20.5 | 38.858 | 450 | 450 |
| EXFW.MH.001 | | 39.078 | 450 | |
| EXFW.MH.002 | | 38.888 | 450 | |
| EXFW.MH.004 | | 38.580 | 750 | |
| EX.MH.5001 | | 37.820 | | |

## Links

| Name | US Node | DS Node | Length (m) | ks (mm) / n | US IL (m) | DS IL (m) | Fall (m) | Slope (1:X) | Dia (mm) |
|---|---|---|---|---|---|---|---|---|---|
| 1.000 | EXFW.MH.003 | EXFW.MH.004 | 27.089 | 1.500 | 37.210 | 36.510 | 0.700 | 38.7 | 100 |
| 2.000 | FW.MH.001 | EXFW.MH.001 | 8.953 | 1.500 | 38.058 | 37.490 | 0.568 | 15.8 | 100 |
| 2.001 | EXFW.MH.001 | EXFW.MH.002 | 6.316 | 1.500 | 37.490 | 37.330 | 0.160 | 39.5 | 100 |
| 2.002 | EXFW.MH.002 | EXFW.MH.004 | 3.376 | 1.500 | 37.330 | 36.990 | 0.340 | 9.9 | 100 |
| 1.001 | EXFW.MH.004 | EX.MH.5001 | 13.662 | 1.500 | 35.210 | 35.120 | 0.090 | 151.8 | 150 |

| Name | US Node | DS Node | Pro Vel @ 1/3 Q (m/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) | US Depth (m) | DS Depth (m) | Pro Depth (mm) | Pro Velocity (m/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.000 | EXFW.MH.003 | EXFW.MH.004 | 0.837 | 1.072 | 8.4 | 5.2 | 1.330 | 1.970 | 57 | 1.128 |
| 2.000 | FW.MH.001 | EXFW.MH.001 | 0.984 | 1.682 | 13.2 | 3.2 | 0.700 | 1.488 | 33 | 1.370 |
| 2.001 | EXFW.MH.001 | EXFW.MH.002 | 0.725 | 1.061 | 8.3 | 3.2 | 1.488 | 1.458 | 43 | 0.985 |
| 2.002 | EXFW.MH.002 | EXFW.MH.004 | 1.174 | 2.121 | 16.7 | 3.2 | 1.458 | 1.490 | 30 | 1.634 |
| 1.001 | EXFW.MH.004 | EX.MH.5001 | 0.517 | 0.710 | 12.5 | 6.1 | 3.220 | 2.550 | 74 | 0.704 |

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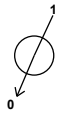
## Pipeline Schedule

| 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 | 27.089 | 38.7 | 100 | Existing SW | 38.640 | 37.210 | 1.330 | 38.580 | 36.510 | 1.970 |
| 2.000 | 8.953 | 15.8 | 100 | Existing SW | 38.858 | 38.058 | 0.700 | 39.078 | 37.490 | 1.488 |
| 2.001 | 6.316 | 39.5 | 100 | Existing SW | 39.078 | 37.490 | 1.488 | 38.888 | 37.330 | 1.458 |
| 2.002 | 3.376 | 9.9 | 100 | Existing SW | 38.888 | 37.330 | 1.458 | 38.580 | 36.990 | 1.490 |
| 1.001 | 13.662 | 151.8 | 150 | Existing SW | 38.580 | 35.210 | 3.220 | 37.820 | 35.120 | 2.550 |

| Link | US Node | Dia (mm) | Width (mm) | Node Type | DS Node | Dia (mm) | Node Type |
|---|---|---|---|---|---|---|---|
| 1.000 | EXFW.MH.003 | 600 | 600 | Manhole | EXFW.MH.004 | 750 | Manhole |
| 2.000 | FW.MH.001 | 450 | 450 | Manhole | EXFW.MH.001 | 450 | Manhole |
| 2.001 | EXFW.MH.001 | 450 | | Manhole | EXFW.MH.002 | 450 | Manhole |
| 2.002 | EXFW.MH.002 | 450 | | Manhole | EXFW.MH.004 | 750 | Manhole |
| 1.001 | EXFW.MH.004 | 750 | | Manhole | EX.MH.5001 | | Junction |

## Manhole Schedule

| Node | CL (m) | Depth (m) | Dia (mm) | Width (mm) | Connections | | Link | IL (m) | Dia (mm) |
|---|---|---|---|---|---|---|---|---|---|
| EXFW.MH.003 | 38.640 | 1.430 | 600 | 600 | | 0 | 1.000 | 37.210 | 100 |
| FW.MH.001 | 38.858 | 0.800 | 450 | 450 | | 0 | 2.000 | 38.058 | 100 |
| EXFW.MH.001 | 39.078 | 1.588 | 450 | |  | 1 | 2.000 | 37.490 | 100 |
| | | | | | | 0 | 2.001 | 37.490 | 100 |

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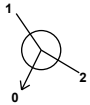
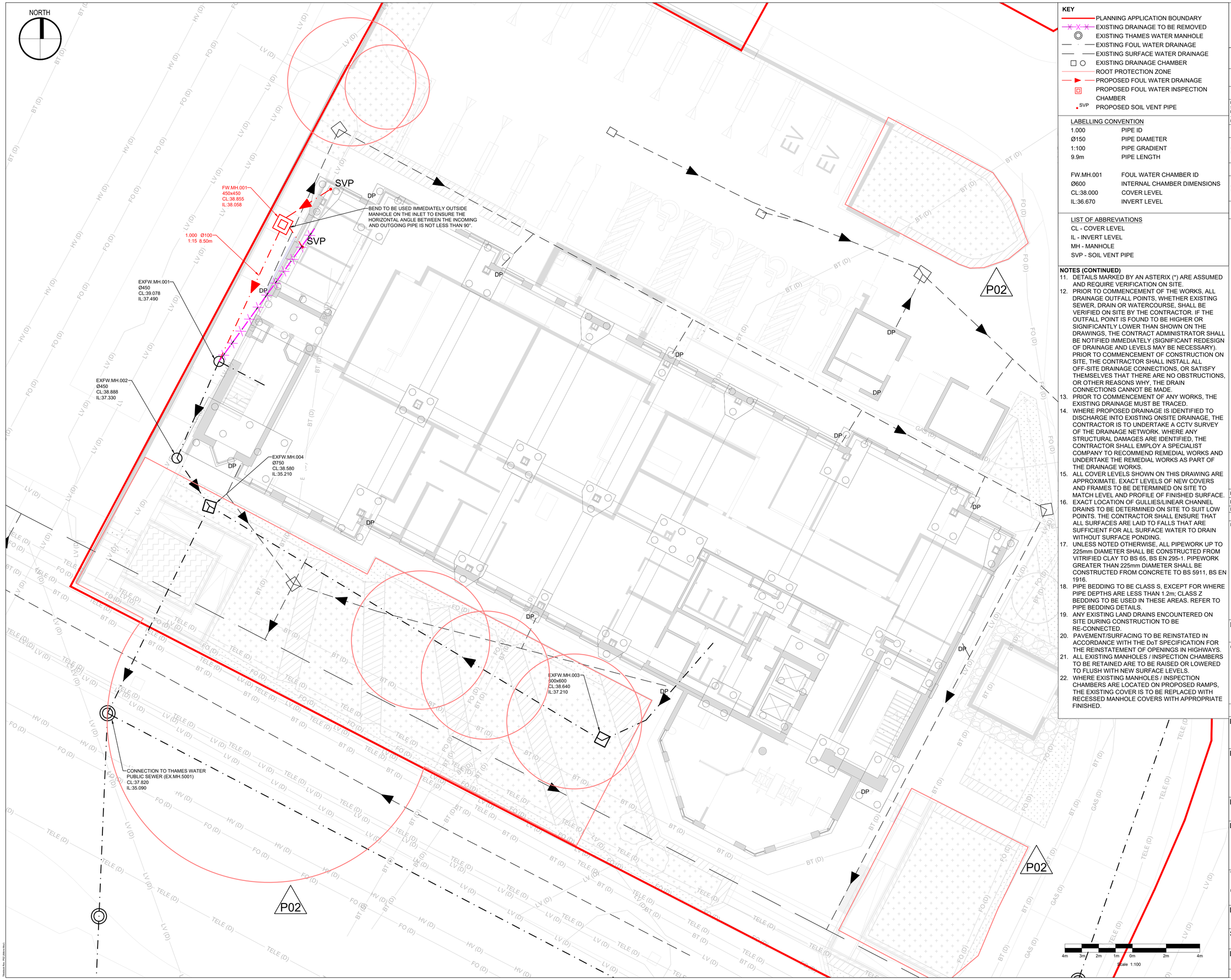
## Manhole Schedule

| Node | CL (m) | Depth (m) | Dia (mm) | Width (mm) | Connections | | Link | IL (m) | Dia (mm) |
|---|---|---|---|---|---|---|---|---|---|
| EXFW.MH.002 | 38.888 | 1.558 | 450 | | | 1 | 2.001 | 37.330 | 100 |
| | | | | | | 0 | 2.002 | 37.330 | 100 |
| EXFW.MH.004 | 38.580 | 3.370 | 750 | |  | 1 | 2.002 | 36.990 | 100 |
| | | | | | | 2 | 1.000 | 36.510 | 100 |
| | | | | | | 0 | 1.001 | 35.210 | 150 |
| EX.MH.5001 | 37.820 | 2.700 | | | | 1 | 1.001 | 35.120 | 150 |

# Appendix F. Proposed Foul Water Drainage Layout




**KEY**

- PLANNING APPLICATION BOUNDARY
- EXISTING DRAINAGE TO BE REMOVED
- EXISTING THAMES WATER MANHOLE
- EXISTING FOUL WATER DRAINAGE
- EXISTING SURFACE WATER DRAINAGE
- EXISTING DRAINAGE CHAMBER
- ROOT PROTECTION ZONE
- PROPOSED FOUL WATER DRAINAGE
- PROPOSED FOUL WATER INSPECTION CHAMBER
- SVP PROPOSED SOIL VENT PIPE

LABELLING CONVENTION

| | |
|---|---|
| 1.000 | PIPE ID |
| Ø150 | PIPE DIAMETER |
| 1:100 | PIPE GRADIENT |
| 9.9m | PIPE LENGTH |
| FW.MH.001 | FOUL WATER CHAMBER ID |
| Ø600 | INTERNAL CHAMBER DIMENSIONS |
| CL:38.000 | COVER LEVEL |
| IL:36.670 | INVERT LEVEL |

LIST OF ABBREVIATIONS

CL - COVER LEVEL
IL - INVERT LEVEL
MH - MANHOLE
SVP - SOIL VENT PIPE

**NOTES (CONTINUED)**

11. DETAILS MARKED BY AN ASTERIX (*) ARE ASSUMED AND REQUIRE VERIFICATION ON SITE.
12. PRIOR TO COMMENCEMENT OF THE WORKS, ALL DRAINAGE OUTFALL POINTS, WHETHER EXISTING SEWER, DRAIN OR WATERCOURSE, SHALL BE VERIFIED ON SITE BY THE CONTRACTOR. IF THE OUTFALL POINT IS FOUND TO BE HIGHER OR SIGNIFICANTLY LOWER THAN SHOWN ON THE DRAWINGS, THE CONTRACT ADMINISTRATOR SHALL BE NOTIFIED IMMEDIATELY (SIGNIFICANT REDESIGN OF DRAINAGE AND LEVELS MAY BE NECESSARY). PRIOR TO COMMENCEMENT OF CONSTRUCTION ON SITE, THE CONTRACTOR SHALL INSTALL ALL OFF-SITE DRAINAGE CONNECTIONS, OR SATISFY THEMSELVES THAT THERE ARE NO OBSTRUCTIONS, OR OTHER REASONS WHY, THE DRAIN CONNECTIONS CANNOT BE MADE.
13. PRIOR TO COMMENCEMENT OF ANY WORKS, THE EXISTING DRAINAGE MUST BE TRACED.
14. WHERE PROPOSED DRAINAGE IS IDENTIFIED TO DISCHARGE INTO EXISTING ONSITE DRAINAGE, THE CONTRACTOR IS TO UNDERTAKE A CCTV SURVEY OF THE DRAINAGE NETWORK. WHERE ANY STRUCTURAL DAMAGES ARE IDENTIFIED, THE CONTRACTOR SHALL EMPLOY A SPECIALIST COMPANY TO RECOMMEND REMEDIAL WORKS AND UNDERTAKE THE REMEDIAL WORKS AS PART OF THE DRAINAGE WORKS.
15. ALL COVER LEVELS SHOWN ON THIS DRAWING ARE APPROXIMATE. EXACT LEVELS OF NEW COVERS AND FRAMES TO BE DETERMINED ON SITE TO MATCH LEVEL AND PROFILE OF FINISHED SURFACE.
16. EXACT LOCATION OF GULLIES/LINEAR CHANNEL DRAINS TO BE DETERMINED ON SITE TO SUIT LOW POINTS. THE CONTRACTOR SHALL ENSURE THAT ALL SURFACES ARE LAID TO FALLS THAT ARE SUFFICIENT FOR ALL SURFACE WATER TO DRAIN WITHOUT SURFACE PONDING.
17. UNLESS NOTED OTHERWISE, ALL PIPEWORK UP TO 225mm DIAMETER SHALL BE CONSTRUCTED FROM VITRIFIED CLAY TO BS 65, BS EN 295-1. PIPEWORK GREATER THAN 225mm DIAMETER SHALL BE CONSTRUCTED FROM CONCRETE TO BS 5911, BS EN 1916.
18. PIPE BEDDING TO BE CLASS S, EXCEPT FOR WHERE PIPE DEPTHS ARE LESS THAN 1.2m; CLASS Z BEDDING TO BE USED IN THESE AREAS. REFER TO PIPE BEDDING DETAILS.
19. ANY EXISTING LAND DRAINS ENCOUNTERED ON SITE DURING CONSTRUCTION TO BE RE-CONNECTED.
20. PAVEMENT/SURFACING TO BE REINSTATED IN ACCORDANCE WITH THE DoT SPECIFICATION FOR THE REINSTATEMENT OF OPENINGS IN HIGHWAYS.
21. ALL EXISTING MANHOLES / INSPECTION CHAMBERS TO BE RETAINED ARE TO BE RAISED OR LOWERED TO FLUSH WITH NEW SURFACE LEVELS.
22. WHERE EXISTING MANHOLES / INSPECTION CHAMBERS ARE LOCATED ON PROPOSED RAMPS, THE EXISTING COVER IS TO BE REPLACED WITH RECESSED MANHOLE COVERS WITH APPROPRIATE FINISHED.

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## SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:

### CONSTRUCTION

BURIED SERVICES INCLUDING POSSIBILITY OF UNCHARTED SERVICES - REFER TO SERVICE PLANS AND USE CABLE AVOID TOOLS PRIOR TO DIGGING. POTENTIAL OF BURIED CONTAMINATION INCLUDED ASBESTOS. LOW RISK OF UNEXPLODED ORDINANCE - KEEP WATCH DURING GROUND WORKS. IF IN DOUBT, STOP WORK AND ASK.
FOR ALL PROJECT AND BUILDING RISKS REFER TO PROJECT & DESIGN RISK REGISTER.

### MAINTENANCE/CLEANING

NO SIGNIFICANT RISK IDENTIFIED. FOR ALL PROJECT AND BUILDING RISKS REFER TO PROJECT & DESIGN RISK REGISTER.

### DECOMMISSIONING/DEMOLITION

NO SIGNIFICANT RISK IDENTIFIED. FOR ALL PROJECT AND BUILDING RISKS REFER TO PROJECT & DESIGN RISK REGISTER.

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement

**NOTES**

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL PROJECT DRAWINGS AND SPECIFICATIONS.
2. ALL CO-ORDINATES ARE IN METRES (m) UNLESS OTHERWISE STATED.
3. ALL DRAINAGE WORKS TO BE DESIGNED IN ACCORDANCE WITH MOJ STANDARDS STD/Z/DG/053 AND STD/X/SPEC/010.
4. EXISTING DRAINAGE INFORMATION HAS BEEN TAKEN FROM THE FOLLOWING SOURCES:
   - 4.1. THAMES WATER PUBLIC SEWER RECORDS "ASSET LOCATION SEARCH SEWER MAP" (ALS/ALS STANDARD/2023_4773851)
   - 4.2. CCTV SURVEY MARKUP DRAWING "2220566 - SOVEREIGN HOUSE, VASTERN ROAD, READING - CCTV SURVEY EWP CIVILS MARKUP"
   - 4.3. VISION SURVEY DRAWING 'SOVEREIGN HOUSE CCTV DRAINAGE SURVEY' (VIS-10300-DWG-001-V1.0)
5. THE POSITION OF BURIED SERVICES SHOWN ON THE PLAN ARE AS DETERMINED FROM VISION SURVEY DRAWING 'SOVEREIGN HOUSE CCTV DRAINAGE SURVEY' (DOC REF: VIS-10300-DWG-001-V1.0).
6. ALL UTILITY APPARATUS MUST BE VERIFIED INOPERATIVE BEFORE CARRYING OUT WORK OR EXCAVATIONS IN THE VICINITY.
7. FOR FOUNDATIONAL PLAN REFER TO STRUCTUAL DRAWING 377915_15380-ATR-RTC-00-D-S-0002.
8. FOR ARCHITECTURAL SITE LAYOUT REFER TO 377915_15380-FMA-RTC-ZZ-D-A-1099.
9. FOR DRAINAGE STANDARD DETAILS SEE DRAWING 377915_15380-ATR-RTC-XX-D-C-0021 TO 0023.
10. FOR MANHOLE SCHEDULE REFER TO DRAWING 377915_15380-ATR-RTC-XX-D-C-0011.

| Rev | Issued by | Issued to | Date | Description |
|---|---|---|---|---|
| P02 | ATR | MOJ | 20/06/25 | TREE RPA UPDATES |
| P01 | ATR | MOJ | 14/03/25 | RIBA STAGE 3 |

Key Plan

NOT APPLICABLE

Project Status

RIBA STAGE 3

Client

Ministry of Justice

Project

HMCTS READING TRIBUNALS COURT (SOVEREIGN HOUSE) REFURBISHMENT PROJECT

Ministry of Justice, 102 Petty France, London, SW1H 9AJ

Project Description / Site

HMCTS READING TRIBUNAL COURT (SOVEREIGN HOUSE)

Project Address

SOVEREIGN HOUSE, VASTERN ROAD, READING, RG1 8BT

Building Type

TRIBUNAL COURT

Drawing Title

FOUL WATER DRAINAGE LAYOUT

Originator Logo

AtkinsRéalis

| | | |
|---|---|---|
| Drawn By: KPL | Date: 24/02/2025 | |
| Checked By: GSS | Date: 07/03/2025 | |
| Approved By: AS | Date: 13/03/2025 | |

Drawing Number

377915_15380-ATR-RTC-XX-D-C-0002

| Sheet No. | Scale | Orig. Sheet Size | Rev. |
|---|---|---|---|
| 1 of 1 | 1:100 | @ A1 | P02 |

Data Security Classification

OFFICIAL

Suitability

S4(3)

File Path:

Sheet size: ISO 216(mm HxV)

# Appendix G. Proposed Drainage Manhole Schedule

**PROPOSED SURFACE WATER DRAINAGE NETWORK MANHOLE SCHEDULE**

| CHAMBER REFERENCE | EASTING (m) | NORTHING (m) | TYPE | INTERNAL DIMENSIONS (mm) | COVER LEVEL (m) | CHAMBER INVERT LEVEL (m) | DEPTH (m) | MIN COVER DIMENSION AND LOAD CLASS | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| SW.MH.001 | 471594.383 | 174070.601 | TYPE B MANHOLE | 1200 | 38.580 | 37.465 | 1.115 | 600mm x 600mm C250 | |
| SW.MH.002 | 471597.690 | 174070.771 | TYPE B MANHOLE | 1200 | 38.550 | 37.430 | 1.120 | 600mm x 600mm D400 | |
| SW.MH.003 | 471604.004 | 174067.481 | TYPE B MANHOLE | 1200 | 38.480 | 37.295 | 1.185 | 600mm x 600mm D400 | CATCHPIT |
| SW.MH.004 | 471605.739 | 174064.501 | TYPE B MANHOLE | 1200 | 38.510 | 37.224 | 1.286 | 600mm x 600mm C250 | |
| SW.MH.005 | 471615.808 | 174029.680 | TYPE D INSPECTION CHAMBER | 450x450 | 38.455 | 37.469 | 0.986 | 450mm x 450mm C250 | BRICKWORK CHAMBER |
| SW.MH.006 | 471619.713 | 174037.121 | TYPE D INSPECTION CHAMBER | 450x450 | 38.575 | 37.385 | 1.190 | 450mm x 450mm C250 | BRICKWORK CHAMBER. CATCHPIT |
| SW.MH.007 | 471618.039 | 174037.995 | TYPE B MANHOLE | 1200 | 38.620 | 36.700 | 1.920 | 600mm x 600mm C250 | FLOW CONTROL CHAMBER<br>DISCHARGE RESTRICTED TO 2 l/s VIA VORTEX FLOW CONTROL |
| SW.MH.008 | 471576.018 | 174050.423 | TYPE D INSPECTION CHAMBER | 450x450 | 38.530 | 37.384 | 1.146 | 450mm x 450mm C250 | BRICKWORK CHAMBER. RECESSED ACCESS COVER. CATCHPIT |
| SW.MH.009 | 471577.887 | 174049.451 | TYPE B MANHOLE | 1200 | 38.355 | 37.279 | 1.076 | 600mm x 600mm C250 | FLOW CONTROL CHAMBER<br>DISCHARGE RESTRICTED TO 2 l/s VIA VORTEX FLOW CONTROL |

**PROPOSED FOUL WATER DRAINAGE NETWORK MANHOLE SCHEDULE**

| CHAMBER REFERENCE | EASTING (m) | NORTHING (m) | TYPE | INTERNAL DIAMETER (mm) | COVER LEVEL (m) | CHAMBER INVERT LEVEL (m) | DEPTH (m) | COVER DIMENSION AND LOAD | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| FW.MH.001 | 471579.530 | 174071.151 | TYPE D INSPECTION CHAMBER | 450x450 | 38.858 | 38.058 | 0.800 | 450mm x 450mm C250 | BRICKWORK CHAMBER |

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BURIED SERVICES INCLUDING POSSIBILITY OF UNCHARTED SERVICES - REFER TO SERVICE PLANS AND USE CABLE AVOID TOOLS PRIOR TO DIGGING. POTENTIAL OF BURIED CONTAMINATION INCLUDED ASBESTOS. LOW RISK OF UNEXPLODED ORDINANCE - KEEP WATCH DURING GROUND WORKS. IF IN DOUBT, STOP WORK AND ASK.
FOR ALL PROJECT AND BUILDING RISKS REFER TO PROJECT & DESIGN RISK REGISTER.

### MAINTENANCE/CLEANING

NO SIGNIFICANT RISK IDENTIFIED. FOR ALL PROJECT AND BUILDING RISKS REFER TO PROJECT & DESIGN RISK REGISTER.

### DECOMMISSIONING/DEMOLITION

NO SIGNIFICANT RISK IDENTIFIED. FOR ALL PROJECT AND BUILDING RISKS REFER TO PROJECT & DESIGN RISK REGISTER.

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement

**NOTES**

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL PROJECT DRAWINGS AND SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN METRES AND LEVELS IN METRES TO ORDNANCE SURVEY DATUM UNLESS STATED OTHERWISE.
3. EXISTING DRAINAGE INFORMATION HAS BEEN TAKEN FROM THE FOLLOWING SOURCES:
   - 3.1. THAMES WATER PUBLIC SEWER RECORDS "ASSET LOCATION SEARCH SEWER MAP" (ALS/ALS STANDARD/2023_4773851)
   - 3.2. CCTV SURVEY MARKUP DRAWING "2220566 - SOVEREIGN HOUSE, VASTERN ROAD, READING - CCTV SURVEY EWP CIVILS MARKUP"
   - 3.3. VISION SURVEY DRAWING 'SOVEREIGN HOUSE CCTV DRAINAGE SURVEY' (VIS-10300-DWG-001-V1.0)
4. LOCATIONS OF EXISTING PIPEWORK AND CHAMBERS MAY NOT BE ACCURATE AND WILL NEED TO BE VERIFIED.
3. ALL DRAINAGE WORKS TO BE DESIGNED IN ACCORDANCE WITH MOJ STANDARDS STD/Z/DG/053 AND STD/X/SPEC/010.
4. FOR DRAINAGE LAYOUTS REFER TO DRAWINGS 377915_15380-ATR-RTC-XX-D-C-0001 TO 0003.
5. FOR DRAINAGE STANDARD DETAILS SEE DRAWING 377915_15380-ATR-RTC-XX-D-C-0021 TO 0023.
6. COVERS TO BE DUCTILE IRON, ONE-PIECE UNITS. COVERS SHALL NOT BE HINGED.
7. COVERS OF EXISTING CHAMBERS TO BE RAISED TO MATCH PROPOSED SURFACE LEVELS.

| Rev | Issued by | Issued to | Date | Description |
|---|---|---|---|---|
| P01 | ATR | MOJ | 14/03/25 | RIBA STAGE 3 |

Key Plan

NOT APPLICABLE

Project Status

RIBA STAGE 3

Client

Ministry of Justice

Project

HMCTS READING TRIBUNALS COURT (SOVEREIGN HOUSE) REFURBISHMENT PROJECT

Ministry of Justice, 102 Petty France, London, SW1H 9AJ

Project Description / Site

HMCTS READING TRIBUNAL COURT (SOVEREIGN HOUSE)

Project Address

SOVEREIGN HOUSE, VASTERN ROAD, READING, RG1 8BT

Building Type

TRIBUNAL COURT

Drawing Title

PROPOSED DRAINAGE MANHOLE SCHEDULES

Originator Logo

AtkinsRéalis

| | | |
|---|---|---|
| Drawn By: KPL | Date: | 28/02/2025 |
| Checked By: GSS | Date: | 05/03/2025 |
| Approved By: AS | Date: | 14/03/2025 |

Drawing Number

377915_15380-ATR-RTC-XX-D-C-0011

| Sheet No. | Scale | Orig. Sheet Size | Rev. |
|---|---|---|---|
| 1 of 1 | NA | @ A1 | P01 |

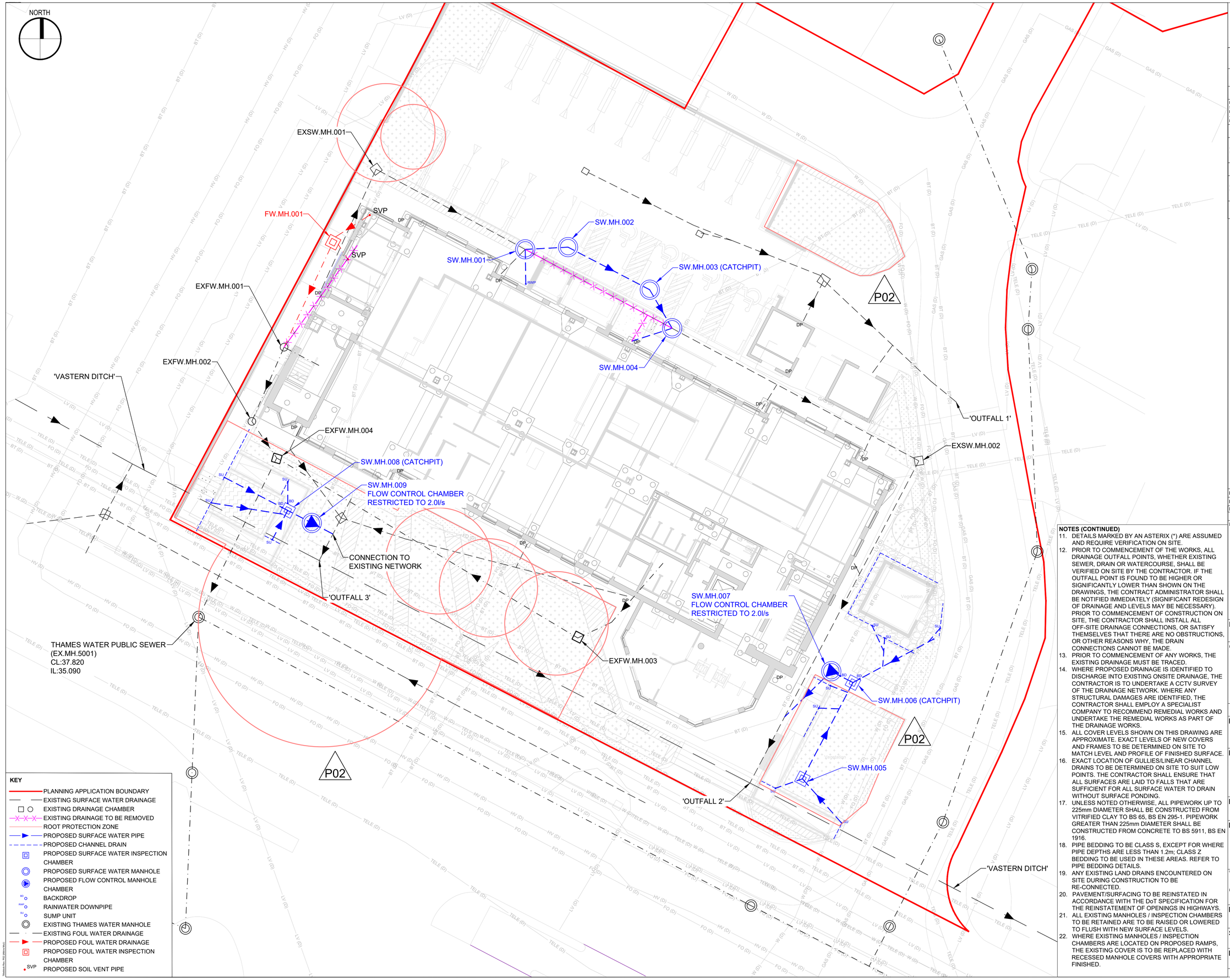
Data Security Classification: OFFICIAL

Suitability: S4(3)

File Path:

Revision No: P02 (Above No2)

# Appendix H. Proposed Combined Drainage Layout

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### CONSTRUCTION

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FOR ALL PROJECT AND BUILDING RISKS REFER TO PROJECT & DESIGN RISK REGISTER.

### MAINTENANCE/CLEANING

NO SIGNIFICANT RISK IDENTIFIED. FOR ALL PROJECT AND BUILDING RISKS REFER TO PROJECT & DESIGN RISK REGISTER.

### DECOMMISSIONING/DEMOLITION

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**NOTES**

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL PROJECT DRAWINGS AND SPECIFICATIONS.
2. ALL CO-ORDINATES ARE IN METRES (m) UNLESS OTHERWISE STATED.
3. ALL DRAINAGE WORKS TO BE DESIGNED IN ACCORDANCE WITH MOJ STANDARDS STD/Z/DG/053 AND STD/X/SPEC/010.
4. EXISTING DRAINAGE INFORMATION HAS BEEN TAKEN FROM THE FOLLOWING SOURCES:
   - 4.1. THAMES WATER PUBLIC SEWER RECORDS "ASSET LOCATION SEARCH SEWER MAP" (ALS/ALS STANDARD/2023_4773851)
   - 4.2. CCTV SURVEY MARKUP DRAWING "2220566 - SOVEREIGN HOUSE, VASTERN ROAD, READING - CCTV SURVEY EWP CIVILS MARKUP"
   - 4.3. VISION SURVEY DRAWING 'SOVEREIGN HOUSE CCTV DRAINAGE SURVEY' (VIS-10300-DWG-001-V1.0)
5. THE POSITION OF BURIED SERVICES SHOWN ON THE PLAN ARE AS DETERMINED FROM VISION SURVEY DRAWING 'SOVEREIGN HOUSE CCTV DRAINAGE SURVEY' (DOC REF: VIS-10300-DWG-001-V1.0).
6. ALL UTILITY APPARATUS MUST BE VERIFIED INOPERATIVE BEFORE CARRYING OUT WORK OR EXCAVATIONS IN THE VICINITY.
7. FOR FOUNDATIONAL PLAN REFER TO STRUCTUAL DRAWING 377915_15380-ATR-RTC-00-D-S-0002.
8. FOR ARCHITECTURAL SITE LAYOUT REFER TO 377915_15380-FMA-RTC-ZZ-D-A-1099.
9. FOR DRAINAGE STANDARD DETAILS SEE DRAWING 377915_15380-ATR-RTC-XX-D-C-0021 TO 0023.
10. FOR MANHOLE SCHEDULE REFER TO DRAWING 377915_15380-ATR-RTC-XX-D-C-0011.

**NOTES (CONTINUED)**

11. DETAILS MARKED BY AN ASTERIX (*) ARE ASSUMED AND REQUIRE VERIFICATION ON SITE.
12. PRIOR TO COMMENCEMENT OF THE WORKS, ALL DRAINAGE OUTFALL POINTS, WHETHER EXISTING SEWER, DRAIN OR WATERCOURSE, SHALL BE VERIFIED ON SITE BY THE CONTRACTOR. IF THE OUTFALL POINT IS FOUND TO BE HIGHER OR SIGNIFICANTLY LOWER THAN SHOWN ON THE DRAWINGS, THE CONTRACT ADMINISTRATOR SHALL BE NOTIFIED IMMEDIATELY (SIGNIFICANT REDESIGN OF DRAINAGE AND LEVELS MAY BE NECESSARY). PRIOR TO COMMENCEMENT OF CONSTRUCTION ON SITE, THE CONTRACTOR SHALL INSTALL ALL OFF-SITE DRAINAGE CONNECTIONS, OR SATISFY THEMSELVES THAT THERE ARE NO OBSTRUCTIONS, OR OTHER REASONS WHY, THE DRAIN CONNECTIONS CANNOT BE MADE.
13. PRIOR TO COMMENCEMENT OF ANY WORKS, THE EXISTING DRAINAGE MUST BE TRACED.
14. WHERE PROPOSED DRAINAGE IS IDENTIFIED TO DISCHARGE INTO EXISTING ONSITE DRAINAGE, THE CONTRACTOR IS TO UNDERTAKE A CCTV SURVEY OF THE DRAINAGE NETWORK. WHERE ANY STRUCTURAL DAMAGES ARE IDENTIFIED, THE CONTRACTOR SHALL EMPLOY A SPECIALIST COMPANY TO RECOMMEND REMEDIAL WORKS AND UNDERTAKE THE REMEDIAL WORKS AS PART OF THE DRAINAGE WORKS.
15. ALL COVER LEVELS SHOWN ON THIS DRAWING ARE APPROXIMATE. EXACT LEVELS OF NEW COVERS AND FRAMES TO BE DETERMINED ON SITE TO MATCH LEVEL AND PROFILE OF FINISHED SURFACE.
16. EXACT LOCATION OF GULLIES/LINEAR CHANNEL DRAINS TO BE DETERMINED ON SITE TO SUIT LOW POINTS. THE CONTRACTOR SHALL ENSURE THAT ALL SURFACES ARE LAID TO FALLS THAT ARE SUFFICIENT FOR ALL SURFACE WATER TO DRAIN WITHOUT SURFACE PONDING.
17. UNLESS NOTED OTHERWISE, ALL PIPEWORK UP TO 225mm DIAMETER SHALL BE CONSTRUCTED FROM VITRIFIED CLAY TO BS 65, BS EN 295-1. PIPEWORK GREATER THAN 225mm DIAMETER SHALL BE CONSTRUCTED FROM CONCRETE TO BS 5911, BS EN 1916.
18. PIPE BEDDING TO BE CLASS S, EXCEPT FOR WHERE PIPE DEPTHS ARE LESS THAN 1.2m; CLASS Z BEDDING TO BE USED IN THESE AREAS. REFER TO PIPE BEDDING DETAILS.
19. ANY EXISTING LAND DRAINS ENCOUNTERED ON SITE DURING CONSTRUCTION TO BE RE-CONNECTED.
20. PAVEMENT/SURFACING TO BE REINSTATED IN ACCORDANCE WITH THE DoT SPECIFICATION FOR THE REINSTATEMENT OF OPENINGS IN HIGHWAYS.
21. ALL EXISTING MANHOLES / INSPECTION CHAMBERS TO BE RETAINED ARE TO BE RAISED OR LOWERED TO FLUSH WITH NEW SURFACE LEVELS.
22. WHERE EXISTING MANHOLES / INSPECTION CHAMBERS ARE LOCATED ON PROPOSED RAMPS, THE EXISTING COVER IS TO BE REPLACED WITH RECESSED MANHOLE COVERS WITH APPROPRIATE FINISHED.

| Rev | Issued by | Issued to | Date | Description |
|---|---|---|---|---|
| P02 | ATR | MOJ | 20/06/25 | TREE RPA UPDATES |
| P01 | ATR | MOJ | 14/03/25 | RIBA STAGE 3 |

Key Plan

NOT APPLICABLE

Project Status

RIBA STAGE 3

Client

Ministry of Justice

Ministry of Justice, 102 Petty France, London, SW1H 9AJ

Project

HMCTS READING TRIBUNALS COURT (SOVEREIGN HOUSE) REFURBISHMENT PROJECT

Project Description / Site

HMCTS READING TRIBUNAL COURT (SOVEREIGN HOUSE)

Project Address

SOVEREIGN HOUSE, VASTERN ROAD, READING, RG1 8BT

Building Type

TRIBUNAL COURT

Drawing Title

COMBINED DRAINAGE LAYOUT

Originator Logo

AtkinsRéalis

| | | |
|---|---|---|
| Drawn By: KPL | Date: 24/02/2025 | |
| Checked By: GSS | Date: 24/02/2025 | |
| Approved By: AS | Date: 13/03/2025 | |

Drawing Number

377915_15380-ATR-RTC-XX-D-C-0003

| Sheet No. | Scale | Orig. Sheet Size | Rev. |
|---|---|---|---|
| 1 of 1 | NTS | @ A1 | P02 |

Data Security Classification

OFFICIAL

Suitability

S4(3)

File Path:

Drawing No. P02 (Minor Mod)

# Appendix I. Thames Water Correspondence

Ka Po Leung

AtkinsRéalis
Nova North
11 Bressenden Place
London SW1E 5BY

Wastewater pre-planning
Our ref DS6127936

25 October 2024

## Pre-planning enquiry: Confirmation of sufficient capacity

**Site Address: Sovereign House, Vastern Road, Reading, RG1 8BT**

Dear Ka Po,

Thank you for providing information on your development to convert office into court, including an increase in sanitation facilities, with gross internal floor area of approximately 2655 $m^2$.

Foul water to discharge via gravity flow into manhole ref. SU7174**5001** on a 300mm foul sewer.

We have completed the assessment of the foul water flows based on the information submitted in your application with the purpose of assessing sewerage capacity within the existing Thames Water sewer network.

### Foul Water

If your proposals progress in line with the details you've provided, we're pleased to confirm that there will be sufficient sewerage capacity in the adjacent foul water sewer network to serve your development.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

**You'll need to keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient capacity.**

### Surface Water

Surface water assessment of capacity has not been undertaken under this application.

In accordance with the Building Act 2000 Clause H3.3, positive connection of surface water to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable. Before we can consider your surface water needs, you'll need written approval from the lead local flood authority that you

have followed the sequential approach to the disposal of surface water and considered all practical means.

The disposal hierarchy being:

1) rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
2) rainwater infiltration to ground at or close to source
3) rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
4) rainwater discharge direct to a watercourse (unless not appropriate)
5) controlled rainwater discharge to a surface water sewer or drain
6) controlled rainwater discharge to a combined sewer.

Where connection to the public sewerage network is required to manage surface water flows, we will accept these flows at a discharge rate in line with CIRIA's best practice guide on SuDS or that stated within the sites planning approval.

Where disposal of surface water is other than to a public sewer, then the applicant shall ensure that approval for the discharge has been obtained from the appropriate authorities.

Please see our FAQ's leaflet for additional information.

## What happens next?

Please make sure you submit your connection application, giving us at least 21 days' notice of the date you wish to make your new connection/s.

If you have any further questions, please contact us.

Yours sincerely,

**Jiahang Yu**
Adoptions & Pre-Planning Engineer
Developer Services
Thames Water Utilities Limited

AtkinsRéalis

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