



The Oracle, Reading Yield Hall Place 1 & 2

Proposed Drainage Strategy

On behalf of: **The Oracle Partnership Ltd.**

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1 Introduction

- 1.1.1 Stantec has been commissioned by The Oracle Partnership Ltd to prepare a Surface Water and Foul Water Drainage Strategy to support a planning application for the mixed-use development of the former Debenhams Department Store and the Vue Cinema complex at The Oracle, Yield Hall Place, Reading. The development consists of 2 apartment blocks holding 436 residential dwellings in total, commercial floorspaces, restaurants/bar areas, and a cinema.
- 1.1.2 This strategy has been prepared in accordance with relevant national, regional and local planning policy guidance as follows:
- National policy regarding flood risk as contained within National Planning Policy Framework (NPPF), dated 19th February 2019, and the accompanying Flood Risk and Coastal Change Planning Practice Guidance (PPG), dated 6th March 2014 and updated in February 2016,
 - The Ministerial Statement HCWS161, dated 18th December 2014,
 - Non-statutory Technical Standards for Sustainable Drainage Systems, March 2015, Defra,
 - Flood Risk Assessments: Climate Change Allowances, 19th February 2016, Environment Agency (EA),
 - Reading Borough Local Plan, Adopted November 2019, Reading Borough Council.
 - Reading Borough Council (RBC) Strategic Flood Risk Assessment (SFRA), June 2017.
 - RBC Revised Sustainable Design and Construction Supplementary Planning Document, December 2019.

1.2 Flood Risk Assessment

- 1.2.1 Section 10 of the National Planning Policy Framework, clause 103, footnote 20 states:

A site specific flood risk assessment is required for proposals of 1 hectare or greater in Flood Zone 1: all proposals for new development (including minor development and change of use) in Flood Zone 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency); and where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding.

- 1.2.2 As parts of the site are within Flood Zones 3 and 2 a site-specific flood risk assessment has been completed for the development. This is contained within a separate document submitted as part of the planning application.

2 Site Information

2.1 Site Location and Plan

- 2.1.1 The proposed development is made up of two parcels, Yield Hall Place 1 and Yield Hall Place 2 which are located to the north and south of the River Kennet respectively. This report covers the surface and foul water drainage strategies for both parcels of the development.
- 2.1.2 The former Debenhams site, Yield Hall Place 1, is approximately 0.780 hectares (ha) in area and forms part of the wider Oracle Shopping Centre. The site is located to the west of Yield Hall Place and along the northern bank of the River Kennet in Central Reading (postcode RG1 2AS, OS grid reference 471,668m E; 173,328m N).
- 2.1.3 The Vue Cinema complex, Yield Hall Place 2, is approximately 0.749ha in area and is located along the southern bank of the River Kennet and to the north of the Queens Road/A329 Inner Distribution Road (IDR) (postcode RG1 2AG, OS grid reference 471,693m E; 173, 237m N)
- 2.1.4 The site locations are shown on **Figure 2.1**.



Figure 2.1: Site Location Plan (not to scale)

- 2.1.5 Yield Hall Place 1 (YHP1) is currently abandoned following the retail building units' closure; Yield Hall Place 2 (YHP2) is continuing to be utilised for its regular function as a cinema and restaurants. The 2 sites share a border with the River Kennet, running between the two sites, and Yield Hall Place on the eastern side of each site. YHP1 is also bordered by Minster Street to the north-west and the wider Oracle shopping centre. YHP2 is also bordered by the box junction between London Street, Queens Road, the A327, and the A329 to the south, with further restaurants of the Oracle to the west of the site.
- 2.1.6 The River Kennet is a main river which flows north-east through the centre of Reading between the two sites.

2.1.7 The topographic survey by Ruxton Surveys is provided in **Appendix A** shows the following for the ground levels around the existing buildings and threshold/ground floor levels:

- YHP1:
 - External ground levels range from 38.00m AOD to 39.25m AOD.
 - Threshold/ground floor levels: 38.17m AOD - 38.39m AOD
- YHP2:
 - External ground levels range from 38.25m AOD to 39.40m AOD.
 - Threshold/ground floor levels: 38.55m AOD-39.11m AOD

2.1.8 Levels along the River Kennet brick/concrete retaining walls adjacent to the sites range from 37.40m AOD to 41.20m AOD.

2.2 Proposals

2.2.1 The YPH1 mixed use development comprises of part demolition to former department store and erection of new building comprising up to 218no. build to rent residential dwellings (Class C3) and 1,209 sqm commercial uses within Uses Class E and / or bar (Sui Generis Use). Reconfiguration and change of use of up to 5,866 sqm remaining department store floorspace (Class E) to uses with within Use Class E and / or bar (SuiGeneris Use) and / or experiential leisure use (Sui Generis Use). Associated public realm, infrastructure works and external alterations to shopping centre, including creation of new shopping centre entrance.

2.2.2 The YPH2 mixed use development comprises of demolition to existing buildings and erection of new building comprising up to 218no. build-to-rent residential dwellings (Class C3) and up to 3,046 sqm commercial floorspace comprising cinema (Sui Generis) and ground floor commercial uses within Use Class E and /or Bar (Sui Generis Use). Associated public realm and infrastructure works.

2.2.3 As shown in the proposed development plan of YHP1, the western part of this development will be Leisure which is a change of use of the existing condition. It is proposed that the foul water and surface water from this section of the site will continue to drain to the existing drainage network as it currently does. As there is no change to the existing drainage condition, drainage from this part of the site is not considered within the remainder of this Drainage Strategy Report.

3 Existing Surface Water Drainage Regime

- 3.1.1 The existing surface water drainage regime is shown in Stantec Drawings 332110757-2001-001 and 332110757-2001-002 shown in **Appendix B**. The existing drainage layout has been based upon For Construction/As-Built drainage records for The Oracle development provided by P.C.Harrington and Edward Roscoe Associates.
- 3.1.2 The existing surface water drainage network for Yield Hall Place 1 is split between two networks. A drainage network which serves the southern section of the site comprises of a 150Ø drainage pipes and discharges into the River Kennet via at existing outfall. A network serving the eastern section of the site comprises of 225Ø drainage pipes and discharges into the Thames Water Surface Water drainage network via MH6201 in Yield Hall Place (road) to the east of the site. This Thames Water sewer discharges into the River Kennet approximately 50m downstream of the development.
- 3.1.3 The existing surface water drainage network for Yield Hall Place 2 is made up of two networks. The network serving the northern section of the existing building comprises of 150Ø drains which outfall into the Kennet River via an outfall pipe. The southern portion of the development is served by a piped network which routes the water east, eventually discharging into the existing Thames Water surface water sewer network in Queens Road.
- 3.1.4 The existing Yield Hall Place 1 site is almost entirely impermeable, and we are not aware of any existing surface water attenuation on the site. The total area of the site is 0.780ha and the area for which the drainage is being amended for is 0.347ha.
- 3.1.5 The existing Yield Hall Place 2 site is almost entirely impermeable, and we are not aware of any existing surface water attenuation on the site. The total area of the site is 0.749ha and the area for which the drainage is being amended for is 0.465ha.
- 3.1.6 The equivalent greenfield and existing brownfield discharge rates have been calculated for the Yield Hall Place 1 & 2.
- 3.1.7 The existing brownfield discharge rate has been calculated using an existing MicroDrainage model of the existing site. An assessment of the equivalent greenfield discharge rate from the site has been undertaken based on the method described in the Rainfall Runoff Management for Developments Report – SC030219.
- 3.1.8 A copy of the greenfield and existing discharge rate calculations are contained in **Appendix C. Table 3.1**, provides a summary of the discharge rates for the YHP1 and YHP2 sites.

Return Period	Greenfield Runoff Rate per ha (l/s)	Equivalent Greenfield Discharge Rate (l/s)		Existing Brownfield Discharge Rate (l/s)	
		YHP1 (0.347ha)	YHP2 (0.465ha)	YHP1 (0.347ha)	YHP2 (0.465ha)
1 in 1 year	1.40	0.48	0.65	40.6	52.2
1 in 30 year	3.79	1.32	1.76	96.9	117.1
1 in 100 year	5.25	1.82	2.44	120.0	146.7

Table 3.1: Equivalent greenfield and existing brownfield discharge rates

4 Existing Foul Water Drainage Regime

- 4.1.1 The existing foul water drainage regime is shown in Stantec Drawings 332110757-2001-001 and 332110757-2001-002 shown in **Appendix B**. The existing drainage layout has been based upon For Construction/As-Built drainage records for The Oracle development provided by P.C.Harrington and Edward Roscoe Associates.
- 4.1.2 Foul water from Yield Hall Place 1 is conveyed east off the site. The sewerage outfalls into the Thames Water 150Ø Foul Sewer in Yield Hall Place (road) via Thames Water Manhole 6212.
- 4.1.3 Foul water from Yield Hall Place 2 is conveyed east off the site. The sewerage outfalls into the Thames Water 150Ø Foul Sewer in London Street via Thames Water Manhole 7202.
- 4.1.4 Thames Water asset records show a Thames Water adopted 150mmØ Foul Water sewer to the south of Yield Hall Place 1 adjacent to the River Kennet. This sewer appears to collect foul water from the restaurants to the west of Yield Hall Place 1, conveying the water east to the sewer network in Yield Hall Pace Road.
- 4.1.5 However, the as-built drainage records show foul water from these restaurants being conveyed north through The Oracle building and discharging into Thames Water manhole 6231. There is no evidence of the existing Thames Water sewer run on the Ruxton Topographic Survey of the site. Therefore, it is assumed at this stage that this sewer does not exist.
- 4.1.6 At the detailed design stage further investigations will be carried out to locate all existing drainage on the site. If this sewer is found to existing we will liaise with Thames Water to agree the necessary offset to the proposed building is provided or if not arrange for a sewer diversion to be carried out.

5 Proposed Surface Water Drainage Strategy

5.1 Proposed Surface Water Drainage Layout

- 5.1.1 The drainage strategy for Yield Hall Place 1 and 2 incorporates SuDS in the form of green roofs, tree pits, underground cellular storage tanks and rainwater harvesting. The green roofs will provide retention, attenuation, treatment of rainwater and promoting evapotranspiration at the roof level. Cross falls within the footway and rain water pipes will direct surface water into tree pits which will treat and attenuate surface water. The tree pits will be lined with land drains at the base to collect surface water, in addition to overflows to prevent flooding if they are overwhelmed. Rainwater harvesting will be incorporated into the irrigation strategy where appropriate and feasible.
- 5.1.2 The drainage strategy for Yield Hall Place 1 incorporates two green roofs, four SuDS tree pits, an underground cellular storage tank and rainwater harvesting. The surface water from the proposed building, green roof and external paved areas of Yield Hall Place 1 is collected in an underground piped network and conveyed to a 105.5m² x 0.8m underground cellular water storage tank located to the south of the development. Surface water is then discharged from a flow control manhole located to the southwestern corner of the site into the River Kennet via an existing pipe / culvert at an outlet level of 36.170mOD.
- 5.1.3 The drainage strategy for Yield Hall Place 2 incorporates a green roof, a SuDS tree pit, an underground cellular storage tank and rainwater harvesting. The surface water from the proposed building, green roof and external paved areas of Yield Hall Place 2 is collected into a traditional underground piped network and conveyed to a 31 x 6 x 0.8m underground cellular water storage tanks located to the northwest of the development. Surface water is then discharged from a flow control manhole located to the north of the site into the River Kennet via an existing outlet at a level of 36.790mOD.
- 5.1.4 Stantec drawings 332110757-2001-003 and 332110757-2001-004 show the proposed drainage layout for the development and these are contained in **Appendix D**.

5.2 Discharge Destination

- 5.2.1 In accordance with the discharge destination hierarchies of the Building Regulations H3 and the National Planning Practice Guidance an assessment of the suitability of the site to utilise infiltration drainage techniques has been undertaken.

See the Planning Practice Guidance

This states:

"Generally the aim should be discharge surface runoff as high up the following hierarchy of drainage options as reasonably practicable:

- 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."*

- 5.2.2 Due to the constrained brownfield nature of the site there is not the required space available to discharge all surface water to groundwater. Additionally given the proximity to the River Kennet it is anticipated that ground water levels will be high making infiltration SuDS features not feasible. As a result, we have assumed that infiltration is not a suitable method of discharge for the development.

- 5.2.3 Following the discharge hierarchy, outfall to a surface water body is the next option considered. The River Kennet is located adjacent to both sites. The proposed surface water drainage strategy is to discharge surface water to this watercourse.

5.3 Peak Flow Control – Defra Technical Standard S3

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 should 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.

- 5.3.1 As previously discussed, (in **Section 3**), the application site is currently developed and the existing peak discharge rates from the site are contained in **Table 3.1**.
- 5.3.2 The EA's Flood Risk Assessments: Climate Change Allowances guidance, which supports the NPPF, provides contingency allowances for potential increases in sea level rise, peak river flow and rainfall intensity. The DEFRA Climate Change Allowances map provides allowances for climate change for rainfall intensity on a catchment-by-catchment basis. The sites are located within the Kennet and Tributaries Management catchment and the climate change allowances are provided in **Table 5.1** for a residential development such as these with a minimum design life of 100 years.
- 5.3.3 In accordance with this guidance, the potential for increased flood probability as the result of possible climate change has been taken into account in the consideration of mitigation measures over the lifetime of the development through an increase in peak rainfall intensity (i.e. surface water drainage) of +25% and +35% for the 1 in 30 year event and +25% and +40% for the 1 in 100 year event.

Kennet and Tributaries Management Catchment	Central	Upper End
Total potential change anticipated for 3.3% (30 year) rainfall event for 2061 to 2125	25%	35%
Total potential change anticipated for 1% (100 year) rainfall event for 2061 to 2125	25%	40%

Table 5.1: Climate Change Allowances Kennet and Tributaries Management Catchment for a development with a 100 year design life

- 5.3.4 The drainage system has been designed to accommodate the 1 in 100 year event with a + 40% allowance for climate change (Upper End).
- 5.3.5 Testing has been carried out to demonstrate the network also has capacity to accommodate the 1 in 30 year event with a +35% allowance for climate change.
- 5.3.6 Due to the constrained space for attenuation on the development it is not possible for the drainage strategy to match the equivalent greenfield runoff rates. As per National standards for sustainable drainage systems (SuDS) condition 3.21.1, a 5 times relaxation factor has been applied to the greenfield runoff rate. As a result, the drainage strategy has been designed to attenuate flows to 9.0 l/s for YHP1 and 9.4 l/s for YHP2 for the 1 in 100 year event with an allowance for climate change. This constitutes a 93% betterment in comparison to the existing condition.

5.3.7 **Table 5.2** compares the existing and proposed runoff rates and shows the betterment provided by the development.

Table 5.2: Proposed and Existing Discharge Rate Comparison

Return Period	Existing Brownfield Discharge Rate (l/s)		Proposed Peak Discharge (l/s)		Betterment	
	YHP1	YHP2	YHP1	YHP2	YHP1	YHP2
1 in 1 year	40.6	52.2	5.6	5.7	86%	89%
1 in 30 year	96.9	117.1	7.3	6.6	92%	94%
1 in 30 year + 35% allowance for climate change	-	-	8.1	7.7	92%	93%
1 in 100 year	120.0	146.7	8.0	7.6	93%	95%
1 in 100 year + 40% allowance for climate change	-	-	9.0	9.4	93%	94%

5.3.8 In order to demonstrate that the proposed peak discharge rates are deliverable within the proposed development layout, an outline proposed surface water drainage network has been modelled. A copy of the MicroDrainage calculations for the proposed development are contained within **Appendix E**.

5.4 Volume Control - Defra Technical Standard S6

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.

5.4.1 The impermeable area on the site will be slightly reduced as a result of new landscaping as a result of the development. Therefore, the volume of run-off in the 100 year 6 hour storm event will be similarly reduced, which is a reduction on the existing volume discharge.

5.5 Flood Risk within the Development – Defra Technical Standards S7 to S9

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.

5.5.1 The proposed surface water drainage network has been designed not to flood in a 1 in 100 annual probability event or a 1 in 100 annual probability event with a +40% climate change.

- 5.5.2 A copy of the Proposed Surface Water Drainage Strategy drawings 332110757-2001-003, 332110757-2001-004 and accompanying MicroDrainage calculations are contained within **Appendices D and E** respectively.

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.

- 5.5.3 The drainage network has been tested with surcharged outfalls and the results are contained in **Appendix F**. Both YHP1 and YHP2 networks have been tested with a surcharged outfall water level of 37.54mAOD which is defined in the accompanying FRA as the river water level for the 1 in 100 year +25% climate change event. The MicroDrainage results indicate there is no flooding for the any event up to the 1 in 30 year storm with a +35% allowance for climate change.
- 5.5.4 Exceedance flood modelling has been carried out on the drainage network for a 100 year storm event with an 60% allowance for climate change and surcharged outfalls. During this flood event there is no flooding across the YHP1 network and 3.2m³ flooding across the YHP2 network. The proposed site levels will be set to route surface water flooding which occurs during this event away from the proposed building. Simulation results for this scenario are contained within **Appendix F**.

5.6 SuDS Selection

- 5.6.1 The Ministerial Statement HCWS161, dated 18th December 2014 states that:

*'.....the Government's expectation is that sustainable drainage systems will be provided in new developments **wherever this is appropriate.**'*

- 5.6.2 The NPPG paragraph 051 describes SuDS as follows:

*'Sustainable drainage systems are designed to control surface water run off close to where it falls and mimic natural drainage as closely as possible. **They provide opportunities to:***

- *reduce the causes and impacts of flooding;*
- *remove pollutants from urban run-off at source;*
- *combine water management with green space with benefits for amenity, recreation and wildlife.'*

- 5.6.3 The current planning policy and guidance advises that SuDS in the form of open or near surface systems employing natural processes should be used where possible, not that they must be used. They can also provide opportunities to combine water management with amenity and wildlife, but only where appropriate.
- 5.6.4 The proposed drainage strategy for the site incorporates open SuDS features in the form of green roofs and tree planters. These provide retention, attenuation, treatment of rainwater and promote evapotranspiration. The town centre setting and constrained nature of the development minimised the space available for additional open SuDS features. The remaining attenuation is provided within an underground cellular storage tank.
- 5.6.5 Rainwater harvesting will be incorporated into the irrigation strategy where appropriate and feasible. This is in accordance with National standards for sustainable drainage systems (SuDS) which prioritises the collection of rainwater for non-potable uses.

5.7 Structural Integrity – Defra Technical Standards S10 & S11

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.

- 5.7.1 The components that make up any drainage network have different life expectancies which can be greatly affected by the effectiveness of their maintenance regime and upstream sediment capture/management.
- 5.7.2 This drainage network comprises a piped network, inspection chambers / catchpits, green roofs, tree pits, cellular crate storage, rainwater harvesting, and a hydraulic flow control. As with any drainage system, this network requires regular inspection and maintenance to ensure that the individual components continue to operate as designed, both in terms of hydraulic capacity and potential pollutant removal.
- 5.7.3 All the gullies, catchpits, inspection chambers, green roofs, tree pits and cellular crate storage points will therefore be inspected and cleaned regularly by a private maintenance company.
- 5.7.4 The detail design of each of the individual components will be undertaken at the detailed design stage.
- 5.7.5 Further details regarding the maintenance of the proposed system are contained in **Section 7**.

6 Proposed Foul Water Drainage Strategy

- 6.1.1 The proposed foul water drainage strategy for Yield Hall Place 1 is to continue discharging to the existing Thames Water foul sewer manhole 6211 located northwest pavement of Yield Hall Place (road). A proposed foul water drainage network is shown in Stantec drawing 332110757-2001-001 included in **Appendix D**.
- 6.1.2 The proposed foul water drainage strategy for Yield Hall Place 2 is to continue discharging to the existing Thames Water foul sewer manhole 7252 located southwest pavement of Yield Hall Place (road). A proposed foul water drainage network is shown in Stantec drawing 332110757-2001-002 included in **Appendix D**.
- 6.1.3 We have received a pre-planning enquiry response from Thames Water that confirms that there is currently sufficient capacity in the existing foul sewer network to serve the proposed development. The pre-planning enquiry response which is contained in **Appendix G** confirms that manhole 6211 has capacity for the YHP1 development and manhole 7252 capacity for the YHP2 development.

7 Maintenance Strategy

7.1.1 This section sets out the inspection and maintenance requirements for long term management of the development's surface water drainage system. This work is to be undertaken by a private maintenance company.

7.2 Health, Safety and Welfare

7.2.1 All those responsible for maintenance should take appropriate health, safety and welfare precautions for all activities including lone working, if relevant, and risk assessments should always be undertaken. The site's infrastructure Health and Safety File should be consulted before carrying out any works either inside or outside of the development's boundary and information regarding the location of existing utilities passed on to operatives.

7.2.2 The requirements of the Health and Safety at Work Act 1974 and The Construction (Design and Management) Regulations 2015 should be adhered to and any residual risks identified in the Health and Safety File should be managed and information passed on to maintenance operatives through task specific risk assessments.

7.3 Operation and Maintenance

7.3.1 There are three types of maintenance activities associated with surface water drainage systems. The SuDS Manual, CIRIA C753, defines these as:

- Regular Maintenance – *'basic tasks undertaken on a frequent and predictable schedule' including vegetation management, litter and debris removal, and inspections.'*
- Occasional Maintenance – *'tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).'*
- Remedial Maintenance – *'intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.'*

7.3.2 Specific maintenance needs should be monitored and maintenance schedules adjusted to suit the location and condition of the drainage feature in question.

Operation and Maintenance Activity	SuDS Components			
	Piped Network / Inspection Chambers / Catchpits	Cellular / Modular Storage	Green Roof	Tree Pits
Regular Maintenance				
Inspection	■	■	■	■
Litter and debris removal	■	□		■
Weed and invasive plant control			■	
Shrub management (including pruning)				□

Operation and Maintenance Activity	SuDS Components			
	Piped Network / Inspection Chambers / Catchpits	Cellular / Modular Storage	Green Roof	Tree Pits
Occasional Maintenance				
Sediment management ¹	■	■		■
Vegetation replacement			■	□
Remedial Maintenance				
Structure rehabilitation / repair	□	□	□	□
■ Will be required □ May be required ¹ Sediment should be collected and managed in pre-treatment systems, upstream of the main device				

Table 7.1: Extract Table 32.1 Typical Key SuDS Components operation and Maintenance Activities, The SuDS Manual C753, CIRIA 2015

Piped Network / Inspection Chambers / Catchpits

- 7.3.3 Piped network components require regular inspection and maintenance to ensure that the individual components continue to operate as designed, both in terms of hydraulic capacity and potential pollutant removal. All drainage inspection chambers and catchpits will therefore be inspected and cleaned regularly.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required take remedial action	Monthly for three months, then six monthly
	Debris removal from catchment surface / gratings (where may cause risks to performance)	Monthly (and after large storms)
	Remove sediment from trapped sumps, manholes and catchpits	Annually or as required
Remedial Maintenance	Repair / rehabilitation of gratings, inlets and outlets	As required
Monitoring	Inspect / check all gratings, trapped sumps, manholes and catchpits to ensure that they are in good condition and operating as designed	Annually and after large storm events
Structure Rehabilitation / Repair	Regular Maintenance and Monitoring to identify if repair and / or replacement of features or pipework is required	As required

Table 7.2: Operation and Maintenance for Piped Network / Inspection Chambers / Catchpits

Cellular / Modular Storage

- 7.3.4 Cellular storage systems are plastic high void ratio modular systems which can be used to control and manage runoff.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required take remedial action	Monthly for three months, then annually
	Remove debris from catchment surface (where may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the from above, check surface of filter for blockage by silt, algae or other matter. Remove and replace surface infiltration medium as necessary	Annually
	Remove sediment from pre-treatment structures and / or internal forebays	Annually, or as required
Remedial Maintenance	Repair / rehabilitate inlets, outlets, overflows and vents	As required
Monitoring	Inspect / check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually, and after large rainfall events
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required
Structure Rehabilitation / Repair	Regular Maintenance and Monitoring to identify if repair and / or replacement of storage units is required	As required

Table 7.3: The SuDS Manual Table 21.3: Operation and maintenance requirements for attenuation storage tanks

Green Roof

- 7.3.5 A green roof system incorporates an area of living vegetation over a growing medium, reservoir layer and waterproofing. Green roofs provide a visual benefit, ecological value, enhanced building performance and reduction in surface water discharge rates.

Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular Maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (ie year one), replace dead plants as required	Monthly (but usually responsibility of the manufacturer)
	Post establishment, replace dead plants as required (where >5% of coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly or as required

	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial Actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

Table 7.4: Extract from The SuDS Manual Table 12.5: Operation and maintenance requirements for green roofs

Tree Pits

- 7.3.6 Tree pits and planters collect and attenuate runoff by providing additional storage with the underlying structure. The soils around the trees filter out pollutants from runoff and the trees can intercept and reduce surface water runoff.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly (or as required)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets and outlets	Inspect monthly
Occasional Maintenance	Check tree health and manage tree appropriately	Annually
	Remove silt build-up from inlets and surface and replace mulch as necessary	Annually or as required
	Water	As required (in periods of drought)
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly

Table 7.5: Extract from The SuDS Manual Table 12.5: Operation and maintenance requirements for tree pits

Rainwater Harvesting

- 7.3.7 Capture and storage of rainwater for non-potable uses such as watering plants.

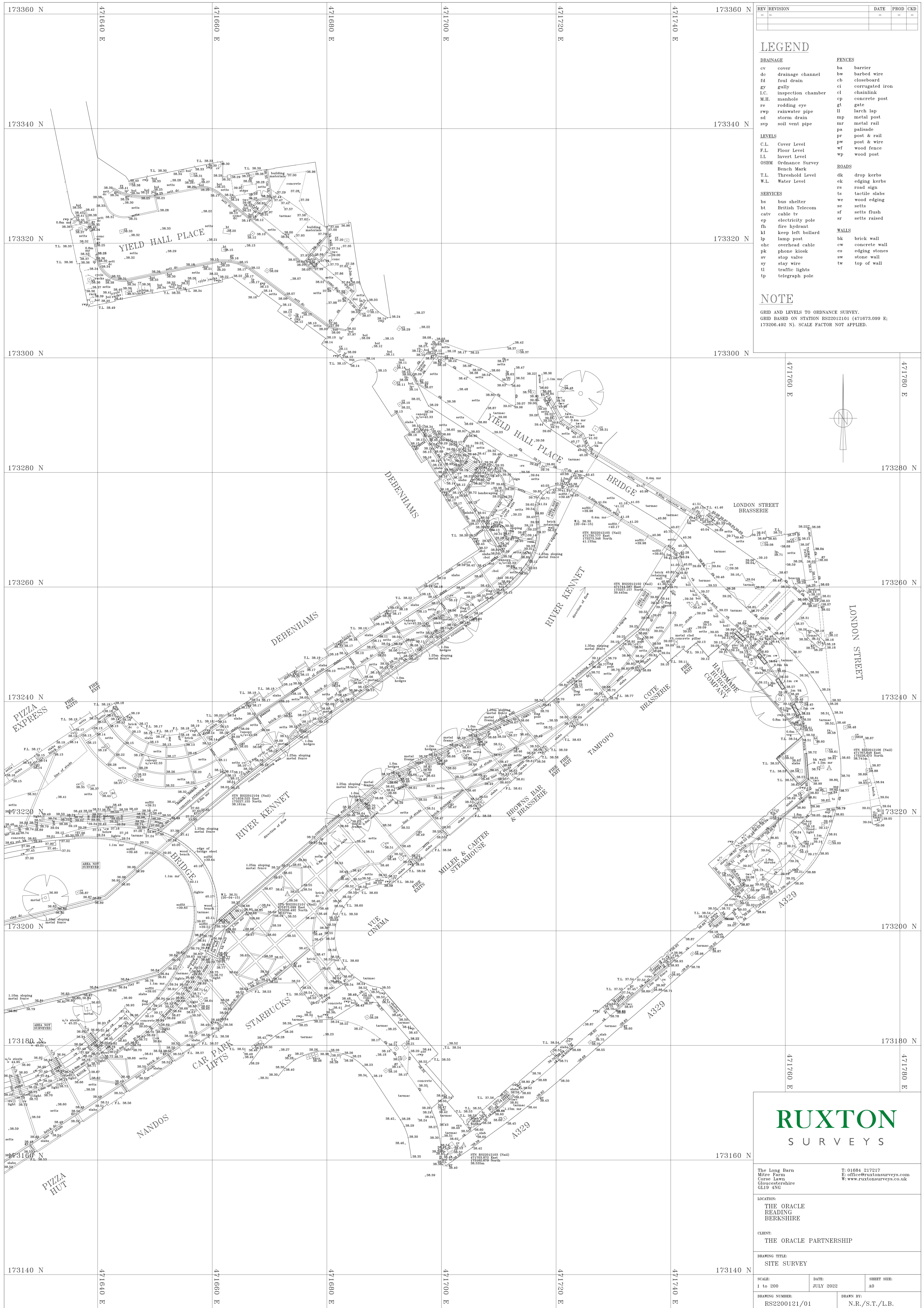
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspection of the tank for debris and sediment build-up, inlets/outlets/withdrawal devices, overflow areas, pumps and filters	Annually (and following poor performance)
	Cleaning of tank, inlets, outlets, utters, withdrawal device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

Table 7.6: Extract from The SuDS Manual Table 12.5: Operation and maintenance requirements for Rainwater Harvesting

8 Summary

- 8.1.1 This Drainage Strategy has been developed in accordance with relevant national, regional and local planning policy guidance.
- 8.1.2 As discharge of surface water via infiltration is not considered a practicable solution, the proposed surface water drainage strategy is to discharge water to the adjacent River Kennet via two existing outfalls. The surface water drainage strategy for Yield Hall Place 1 and Yield Hall Place 2 incorporates SuDS in the form of green roofs, tree pits, underground cellular storage tanks and rainwater harvesting for irrigation.
- 8.1.3 The drainage strategy has been designed to attenuate surface water from the development to provide more than 86% betterment compared to the existing condition for the 1 in 1 year, 1 in 30 year and 1 in 100 year with an allowance for climate change events. The network has been designed not to flood during the 1 in 100 year with a +40% allowance for climate change event. Additional testing has been carried out for exceedance and surcharged outfall scenarios.
- 8.1.4 The proposed foul water drainage strategy is to discharge flows from the site to the surrounding Thames Water foul water drainage network.
- 8.1.5 A private maintenance contractor will be responsible for the long-term maintenance of the proposed system and will undertake inspection and maintenance in accordance with this Strategy.
- 8.1.6 As a result, the principles advocated by relevant national, regional and local planning policy guidance have been satisfactorily addressed.

Appendix A Site Topographical Survey, Ruxton Surveys, RS2200121/01



Appendix B Existing Drainage Drawing, Stantec 332110757-2001-001 and 332110757-2001-002



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5. IT IS ASSUMED AT THIS STAGE THAT SOME DRAINS SHOWN ON THE THAMES WATER RECORDS ON THE SOUTHERN SIDE OF YIELD HALL PLACE 1 DO NOT EXIST AS THEY ARE NOT SHOWN ON AS-BUILT RECORDS AND NO MANHOLE COVERS ARE VISIBLE ON THE TOPOGRAPHIC SURVEY. FURTHER DRAINAGE INVESTIGATIONS AREA REQUIRED TO CONFIRM THIS.

KEY:

-  THAMES WATER SURFACE WATER SEWER AND MANHOLE
 THAMES WATER FOUL SEWER AND MANHOLE
 ABANDONED SEWER
 EXISTING PRIVATE SURFACE WATER DRAIN AND MANHOLE
 EXISTING PRIVATE FOUL DRAIN AND MANHOLE

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Issued/Revision	By	Appd	YYYY.MM.DD
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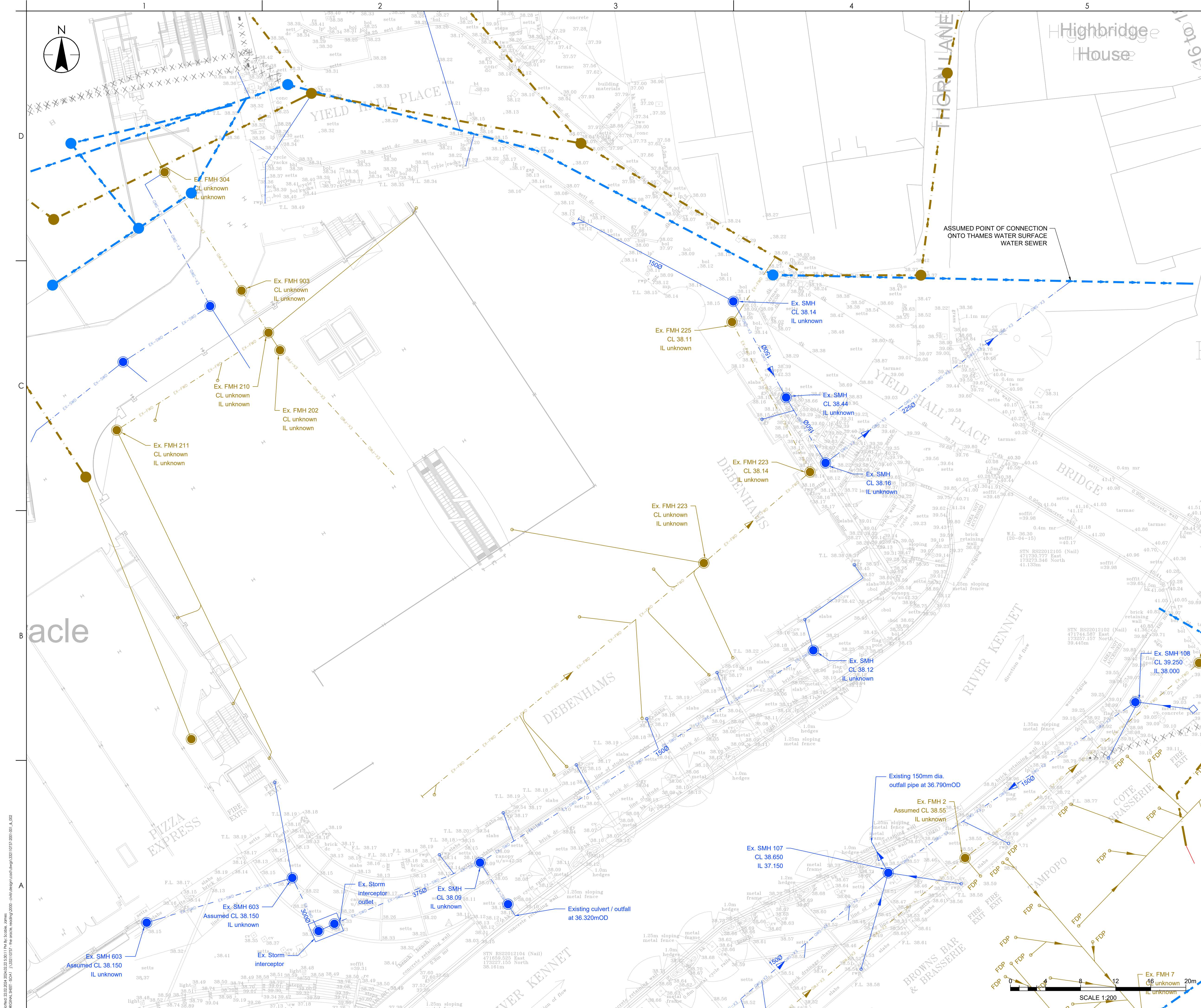
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YIELD HALL PLACE

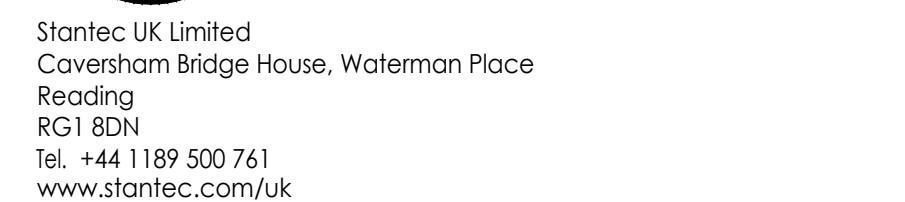
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Title

EXISTING DRAINAGE LAYOUT
YIELD HALL PLACE 1

Project No. 332110757	A1 Scale 1:200
Revision P01	Drawing No. 332110757-2001-001





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 THAMES WATER SURFACE WATER SEWER AND MANHOLE
 THAMES WATER FOUL SEWER AND MANHOLE
 ABANDONED SEWER
 EX-SUR EXISTING PRIVATE SURFACE WATER DRAIN AND MANHOLE
 EX-FOUL EXISTING PRIVATE FOUL DRAIN AND MANHOLE

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	Dwn.	Dsgn.	Chkd.
			2024.02.22
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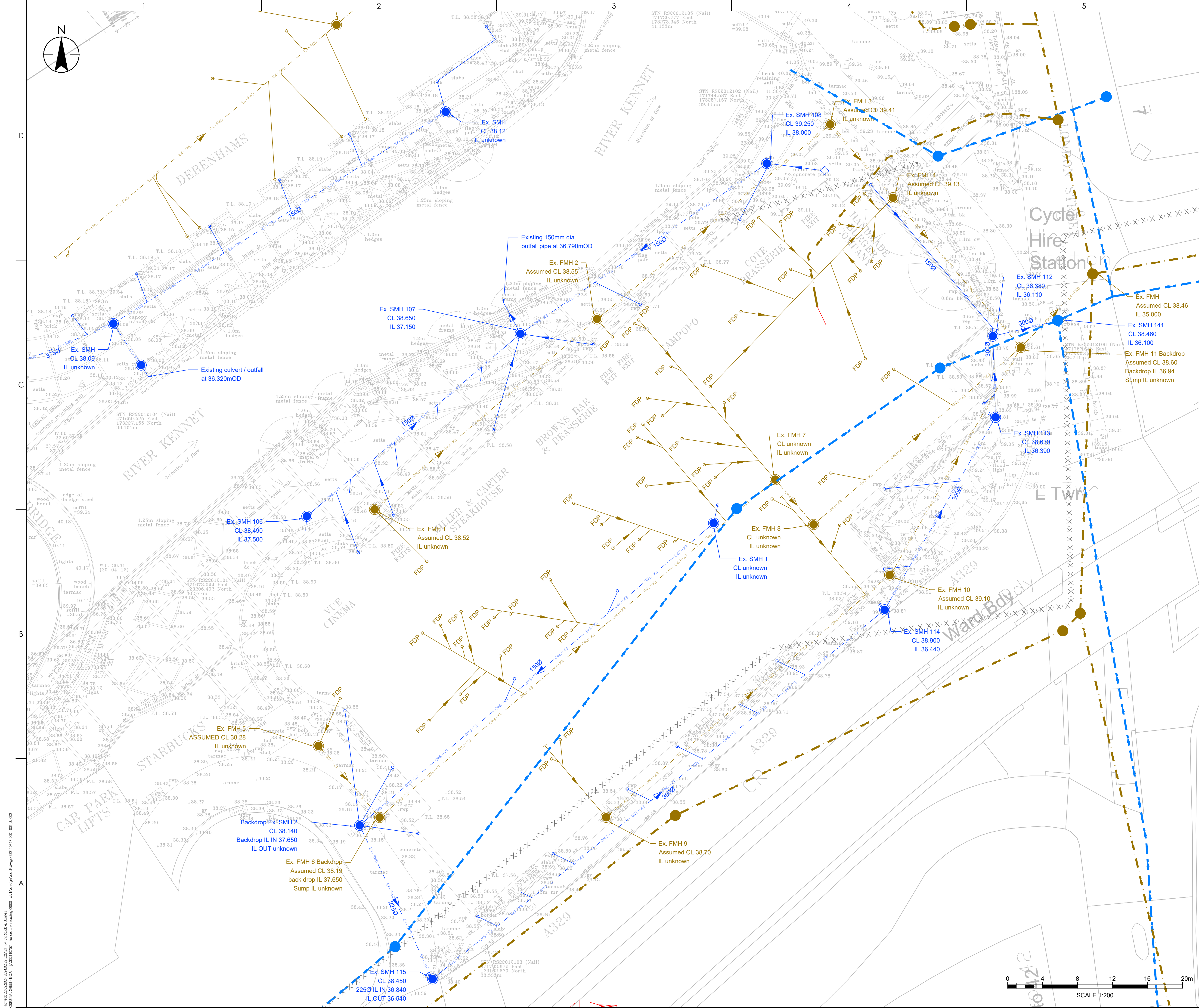
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YIELD HALL PLACE

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Title	EXISTING DRAINAGE LAYOUT YIELD HALL PLACE 2
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Project No. 332110757	A1 Scale 1:200
Revision P01	Drawing No. 332110757-2001-002



Appendix C Greenfield Runoff Estimation and Existing Brownfield Runoff Calculation

	The Oracle, Reading		JOB No:		SHEET:	
			332110757		1 of 1	
	Surface Water Drainage Strategy Calculation of Equivalent Greenfield Discharge Rate		DATE:	BY:	CHECKED:	
			25.01.24	JPS	SB	

Calculation based on 'Rainfall runoff management for developments' - Report SC030219, October 2013, Defra / Environmental Agency

	Site	
R	6	Hydrological region (see Figure A1.1)
S	2	SOIL type from: https://www.uksuds.com/tools/greenfield-runoff-rate-estimation
Catchment	< 50	ha
$A_{(site)}$	1.00	ha
SAAR or AAR	642	mm
SPR	0.3	For SOIL type 1 (0.1), type 2 (0.3), type 3 (0.37), type 4 (0.47), type 5 (0.53)
$A_{(50)}$	50	ha
$Q_{BAR(50)}$	82.35	l/s
Q_{BAR}	1.65	l/s
$Q_{BAR(site)}/A_{(site)}$	1.65	l/s/ha
$Q_{throttle}$	5.00	l/s
$Q_{throttle}/A_{(site)}$	5.00	l/s/ha
$Q_{throttle}/3.5A_{(site)}$	1.43	l/s/ha
Q_{BAR}/A	1.65	l/s/ha
GC_1	0.85	Use greater value of $Q_{BAR(site)}/A_{(site)}$ and $Q_{throttle}/A_{(site)}$ Value taken from Line 10.1
GC_{30}	2.30	Value from: https://www.uksuds.com/tools/greenfield-runoff-rate-estimation
GC_{100}	3.19	Value from: https://www.uksuds.com/tools/greenfield-runoff-rate-estimation
Q_{1yr}	1.40	l/s/ha
Q_{30yr}	3.79	l/s/ha
Q_{100yr}	5.25	l/s/ha
Total Q_{1yr}	1.40	l/s
Total Q_{30yr}	3.79	l/s
Total Q_{100yr}	5.25	l/s

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
5.000	53.193	0.527	100.9	0.045	5.00	0.0	0.600	o	150	Pipe/Conduit	
5.001	19.428	0.193	100.7	0.046	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.002	66.808	0.100	668.1	0.035	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.003	25.364	0.050	507.3	0.060	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.004	9.292	0.280	33.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.000	22.223	1.740	12.8	0.017	5.00	0.0	0.600	o	150	Pipe/Conduit	
5.005	7.614	0.075	101.5	0.041	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
5.000	50.00	5.89	37.410	0.045	0.0	0.0	0.0	1.00	17.7	6.1
5.001	50.00	6.13	36.808	0.091	0.0	0.0	0.0	1.30	51.8	12.3
5.002	50.00	7.99	36.540	0.126	0.0	0.0	0.0	0.60	42.5	17.1
5.003	50.00	8.60	36.440	0.186	0.0	0.0	0.0	0.69	48.9	25.2
5.004	50.00	8.66	36.390	0.186	0.0	0.0	0.0	2.74	193.6	25.2
6.000	50.00	5.13	38.000	0.017	0.0	0.0	0.0	2.83	50.1	2.3
5.005	50.00	8.74	36.110	0.244	0.0	0.0	0.0	1.56	110.3	33.0

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	38.200	1.050	Open Manhole	1200	1.000	37.150	150				
2	38.200	1.241	Open Manhole	1200	1.001	36.959	150	1.000	36.959	150	
3	38.200	1.526	Open Manhole	1200	1.002	36.674	225	1.001	36.749	150	
	38.200	1.738	Open Manhole	0		OUTFALL		1.002	36.462	225	
4	38.200	1.050	Open Manhole	1200	2.000	37.150	150				
5	38.200	1.572	Open Manhole	1200	2.001	36.628	225	2.000	36.703	150	
	38.200	1.649	Open Manhole	0		OUTFALL		2.001	36.551	225	
6	38.490	0.990	Open Manhole	1200	3.000	37.500	150				
7	39.250	1.250	Open Manhole	1200	4.000	38.000	150				
7	38.650	1.500	Open Manhole	1200	3.001	37.150	150	3.000	37.150	150	
								4.000	37.150	150	
	38.650	1.860	Open Manhole	0		OUTFALL		3.001	36.790	150	
9	38.600	1.190	Open Manhole	1200	5.000	37.410	150				
10	38.140	1.332	Open Manhole	1200	5.001	36.808	225	5.000	36.883	150	
11	38.450	1.910	Open Manhole	1200	5.002	36.540	300	5.001	36.615	225	
12	38.900	2.460	Open Manhole	1200	5.003	36.440	300	5.002	36.440	300	
13	38.630	2.240	Open Manhole	1200	5.004	36.390	300	5.003	36.390	300	
14	39.130	1.130	Open Manhole	1200	6.000	38.000	150				
14	38.380	2.270	Open Manhole	1200	5.005	36.110	300	5.004	36.110	300	
								6.000	36.260	150	
	38.380	2.345	Open Manhole	0		OUTFALL		5.005	36.035	300	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1	471675.016	173307.089	471675.016	173307.089	Required	
2	471692.004	173297.971	471692.004	173297.971	Required	
3	471702.471	173279.554	471702.471	173279.554	Required	
	471719.660	173292.275			No Entry	
4	471701.098	173258.219	471701.098	173258.219	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
5	471663.105	173233.965	471663.105	173233.965	Required	
	471667.436	173227.517			No Entry	
6	471685.230	173211.949	471685.230	173211.949	Required	
7	471737.864	173252.298	471737.864	173252.298	Required	
7	471709.663	173232.799	471709.663	173232.799	Required	
	471707.623	173236.534			No Entry	
9	471731.750	173211.138	471731.750	173211.138	Required	
10	471691.294	173176.600	471691.294	173176.600	Required	
11	471699.569	173159.022	471699.569	173159.022	Required	
12	471751.352	173201.234	471751.352	173201.234	Required	
13	471763.962	173223.241	471763.962	173223.241	Required	
14	471749.739	173249.837	471749.739	173249.837	Required	
14	471763.677	173232.528	471763.677	173232.528	Required	
	471771.082	173234.300			No Entry	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	1	38.200	37.150	0.900	Open Manhole	1200
1.001	o	150	2	38.200	36.959	1.091	Open Manhole	1200
1.002	o	225	3	38.200	36.674	1.301	Open Manhole	1200
2.000	o	150	4	38.200	37.150	0.900	Open Manhole	1200
2.001	o	225	5	38.200	36.628	1.347	Open Manhole	1200
3.000	o	150	6	38.490	37.500	0.840	Open Manhole	1200
4.000	o	150	7	39.250	38.000	1.100	Open Manhole	1200
3.001	o	150	7	38.650	37.150	1.350	Open Manhole	1200
5.000	o	150	9	38.600	37.410	1.040	Open Manhole	1200
5.001	o	225	10	38.140	36.808	1.107	Open Manhole	1200
5.002	o	300	11	38.450	36.540	1.610	Open Manhole	1200
5.003	o	300	12	38.900	36.440	2.160	Open Manhole	1200
5.004	o	300	13	38.630	36.390	1.940	Open Manhole	1200
6.000	o	150	14	39.130	38.000	0.980	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	19.280	100.9	2	38.200	36.959	1.091	Open Manhole	1200
1.001	21.184	100.9	3	38.200	36.749	1.301	Open Manhole	1200
1.002	21.384	100.9		38.200	36.462	1.513	Open Manhole	0
2.000	45.074	100.8	5	38.200	36.703	1.347	Open Manhole	1200
2.001	7.768	100.9		38.200	36.551	1.424	Open Manhole	0
3.000	32.120	91.8	7	38.650	37.150	1.350	Open Manhole	1200
4.000	34.286	40.3	7	38.650	37.150	1.350	Open Manhole	1200
3.001	4.256	11.8		38.650	36.790	1.710	Open Manhole	0
5.000	53.193	100.9	10	38.140	36.883	1.107	Open Manhole	1200
5.001	19.428	100.7	11	38.450	36.615	1.610	Open Manhole	1200
5.002	66.808	668.1	12	38.900	36.440	2.160	Open Manhole	1200
5.003	25.364	507.3	13	38.630	36.390	1.940	Open Manhole	1200
5.004	9.292	33.2	14	38.380	36.110	1.970	Open Manhole	1200
6.000	22.223	12.8	14	38.380	36.260	1.970	Open Manhole	1200

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
5.005	o	300	14	38.380	36.110	1.970	Open Manhole	1200

Downstream Manhole

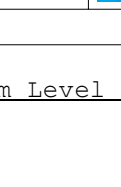
PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
5.005	7.614	101.5		38.380	36.035	2.045	Open Manhole	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.400		

Stantec UK Ltd		Page 7
Caversham Bridge House Waterman Place Reading, RG1 8DN	YHP1 & 2, The Oracle Reading Existing Drainage	
Date 14/02/2024	Designed by JPS	
File EXISTING DRAINAGE NETWO...	Checked by PJG	
Innovyze	Network 2020.1	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region England and Wales Cv (Summer)			0.750
M5-60 (mm)	18.800 Cv (Winter)		0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)

Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1 15	Winter	1	+0%	30/15 Summer			
1.001	2 15	Winter	1	+0%	30/15 Summer			
1.002	3 15	Winter	1	+0%				
2.000	4 15	Winter	1	+0%	30/15 Summer	100/15 Summer		
2.001	5 15	Winter	1	+0%	30/15 Summer			
3.000	6 15	Winter	1	+0%	30/15 Summer	100/15 Summer		
4.000	7 15	Winter	1	+0%	100/15 Summer			
3.001	7 15	Winter	1	+0%	30/15 Summer			
5.000	9 15	Winter	1	+0%	100/15 Winter			
5.001	10 15	Winter	1	+0%				
5.002	11 15	Winter	1	+0%	100/15 Summer			
5.003	12 15	Winter	1	+0%	100/15 Summer			
5.004	13 15	Winter	1	+0%				
6.000	14 15	Winter	1	+0%				
5.005	14 15	Winter	1	+0%	100/15 Summer			

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Caversham Bridge House Waterman Place Reading, RG1 8DN	YHP1 & 2, The Oracle Reading Existing Drainage	
Date 14/02/2024 File EXISTING DRAINAGE NETWO...	Designed by JPS Checked by PJG	
Innovyze	Network 2020.1	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status	Level Exceeded
		Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)		
1.000	1	37.208	-0.092	0.000	0.31			5.1	OK	
1.001	2	37.042	-0.067	0.000	0.59			9.8	OK	
1.002	3	36.762	-0.137	0.000	0.33			15.4	OK	
2.000	4	37.247	-0.053	0.000	0.72			12.4	OK	2
2.001	5	36.760	-0.093	0.000	0.64			25.2	OK	
3.000	6	37.595	-0.055	0.000	0.70			12.6	OK	4
4.000	7	38.054	-0.096	0.000	0.27			7.3	OK	
3.001	7	37.251	-0.049	0.000	0.78			29.4	OK	
5.000	9	37.471	-0.089	0.000	0.34			5.9	OK	
5.001	10	36.881	-0.152	0.000	0.23			10.9	OK	
5.002	11	36.664	-0.176	0.000	0.33			13.5	OK	
5.003	12	36.576	-0.164	0.000	0.42			18.3	OK	
5.004	13	36.464	-0.226	0.000	0.14			18.4	OK	
6.000	14	38.021	-0.129	0.000	0.05			2.2	OK	
5.005	14	36.229	-0.181	0.000	0.33			22.8	OK	

Stantec UK Ltd

Caversham Bridge House

Waterman Place

Reading, RG1 8DN

Date 14/02/2024

File EXISTING DRAINAGE NETWO...

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YHP1 & 2, The Oracle

Reading

Existing Drainage

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)

for Storm

Simulation Criteria

Areal Reduction Factor 1.000

Additional Flow - % of Total Flow 0.000

Hot Start (mins) 0

MADD Factor * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coefficient 0.800

Manhole Headloss Coeff (Global) 0.500

Flow per Person per Day (l/per/day) 0.000

Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0

Number of Storage Structures 0

Number of Online Controls 0

Number of Time/Area Diagrams 0

Number of Offline Controls 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model

FSR

Ratio R 0.400

Region England and Wales Cv (Summer) 0.750

M5-60 (mm)

18.800 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0

DVD Status OFF

Analysis Timestep Fine

Inertia Status OFF

DTS Status ON

Profile(s)

Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440

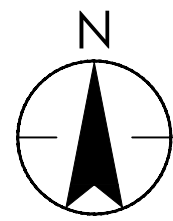
Return Period(s) (years) 1, 30, 100

Climate Change (%) 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1 15 Winter		30	+0%	30/15 Summer			
1.001	2 15 Winter		30	+0%	30/15 Summer			
1.002	3 15 Winter		30	+0%				
2.000	4 15 Winter		30	+0%	30/15 Summer	100/15 Summer		
2.001	5 15 Winter		30	+0%	30/15 Summer			
3.000	6 15 Winter		30	+0%	30/15 Summer	100/15 Summer		
4.000	7 15 Winter		30	+0%	100/15 Summer			
3.001	7 15 Winter		30	+0%	30/15 Summer			
5.000	9 15 Winter		30	+0%	100/15 Winter			
5.001	10 15 Winter		30	+0%				
5.002	11 15 Winter		30	+0%	100/15 Summer			
5.003	12 15 Winter		30	+0%	100/15 Summer			
5.004	13 15 Winter		30	+0%				
6.000	14 15 Winter		30	+0%				
5.005	14 15 Winter		30	+0%	100/15 Summer			

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Appendix D Proposed Drainage Layouts, Stantec 332110757-2001-003 & 332110757-2001-004



Stantec UK Limited
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Reading
RG1 8DN
Tel: +44 1189 500 761
www.stantec.com/uk

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KEY:

- RED LINE BOUNDARY
- HIGHWAY BOUNDARY
- EXISTING PRIVATE SURFACE WATER DRAIN AND MANHOLE
- EXISTING PRIVATE FOUL DRAIN AND MANHOLE
- THAMES WATER SURFACE WATER SEWER AND MANHOLE
- THAMES WATER FOUL SEWER AND MANHOLE
- ABANDONED SEWER
- CELLULAR STORAGE TANK
- GREEN ROOF
- SUDS TREE PIT / PLANTER
- PROPOSED SURFACE WATER DRAINAGE AND MANHOLE
- PROPOSED RAINWATER DOWNPIPE
- PROPOSED SURFACE WATER CATCHPIT
- PROPOSED FLOW CONTROL MANHOLE
- PROPOSED SURFACE WATER GULLY AND CONNECTION
- PROPOSED FOUL WATER INSPECTION CHAMBER AND DRAINAGE
- PROPOSED FOUL WATER SOIL VENT PIPE

P03 UPDATED FOLLOWING RBC COMMENTS	JR	JPS	2025.11.20	
P02 TANK SHAPE AMENDED	JR	JPS	2025.06.10	
P01 FIRST ISSUE	JR	PJG	2024.02.28	
Issued/Revision	By	Appd	YYYY.MM.DD	
	JR	STB	JPS	2024.02.22
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

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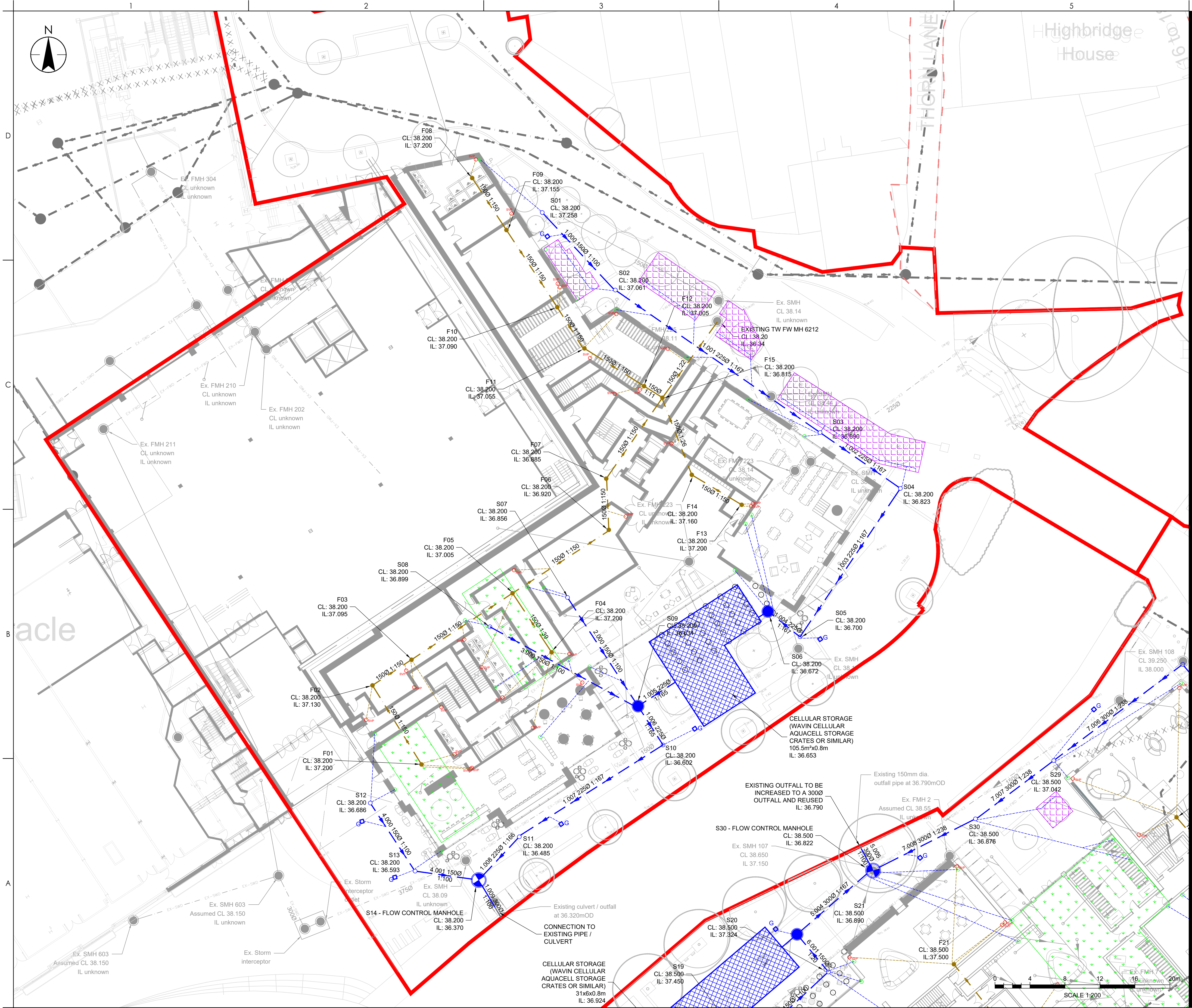
THE ORACLE LIMITED PARTNERSHIP

Client/Project
YIELD HALL PLACE

THE ORACLE

Title
PROPOSED DRAINAGE LAYOUT
YIELD HALL PLACE 1

Project No.	332110757	A1 Scale	1:200
Revision	P03	Drawing No.	332110757-2001-003



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KEY:

- RED LINE BOUNDARY
- HIGHWAY BOUNDARY
- EXISTING PRIVATE SURFACE WATER DRAIN AND MANHOLE
- EXISTING PRIVATE FOUL DRAIN AND MANHOLE
- THAMES WATER SURFACE WATER SEWER AND MANHOLE
- THAMES WATER FOUL SEWER AND MANHOLE
- ABANDONED SEWER
- CELLULAR STORAGE TANK
- GREEN ROOF
- SUDS TREE PIT / PLANTER
- PROPOSED SURFACE WATER DRAINAGE AND MANHOLE
- PROPOSED RAINWATER DOWNPIPE
- PROPOSED SURFACE WATER CATCHPIT
- PROPOSED FLOW CONTROL MANHOLE
- PROPOSED SURFACE WATER GULLY AND CONNECTION
- PROPOSED FOUL WATER INSPECTION CHAMBER AND DRAINAGE
- PROPOSED FOUL WATER SOIL VENT PIPE

P03 UPDATED FOLLOWING RBC COMMENTS	JR	JPS	2025.11.20
P02 TANK SHAPE AMENDED	JR	JPS	2025.06.10
P01 FIRST ISSUE	JR	PJG	2024.02.28
Issued/Revision	By	Appd	YYYY.MM.DD
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YIELD HALL PLACE

THE ORACLE

Title

PROPOSED DRAINAGE LAYOUT
YIELD HALL PLACE 2

Project No.

332110757

A1 Scale

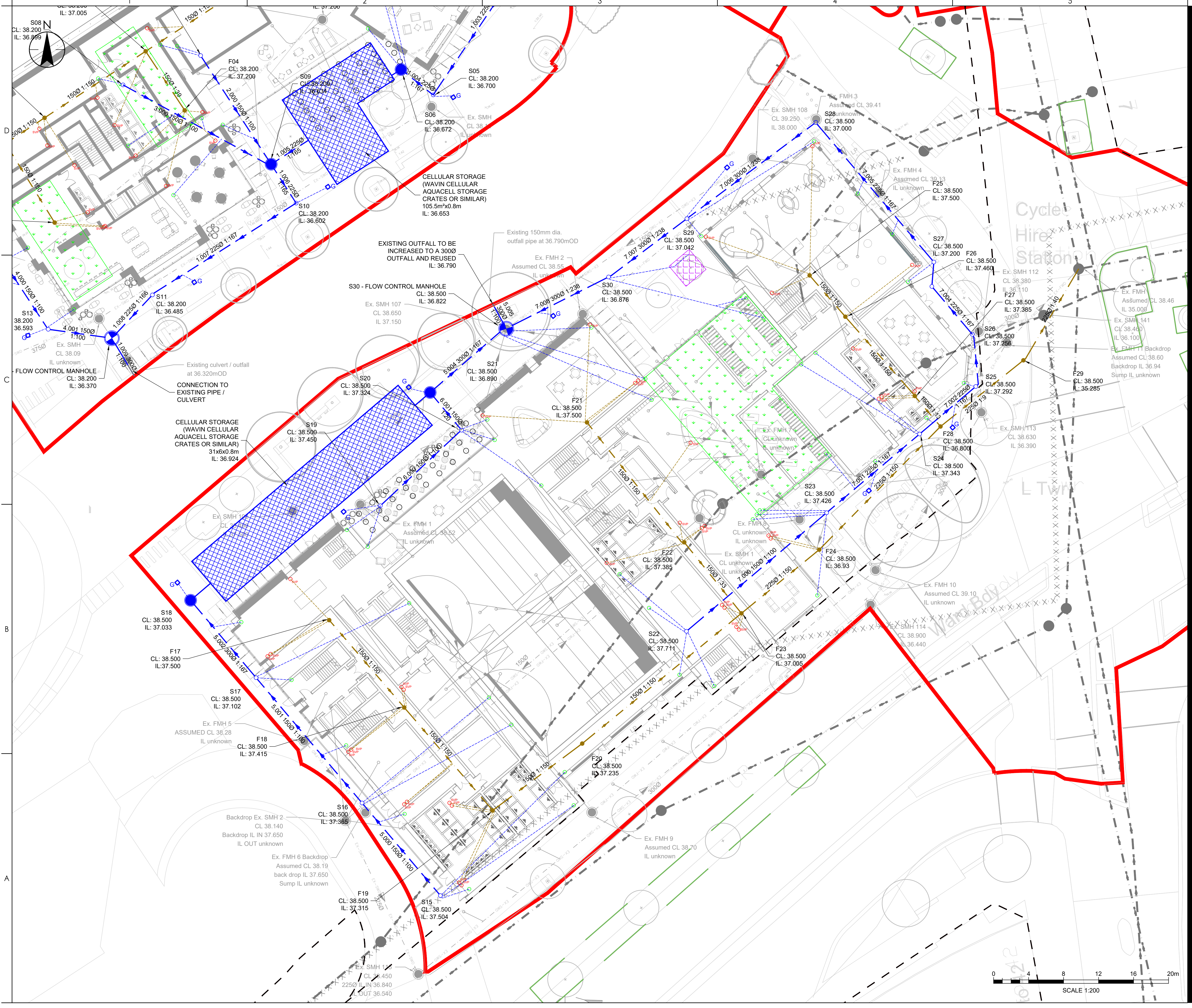
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Revision

P03

Drawing No.

332110757-2001-004



Appendix E Proposed Surface Water Drainage Strategy MicroDrainage Calculations

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Caversham Bridge House Waterman Place Reading, RG1 8DN				YHP1 & 2, The Oracle Reading						
Date 19/11/2025 File SW-DRAINAGE.MDX				Designed by JPS Checked by PJG						
Innovyze				Network 2020.1						
Manhole Schedules for Storm										
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)
1	38.200	0.942	Open Manhole	450	1.000	37.258	150			
2	38.200	1.139	Open Manhole	450	1.001	37.061	225	1.000	37.136	150
3	38.200	1.310	Open Manhole	450	1.002	36.890	225	1.001	36.890	225
4	38.200	1.377	Open Manhole	450	1.003	36.823	225	1.002	36.823	225
5	38.200	1.500	Open Manhole	450	1.004	36.700	225	1.003	36.700	225
6	38.200	1.528	Open Manhole	1200	1.005	36.672	225	1.004	36.672	225
7	38.200	1.344	Open Manhole	450	2.000	36.856	150			
8	38.200	1.301	Open Manhole	450	3.000	36.899	150			
9	38.200	1.566	Open Manhole	1200	1.006	36.634	225	1.005	36.634	225
								2.000	36.709	150
								3.000	36.709	150
10	38.200	1.598	Open Manhole	450	1.007	36.602	225	1.006	36.602	225
11	38.200	1.715	Open Manhole	450	1.008	36.485	225	1.007	36.485	225
12	38.200	1.514	Open Manhole	450	4.000	36.686	150			
13	38.200	1.607	Open Manhole	450	4.001	36.593	150	4.000	36.593	150
14	38.200	1.830	Open Manhole	1500	1.009	36.370	300	1.008	36.444	225
								4.001	36.520	150
	38.200	1.880	Open Manhole	0		OUTFALL		1.009	36.320	300
15	38.500	0.996	Open Manhole	450	5.000	37.504	150			
16	38.500	1.135	Open Manhole	450	5.001	37.365	150	5.000	37.365	150
17	38.500	1.398	Open Manhole	450	5.002	37.102	225	5.001	37.177	150
18	38.500	1.467	Open Manhole	1200	5.003	37.033	225	5.002	37.033	225
19	38.500	1.050	Open Manhole	450	6.000	37.450	150			
20	38.500	1.176	Open Manhole	450	6.001	37.324	150	6.000	37.324	150
21	38.500	1.610	Open Manhole	1200	5.004	36.890	300	5.003	36.965	225
								6.001	37.040	150
22	38.500	0.789	Open Manhole	450	7.000	37.711	150			
23	38.500	1.074	Open Manhole	450	7.001	37.426	225	7.000	37.501	150
24	38.500	1.157	Open Manhole	450	7.002	37.343	225	7.001	37.343	225
25	38.500	1.208	Open Manhole	450	7.003	37.292	225	7.002	37.292	225
26	38.500	1.244	Open Manhole	450	7.004	37.256	225	7.003	37.256	225
27	38.500	1.300	Open Manhole	450	7.005	37.200	225	7.004	37.200	225
28	38.500	1.500	Open Manhole	450	7.006	37.000	300	7.005	37.075	225
29	38.500	1.577	Open Manhole	450	7.007	36.923	300	7.006	36.923	300
30	38.500	1.624	Open Manhole	450	7.008	36.876	300	7.007	36.876	300
31	38.500	1.679	Open Manhole	1500	5.005	36.822	300	5.004	36.822	300
								7.008	36.821	300
	38.500	1.710	Open Manhole	0		OUTFALL		5.005	36.790	300
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Caversham Bridge House Waterman Place Reading, RG1 8DN	YHP1 & 2, The Oracle Reading	
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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
30	471721.349	173238.733	471721.349	173238.733	Required	
31	471709.646	173232.806	471709.646	173232.806	Required	
	471708.112	173235.666			No Entry	

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Caversham Bridge House Waterman Place Reading, RG1 8DN	YHP1 & 2, The Oracle Reading	
Date 19/11/2025 File SW-DRAINAGE.MDX	Designed by JPS Checked by PJG	
Innovyze	Network 2020.1	

PIPELINE SCHEDULES for Storm

Upstream Manhole

- Indicates pipe length does not match coordinates

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	1	38.200	37.258	0.792	Open Manhole	450
1.001	o	225	2	38.200	37.061	0.914	Open Manhole	450
1.002	o	225	3	38.200	36.890	1.085	Open Manhole	450
1.003	o	225	4	38.200	36.823	1.152	Open Manhole	450
1.004	o	225	5	38.200	36.700	1.275	Open Manhole	450
1.005	o	225	6	38.200	36.672	1.303	Open Manhole	1200
2.000	o	150	7	38.200	36.856	1.194	Open Manhole	450
3.000	o	150	8	38.200	36.899	1.151	Open Manhole	450
1.006	o	225	9	38.200	36.634	1.341	Open Manhole	1200
1.007	o	225	10	38.200	36.602	1.373	Open Manhole	450
1.008	o	225	11	38.200	36.485	1.490	Open Manhole	450
4.000	o	150	12	38.200	36.686	1.364	Open Manhole	450
4.001	o	150	13	38.200	36.593	1.457	Open Manhole	450
1.009	o	300	14	38.200	36.370	1.530	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	12.184	99.9	2	38.200	37.136	0.914	Open Manhole	450
1.001	28.576	167.1	3	38.200	36.890	1.085	Open Manhole	450
1.002	11.133	166.2	4	38.200	36.823	1.152	Open Manhole	450
1.003	20.477	166.5	5	38.200	36.700	1.275	Open Manhole	450
1.004	4.691	167.5	6	38.200	36.672	1.303	Open Manhole	1200
1.005	10.000#	263.2	9	38.200	36.634	1.341	Open Manhole	1200
2.000	14.809	100.7	9	38.200	36.709	1.341	Open Manhole	1200
3.000	19.209	101.1	9	38.200	36.709	1.341	Open Manhole	1200
1.006	5.281	165.0	10	38.200	36.602	1.373	Open Manhole	450
1.007	19.494	166.6	11	38.200	36.485	1.490	Open Manhole	450
1.008	6.787	165.5	14	38.200	36.444	1.531	Open Manhole	1500
4.000	9.324	100.3	13	38.200	36.593	1.457	Open Manhole	450
4.001	7.341	100.6	14	38.200	36.520	1.530	Open Manhole	1500
1.009	5.032	100.6		38.200	36.320	1.580	Open Manhole	0

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Caversham Bridge House Waterman Place Reading, RG1 8DN	YHP1 & 2, The Oracle Reading	
Date 19/11/2025 File SW-DRAINAGE.MDX	Designed by JPS Checked by PJG	
Innovyze	Network 2020.1	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
5.000	o	150	15	38.500	37.504	0.846	Open Manhole	450
5.001	o	150	16	38.500	37.365	0.985	Open Manhole	450
5.002	o	225	17	38.500	37.102	1.173	Open Manhole	450
5.003	o	225	18	38.500	37.033	1.242	Open Manhole	1200
6.000	o	150	19	38.500	37.450	0.900	Open Manhole	450
6.001	o	150	20	38.500	37.324	1.026	Open Manhole	450
5.004	o	300	21	38.500	36.890	1.310	Open Manhole	1200
7.000	o	150	22	38.500	37.711	0.639	Open Manhole	450
7.001	o	225	23	38.500	37.426	0.849	Open Manhole	450
7.002	o	225	24	38.500	37.343	0.932	Open Manhole	450
7.003	o	225	25	38.500	37.292	0.983	Open Manhole	450
7.004	o	225	26	38.500	37.256	1.019	Open Manhole	450
7.005	o	225	27	38.500	37.200	1.075	Open Manhole	450
7.006	o	300	28	38.500	37.000	1.200	Open Manhole	450
7.007	o	300	29	38.500	36.923	1.277	Open Manhole	450
7.008	o	300	30	38.500	36.876	1.324	Open Manhole	450

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
5.000	13.873	99.8	16	38.500	37.365	0.985	Open Manhole	450
5.001	18.763	99.8	17	38.500	37.177	1.173	Open Manhole	450
5.002	11.587	167.0	18	38.500	37.033	1.242	Open Manhole	1200
5.003	11.260#	165.6	21	38.500	36.965	1.310	Open Manhole	1200
6.000	12.689	100.7	20	38.500	37.324	1.026	Open Manhole	450
6.001	10.000#	35.2	21	38.500	37.040	1.310	Open Manhole	1200
5.004	11.345	166.8	31	38.500	36.822	1.378	Open Manhole	1500
7.000	20.989	99.9	23	38.500	37.501	0.849	Open Manhole	450
7.001	13.928	167.0	24	38.500	37.343	0.932	Open Manhole	450
7.002	8.413	167.0	25	38.500	37.292	0.983	Open Manhole	450
7.003	5.973	165.9	26	38.500	37.256	1.019	Open Manhole	450
7.004	9.369	167.3	27	38.500	37.200	1.075	Open Manhole	450
7.005	20.899	167.2	28	38.500	37.075	1.200	Open Manhole	450
7.006	18.400	238.0	29	38.500	36.923	1.277	Open Manhole	450
7.007	11.161	238.0	30	38.500	36.876	1.324	Open Manhole	450
7.008	13.118	238.5	31	38.500	36.821	1.379	Open Manhole	1500

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
5.005	o	300	31	38.500	36.822	1.378	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
5.005	10.000#	312.5		38.500	36.790	1.410	Open Manhole	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	4
Number of Online Controls	3	Number of Time/Area Diagrams	4
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: 14, DS/PN: 1.009, Volume (m³): 3.6

Unit Reference	MD-SCU-0093-9100-1050-9100
Design Head (m)	1.050
Design Flow (l/s)	9.1
Flush-Flo™	Calculated
Objective	Linear discharge profile
Application	Surface
Sump Available	Yes
Diameter (mm)	93
Invert Level (m)	36.370
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.050	9.1
Flush-Flo™	0.121	3.6
Kick-Flo®	0.139	3.6
Mean Flow over Head Range	-	6.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.3	1.200	9.7	3.000	15.0	7.000	22.5
0.200	4.2	1.400	10.4	3.500	16.1	7.500	23.3
0.300	5.1	1.600	11.1	4.000	17.2	8.000	24.0
0.400	5.8	1.800	11.7	4.500	18.2	8.500	24.7
0.500	6.4	2.000	12.3	5.000	19.2	9.000	25.4
0.600	7.0	2.200	12.9	5.500	20.1	9.500	26.1
0.800	8.0	2.400	13.5	6.000	20.9		
1.000	8.9	2.600	14.0	6.500	21.7		

Orifice Manhole: 21, DS/PN: 5.004, Volume (m³): 2.4

Diameter (m) 0.200 Discharge Coefficient 0.600 Invert Level (m) 36.890

Complex Manhole: 31, DS/PN: 5.005, Volume (m³): 4.5

Orifice

Diameter (m) 0.069 Discharge Coefficient 0.600 Invert Level (m) 36.822

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Surcharged		Flooded		Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow	Overflow					
1.000	1	-0.102	0.000	0.23				3.6	OK	
1.001	2	-0.153	0.000	0.22				8.1	OK	
1.002	3	-0.150	0.000	0.24			8	8.2	OK	
1.003	4	-0.130	0.000	0.37				13.5	OK	
1.004	5	-0.078	0.000	0.63				18.0	OK	
1.005	6	-0.063	0.000	0.86				22.8	OK	
2.000	7	-0.113	0.000	0.14				2.2	OK	
3.000	8	-0.140	0.000	0.01				0.2	OK	
1.006	9	-0.098	0.000	0.25			35	7.3	OK	
1.007	10	-0.069	0.000	0.22				7.9	OK	
1.008	11	0.038	0.000	0.24				7.2	SURCHARGED	
4.000	12	-0.092	0.000	0.01				0.2	OK	
4.001	13	0.000	0.000	0.01				0.2	SURCHARGED	
1.009	14	0.073	0.000	0.09				5.6	SURCHARGED	
5.000	15	-0.097	0.000	0.27				4.4	OK	
5.001	16	-0.078	0.000	0.46				7.6	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

US/MH		Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level
PN	Name								(m)
5.002	17	15 Winter	1	+0%	30/15 Summer				37.197
5.003	18	15 Winter	1	+0%	30/15 Summer				37.140
6.000	19	15 Winter	1	+0%					37.500
6.001	20	15 Winter	1	+0%					37.379
5.004	21	360 Winter	1	+0%	30/30 Winter				37.038
7.000	22	15 Winter	1	+0%	30/15 Winter				37.767
7.001	23	15 Winter	1	+0%	30/15 Summer				37.483
7.002	24	15 Winter	1	+0%	30/15 Summer				37.429
7.003	25	15 Winter	1	+0%	30/15 Summer				37.381
7.004	26	15 Winter	1	+0%	30/15 Summer				37.339
7.005	27	15 Winter	1	+0%	30/15 Summer				37.298
7.006	28	30 Winter	1	+0%	30/15 Summer				37.248
7.007	29	15 Winter	1	+0%	30/15 Summer				37.223
7.008	30	30 Winter	1	+0%	1/15 Summer				37.202
5.005	31	30 Winter	1	+0%	1/15 Summer				37.192

US/MH		Depth	Volume	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level
PN	Name								Exceeded
5.002	17	-0.130	0.000	0.37			12.6	OK	
5.003	18	-0.118	0.000	0.46			15.7	OK	
6.000	19	-0.100	0.000	0.24			3.9	OK	
6.001	20	-0.095	0.000	0.28			7.5	OK	
5.004	21	-0.152	0.000	0.03		190	1.7	OK	
7.000	22	-0.094	0.000	0.29			4.9	OK	
7.001	23	-0.168	0.000	0.14			4.9	OK	
7.002	24	-0.139	0.000	0.31			9.8	OK	
7.003	25	-0.136	0.000	0.33			9.8	OK	
7.004	26	-0.142	0.000	0.30			9.8	OK	
7.005	27	-0.127	0.000	0.38			14.0	OK	
7.006	28	-0.052	0.000	0.23			14.0	OK	
7.007	29	0.000	0.000	0.25			14.1	OK	
7.008	30	0.026	0.000	0.24			14.0	SURCHARGED	
5.005	31	0.070	0.000	0.12			5.7	SURCHARGED	

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	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water																																		
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.		Level																																		
										(m)																																		
1.000	1	15 Winter	30	+0%						37.338																																		
1.001	2	15 Winter	30	+0%	100/15 Summer					37.216																																		
1.002	3	15 Winter	30	+0%	30/15 Summer					37.169																																		
1.003	4	15 Winter	30	+0%	30/15 Summer					37.149																																		
1.004	5	15 Winter	30	+0%	30/15 Summer					37.068																																		
1.005	6	60 Winter	30	+0%	30/15 Summer					37.046																																		
2.000	7	60 Winter	30	+0%	30/60 Winter					37.041																																		
3.000	8	60 Winter	30	+0%	100/30 Summer					37.041																																		
1.006	9	60 Winter	30	+0%	30/15 Summer					37.039																																		
1.007	10	60 Winter	30	+0%	30/15 Summer					37.048																																		
1.008	11	60 Winter	30	+0%	1/15 Winter					37.050																																		
4.000	12	60 Winter	30	+0%	30/15 Summer					37.049																																		
4.001	13	60 Winter	30	+0%	1/60 Winter					37.048																																		
1.009	14	60 Winter	30	+0%	1/15 Summer					37.049																																		
5.000	15	15 Winter	30	+0%	30/15 Summer					37.681																																		
5.001	16	15 Winter	30	+0%	30/15 Summer					37.623																																		
5.002	17	15 Winter	30	+0%	30/15 Summer					37.374																																		
5.003	18	120 Winter	30	+0%	30/15 Summer					37.304																																		
6.000	19	15 Winter	30	+0%						37.534																																		
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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Surcharged		Flooded		Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Volume (m³)	Flow (l/s)					
1.000	1	-0.070	0.000	0.000	0.56			9.0	OK	
1.001	2	-0.070	0.000	0.000	0.59			22.0	OK	
1.002	3	0.054	0.000	0.000	0.62		4	21.2	SURCHARGED	
1.003	4	0.101	0.000	0.000	0.75			27.4	SURCHARGED	
1.004	5	0.143	0.000	0.000	1.28			36.9	SURCHARGED	
1.005	6	0.149	0.000	0.000	1.26			33.5	SURCHARGED	
2.000	7	0.035	0.000	0.000	0.17			2.8	SURCHARGED	
3.000	8	-0.008	0.000	0.000	0.04			0.6	OK	
1.006	9	0.180	0.000	0.000	0.39			11.5	SURCHARGED	
1.007	10	0.221	0.000	0.000	0.28			10.1	SURCHARGED	
1.008	11	0.340	0.000	0.000	0.32			9.4	SURCHARGED	
4.000	12	0.213	0.000	0.000	0.05			0.7	SURCHARGED	
4.001	13	0.305	0.000	0.000	0.06			0.9	SURCHARGED	
1.009	14	0.379	0.000	0.000	0.12			7.3	SURCHARGED	
5.000	15	0.027	0.000	0.000	0.65			10.5	SURCHARGED	
5.001	16	0.108	0.000	0.000	1.14			19.1	SURCHARGED	
5.002	17	0.047	0.000	0.000	0.97			33.0	SURCHARGED	
5.003	18	0.047	0.000	0.000	0.41			13.9	SURCHARGED	
6.000	19	-0.066	0.000	0.000	0.60			9.6	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
6.001	20	15 Winter	30	+0%					37.425
5.004	21	120 Winter	30	+0%	30/30 Winter				37.301
7.000	22	15 Winter	30	+0%	30/15 Winter				37.889
7.001	23	15 Winter	30	+0%	30/15 Summer				37.797
7.002	24	15 Winter	30	+0%	30/15 Summer				37.778
7.003	25	15 Winter	30	+0%	30/15 Summer				37.717
7.004	26	15 Winter	30	+0%	30/15 Summer				37.660
7.005	27	15 Winter	30	+0%	30/15 Summer				37.596
7.006	28	15 Winter	30	+0%	30/15 Summer				37.490
7.007	29	15 Winter	30	+0%	30/15 Summer				37.409
7.008	30	15 Winter	30	+0%	1/15 Summer				37.337
5.005	31	120 Winter	30	+0%	1/15 Summer				37.292

PN	US/MH Name	Depth (m)	Surcharged Volume (m³)	Flooded Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
6.001	20	-0.049	0.000	0.78			20.8		OK
5.004	21	0.111	0.000	0.13			8.5	SURCHARGED	
7.000	22	0.028	0.000	0.69			11.5	SURCHARGED	
7.001	23	0.146	0.000	0.34			11.8	SURCHARGED	
7.002	24	0.210	0.000	0.70			22.3	SURCHARGED	
7.003	25	0.200	0.000	0.75			22.3	SURCHARGED	
7.004	26	0.179	0.000	0.68			22.5	SURCHARGED	
7.005	27	0.171	0.000	0.89			32.4	SURCHARGED	
7.006	28	0.190	0.000	0.71			43.7	SURCHARGED	
7.007	29	0.186	0.000	0.76			43.6	SURCHARGED	
7.008	30	0.161	0.000	0.75			43.8	SURCHARGED	
5.005	31	0.170	0.000	0.14		84	6.6	SURCHARGED	

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Waterman Place
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000

Additional Flow - % of Total Flow 0.000

Hot Start (mins) 0

MADD Factor * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coefficient 0.800

Manhole Headloss Coeff (Global) 0.500

Flow per Person per Day (l/per/day) 0.000

Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0

Number of Storage Structures 4

Number of Online Controls 3

Number of Time/Area Diagrams 4

Number of Offline Controls 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR

Ratio R 0.400

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 18.800 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status OFF

DVD Status ON

Inertia Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440

Return Period(s) (years) 1, 30, 100

Climate Change (%) 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	100	+0%					37.369
1.001	2	15 Winter	100	+0%	100/15 Summer				37.317
1.002	3	15 Winter	100	+0%	30/15 Summer				37.248
1.003	4	15 Winter	100	+0%	30/15 Summer				37.222
1.004	5	120 Winter	100	+0%	30/15 Summer				37.191
1.005	6	120 Winter	100	+0%	30/15 Summer				37.188
2.000	7	120 Winter	100	+0%	30/60 Winter				37.182
3.000	8	120 Winter	100	+0%	100/30 Summer				37.182
1.006	9	120 Winter	100	+0%	30/15 Summer				37.180
1.007	10	120 Winter	100	+0%	30/15 Summer				37.192
1.008	11	120 Winter	100	+0%	1/15 Winter				37.193
4.000	12	120 Winter	100	+0%	30/15 Summer				37.195
4.001	13	120 Winter	100	+0%	1/60 Winter				37.190
1.009	14	120 Winter	100	+0%	1/15 Summer				37.191
5.000	15	15 Winter	100	+0%	30/15 Summer				37.959
5.001	16	15 Winter	100	+0%	30/15 Summer				37.872
5.002	17	15 Winter	100	+0%	30/15 Summer				37.468
5.003	18	120 Winter	100	+0%	30/15 Summer				37.453
6.000	19	15 Winter	100	+0%					37.550

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100 year Return Period Summary of Critical Results by Maximum Level (Rank
1) for Storm

PN	US/MH Name	Surcharged		Flooded		Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Volume (m³)	Flow (l/s)						
1.000	1	-0.039	0.000	0.000	0.71				11.5		OK
1.001	2	0.031	0.000	0.000	0.74				27.6	SURCHARGED	
1.002	3	0.133	0.000	0.000	0.64			7	21.9	SURCHARGED	
1.003	4	0.174	0.000	0.000	0.84				30.6	SURCHARGED	
1.004	5	0.266	0.000	0.000	0.68				19.4	SURCHARGED	
1.005	6	0.291	0.000	0.000	0.94				25.1	SURCHARGED	
2.000	7	0.176	0.000	0.000	0.13				2.2	SURCHARGED	
3.000	8	0.133	0.000	0.000	0.04				0.6	SURCHARGED	
1.006	9	0.321	0.000	0.000	0.43			103	12.7	SURCHARGED	
1.007	10	0.365	0.000	0.000	0.31				11.1	SURCHARGED	
1.008	11	0.483	0.000	0.000	0.35				10.4	SURCHARGED	
4.000	12	0.359	0.000	0.000	0.05				0.8	SURCHARGED	
4.001	13	0.447	0.000	0.000	0.06				1.0	SURCHARGED	
1.009	14	0.521	0.000	0.000	0.13				8.0	SURCHARGED	
5.000	15	0.305	0.000	0.000	0.85				13.8	SURCHARGED	
5.001	16	0.357	0.000	0.000	1.46				24.3	SURCHARGED	
5.002	17	0.141	0.000	0.000	1.24				42.3	SURCHARGED	
5.003	18	0.195	0.000	0.000	0.51				17.3	SURCHARGED	
6.000	19	-0.050	0.000	0.000	0.77				12.4		OK

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
6.001	20	120 Winter	100	+0%					37.453
5.004	21	120 Winter	100	+0%	30/30 Winter				37.450
7.000	22	15 Winter	100	+0%	30/15 Winter				38.146
7.001	23	15 Winter	100	+0%	30/15 Summer				37.990
7.002	24	15 Winter	100	+0%	30/15 Summer				37.965
7.003	25	15 Winter	100	+0%	30/15 Summer				37.891
7.004	26	15 Winter	100	+0%	30/15 Summer				37.818
7.005	27	15 Winter	100	+0%	30/15 Summer				37.738
7.006	28	30 Winter	100	+0%	30/15 Summer				37.601
7.007	29	30 Winter	100	+0%	30/15 Summer				37.519
7.008	30	30 Winter	100	+0%	1/15 Summer				37.445
5.005	31	120 Winter	100	+0%	1/15 Summer				37.439

PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
6.001	20	-0.021	0.000	0.32			8.5	OK	
5.004	21	0.260	0.000	0.15			9.9	SURCHARGED	
7.000	22	0.285	0.000	0.85			14.3	SURCHARGED	
7.001	23	0.339	0.000	0.42			14.6	SURCHARGED	
7.002	24	0.398	0.000	0.94			29.6	SURCHARGED	
7.003	25	0.374	0.000	0.98			29.3	SURCHARGED	
7.004	26	0.337	0.000	0.88			29.0	SURCHARGED	
7.005	27	0.313	0.000	1.19			43.4	SURCHARGED	
7.006	28	0.301	0.000	0.80			49.5	SURCHARGED	
7.007	29	0.296	0.000	0.87			49.6	SURCHARGED	
7.008	30	0.269	0.000	0.85			49.9	SURCHARGED	
5.005	31	0.317	0.000	0.16		115	7.6	SURCHARGED	

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Micro Drainage

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor 1.000

Additional Flow - % of Total Flow 0.000

Hot Start (mins) 0

MADD Factor * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coefficient 0.800

Manhole Headloss Coeff (Global) 0.500

Flow per Person per Day (l/per/day) 0.000

Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0

Number of Storage Structures 4

Number of Online Controls 3

Number of Time/Area Diagrams 4

Number of Offline Controls 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR

Ratio R 0.400

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 18.800

Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status OFF

DVD Status ON

Inertia Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440

Return Period(s) (years) 30, 100

Climate Change (%) 35, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	30	+35%	100/15 Summer				37.393
1.001	2	15 Winter	30	+35%	30/15 Summer				37.336
1.002	3	15 Winter	30	+35%	30/15 Summer				37.264
1.003	4	15 Winter	30	+35%	30/15 Summer				37.237
1.004	5	120 Winter	30	+35%	30/15 Summer				37.207
1.005	6	120 Winter	30	+35%	30/15 Summer				37.203
2.000	7	120 Winter	30	+35%	30/15 Winter				37.197
3.000	8	120 Winter	30	+35%	30/30 Summer				37.197
1.006	9	120 Winter	30	+35%	30/15 Summer				37.196
1.007	10	120 Winter	30	+35%	30/15 Summer				37.206
1.008	11	120 Winter	30	+35%	30/15 Summer				37.207
4.000	12	120 Winter	30	+35%	30/15 Summer				37.211
4.001	13	120 Winter	30	+35%	30/15 Summer				37.207
1.009	14	120 Winter	30	+35%	30/15 Summer				37.205
5.000	15	15 Winter	30	+35%	30/15 Summer				38.018
5.001	16	15 Winter	30	+35%	30/15 Summer				37.924
5.002	17	15 Winter	30	+35%	30/15 Summer				37.491
5.003	18	120 Winter	30	+35%	30/15 Summer				37.469
6.000	19	15 Winter	30	+35%	100/15 Summer				37.569

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Surcharged		Flooded		Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)				
1.000	1	-0.015	0.000	0.73			11.7		OK
1.001	2	0.050	0.000	0.77			28.6	SURCHARGED	
1.002	3	0.149	0.000	0.65		7	22.1	SURCHARGED	
1.003	4	0.189	0.000	0.85			30.9	SURCHARGED	
1.004	5	0.282	0.000	0.68			19.5	SURCHARGED	
1.005	6	0.306	0.000	0.95			25.4	SURCHARGED	
2.000	7	0.191	0.000	0.14			2.2	SURCHARGED	
3.000	8	0.148	0.000	0.04			0.6	SURCHARGED	
1.006	9	0.337	0.000	0.43		104	12.7	SURCHARGED	
1.007	10	0.379	0.000	0.31			11.1	SURCHARGED	
1.008	11	0.497	0.000	0.35			10.4	SURCHARGED	
4.000	12	0.375	0.000	0.05			0.9	SURCHARGED	
4.001	13	0.464	0.000	0.07			1.0	SURCHARGED	
1.009	14	0.535	0.000	0.13			8.1	SURCHARGED	
5.000	15	0.364	0.000	0.88			14.4	SURCHARGED	
5.001	16	0.409	0.000	1.51			25.2	SURCHARGED	
5.002	17	0.164	0.000	1.29			43.9	SURCHARGED	
5.003	18	0.212	0.000	0.52			17.7	SURCHARGED	
6.000	19	-0.031	0.000	0.79			12.7		OK

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
6.001	20	15 Winter	30	+35%	30/15 Summer				37.489
5.004	21	120 Winter	30	+35%	30/15 Summer				37.466
7.000	22	15 Winter	30	+35%	30/15 Summer				38.189
7.001	23	15 Winter	30	+35%	30/15 Summer				38.020
7.002	24	15 Winter	30	+35%	30/15 Summer				37.994
7.003	25	15 Winter	30	+35%	30/15 Summer				37.920
7.004	26	15 Winter	30	+35%	30/15 Summer				37.848
7.005	27	15 Winter	30	+35%	30/15 Summer				37.769
7.006	28	30 Winter	30	+35%	30/15 Summer				37.619
7.007	29	30 Winter	30	+35%	30/15 Summer				37.536
7.008	30	30 Winter	30	+35%	30/15 Summer				37.463
5.005	31	120 Winter	30	+35%	30/15 Summer				37.456

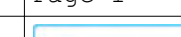
PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
6.001	20	0.015	0.000	1.02			27.2	SURCHARGED	
5.004	21	0.276	0.000	0.15			9.7	SURCHARGED	
7.000	22	0.328	0.000	0.89			14.9	SURCHARGED	
7.001	23	0.369	0.000	0.43			15.2	SURCHARGED	
7.002	24	0.426	0.000	0.98			31.0	SURCHARGED	
7.003	25	0.403	0.000	1.03			30.8	SURCHARGED	
7.004	26	0.367	0.000	0.92			30.5	SURCHARGED	
7.005	27	0.343	0.000	1.25			45.6	SURCHARGED	
7.006	28	0.318	0.000	0.83			51.2	SURCHARGED	
7.007	29	0.313	0.000	0.89			51.2	SURCHARGED	
7.008	30	0.287	0.000	0.88			52.0	SURCHARGED	
5.005	31	0.334	0.000	0.16		119	7.7	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank
1) for Storm

PN	US/MH Name	Surcharged		Flooded		Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow	Overflow					
1.000	1	0.231	0.000	0.95				15.3	SURCHARGED	
1.001	2	0.253	0.000	1.01				37.6	SURCHARGED	
1.002	3	0.330	0.000	0.25			61	8.6	SURCHARGED	
1.003	4	0.394	0.000	0.42				15.4	SURCHARGED	
1.004	5	0.510	0.000	0.78				22.4	SURCHARGED	
1.005	6	0.534	0.000	1.11				29.4	SURCHARGED	
2.000	7	0.419	0.000	0.19				3.1	SURCHARGED	
3.000	8	0.375	0.000	0.05				0.9	SURCHARGED	
1.006	9	0.563	0.000	0.46			128	13.8	SURCHARGED	
1.007	10	0.603	0.000	0.33				12.2	SURCHARGED	
1.008	11	0.720	0.000	0.38				11.4	SURCHARGED	
4.000	12	0.598	0.000	0.07				1.0	SURCHARGED	
4.001	13	0.687	0.000	0.08				1.2	SURCHARGED	
1.009	14	0.758	0.000	0.15				9.0	SURCHARGED	
5.000	15	0.841	0.000	1.20				19.5	FLOOD RISK	
5.001	16	0.892	0.000	1.92				31.9	FLOOD RISK	

Appendix F Proposed Surface Water Drainage Strategy MicroDrainage Calculations – with Surcharged Outfall & Exceedance Scenario

Stantec UK Ltd		Page 1
Caversham Bridge House	YHP1 & 2, The Oracle	
Waterman Place	Reading	
Reading, RG1 8DN	Surcharged Outfalls	
Date 19/11/2025	Designed by JPS	
File SW-DRAINAGE.MDX	Checked by PJG	
Innovyze	Network 2020.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	4
Number of Online Controls	3	Number of Time/Area Diagrams	4
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.800	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	30
Climate Change (%)	35

WARNING: Half Drain Time has not been calculated as the structure is too full.

									Water
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level (m)
1.000	1	960	Winter	30	+35%	30/240	Summer		37.790
1.001	2	960	Winter	30	+35%	30/15	Summer		37.789
1.002	3	960	Winter	30	+35%	30/15	Summer		37.786
1.003	4	960	Winter	30	+35%	30/15	Summer		37.784
1.004	5	960	Winter	30	+35%	30/15	Summer		37.781
1.005	6	960	Winter	30	+35%	30/15	Summer		37.779
2.000	7	960	Winter	30	+35%	30/15	Winter		37.776
3.000	8	960	Winter	30	+35%	30/30	Summer		37.775
1.006	9	960	Winter	30	+35%	30/15	Summer		37.774
1.007	10	960	Winter	30	+35%	30/15	Summer		37.771
1.008	11	960	Winter	30	+35%	30/15	Summer		37.764
4.000	12	960	Winter	30	+35%	30/15	Summer		37.760
4.001	13	960	Winter	30	+35%	30/15	Summer		37.760
1.009	14	960	Winter	30	+35%	30/15	Summer		37.759
5.000	15	15	Winter	30	+35%	30/15	Summer		38.018
5.001	16	15	Winter	30	+35%	30/15	Summer		37.924

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Caversham Bridge House	YHP1 & 2, The Oracle	
Waterman Place	Reading	
Reading, RG1 8DN	Surcharged Outfalls	
Date 19/11/2025	Designed by JPS	
File SW-DRAINAGE.MDX	Checked by PJG	
Innovyze	Network 2020.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Surcharged		Flooded		Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)				
1.000	1	0.382	0.000	0.05			0.8	SURCHARGED	
1.001	2	0.503	0.000	0.05			1.8	SURCHARGED	
1.002	3	0.671	0.000	0.05			1.6	SURCHARGED	
1.003	4	0.736	0.000	0.06			2.2	SURCHARGED	
1.004	5	0.856	0.000	0.11			3.2	SURCHARGED	
1.005	6	0.882	0.000	0.15			4.1	SURCHARGED	
2.000	7	0.770	0.000	0.03			0.5	SURCHARGED	
3.000	8	0.726	0.000	0.01			0.2	SURCHARGED	
1.006	9	0.915	0.000	0.12			3.7	SURCHARGED	
1.007	10	0.944	0.000	0.11			3.9	SURCHARGED	
1.008	11	1.054	0.000	0.14			4.3	SURCHARGED	
4.000	12	0.924	0.000	0.01			0.2	SURCHARGED	
4.001	13	1.017	0.000	0.01			0.2	SURCHARGED	
1.009	14	1.089	0.000	0.07			4.4	SURCHARGED	
5.000	15	0.364	0.000	0.88			14.4	SURCHARGED	
5.001	16	0.409	0.000	1.51			25.2	SURCHARGED	

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Caversham Bridge House Waterman Place Reading, RG1 8DN	YHP1 & 2, The Oracle Reading Surcharged Outfalls	
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Innovyze	Network 2020.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
5.002	17	960 Winter	30	+35%	30/15 Summer				37.920
5.003	18	960 Winter	30	+35%	30/15 Summer				37.918
6.000	19	960 Winter	30	+35%	30/240 Summer				37.920
6.001	20	960 Winter	30	+35%	30/15 Summer				37.918
5.004	21	960 Winter	30	+35%	30/15 Summer				37.915
7.000	22	15 Winter	30	+35%	30/15 Summer				38.189
7.001	23	15 Winter	30	+35%	30/15 Summer				38.020
7.002	24	15 Winter	30	+35%	30/15 Summer				37.994
7.003	25	15 Winter	30	+35%	30/15 Summer				37.920
7.004	26	960 Winter	30	+35%	30/15 Summer				37.917
7.005	27	960 Winter	30	+35%	30/15 Summer				37.915
7.006	28	960 Winter	30	+35%	30/15 Summer				37.911
7.007	29	960 Winter	30	+35%	30/15 Summer				37.909
7.008	30	960 Winter	30	+35%	30/15 Summer				37.907
5.005	31	960 Winter	30	+35%	30/15 Summer				37.905

PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
5.002	17	0.593	0.000	0.08			2.9	SURCHARGED	
5.003	18	0.660	0.000	0.10			3.6	SURCHARGED	
6.000	19	0.320	0.000	0.05			0.8	SURCHARGED	
6.001	20	0.444	0.000	0.06			1.7	SURCHARGED	
5.004	21	0.725	0.000	0.12			7.8	SURCHARGED	
7.000	22	0.328	0.000	0.89			14.9	SURCHARGED	
7.001	23	0.369	0.000	0.43			15.2	SURCHARGED	
7.002	24	0.426	0.000	0.98			31.0	SURCHARGED	
7.003	25	0.403	0.000	1.03			30.8	SURCHARGED	
7.004	26	0.435	0.000	0.07			2.4	SURCHARGED	
7.005	27	0.490	0.000	0.09			3.4	SURCHARGED	
7.006	28	0.611	0.000	0.08			4.7	SURCHARGED	
7.007	29	0.686	0.000	0.08			4.7	SURCHARGED	
7.008	30	0.731	0.000	0.09			5.5	SURCHARGED	
5.005	31	0.783	0.000	0.12			5.7	SURCHARGED	

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Caversham Bridge House

Waterman Place

Reading, RG1 8DN

Date 19/11/2025

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Reading

Exceedance Event

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Network 2020.1

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000

Additional Flow - % of Total Flow 0.000

Hot Start (mins) 0

MADD Factor * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coefficient 0.800

Manhole Headloss Coeff (Global) 0.500

Flow per Person per Day (l/per/day) 0.000

Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0

Number of Storage Structures 4

Number of Online Controls 3

Number of Time/Area Diagrams 4

Number of Offline Controls 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR

Ratio R 0.400

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 18.800 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status OFF

DVD Status ON

Inertia Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440

Return Period(s) (years) 100

Climate Change (%) 60

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Winter	100	+60%	100/15 Summer			
1.001	2	120 Winter	100	+60%	100/15 Summer			
1.002	3	120 Winter	100	+60%	100/15 Summer			
1.003	4	120 Winter	100	+60%	100/15 Summer			
1.004	5	120 Winter	100	+60%	100/15 Summer			
1.005	6	120 Winter	100	+60%	100/15 Summer			
2.000	7	120 Winter	100	+60%	100/15 Summer			
3.000	8	120 Winter	100	+60%	100/15 Summer			
1.006	9	120 Winter	100	+60%	100/15 Summer			
1.007	10	120 Winter	100	+60%	100/15 Summer			
1.008	11	120 Winter	100	+60%	100/15 Summer			
4.000	12	120 Winter	100	+60%	100/15 Summer			
4.001	13	120 Winter	100	+60%	100/15 Summer			
1.009	14	120 Winter	100	+60%	100/15 Summer			
5.000	15	15 Winter	100	+60%	100/15 Summer			
5.001	16	120 Winter	100	+60%	100/15 Summer	100/120 Winter		
5.002	17	120 Winter	100	+60%	100/15 Summer	100/120 Winter		
5.003	18	120 Winter	100	+60%	100/15 Summer			
6.000	19	120 Winter	100	+60%	100/15 Summer	100/120 Winter		

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Caversham Bridge House Waterman Place Reading, RG1 8DN	YHP1 & 2, The Oracle Reading Exceedance Event	
Date 19/11/2025 File SW-DRAINAGE.MDX	Designed by JPS Checked by PJG	
Innovyze	Network 2020.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	37.795	0.387	0.000	1.08		17.4	SURCHARGED
1.001	2	37.789	0.503	0.000	0.38		14.1	SURCHARGED
1.002	3	37.783	0.668	0.000	0.26	42	8.9	SURCHARGED
1.003	4	37.780	0.732	0.000	0.43		15.8	SURCHARGED
1.004	5	37.771	0.846	0.000	0.79		22.8	SURCHARGED
1.005	6	37.767	0.870	0.000	1.15		30.5	SURCHARGED
2.000	7	37.760	0.754	0.000	0.21		3.5	SURCHARGED
3.000	8	37.759	0.710	0.000	0.06		1.0	SURCHARGED
1.006	9	37.757	0.898	0.000	0.45		13.5	SURCHARGED
1.007	10	37.750	0.923	0.000	0.34		12.2	SURCHARGED
1.008	11	37.732	1.022	0.000	0.47		14.0	SURCHARGED
4.000	12	37.725	0.889	0.000	0.06		1.0	SURCHARGED
4.001	13	37.724	0.981	0.000	0.06		1.0	SURCHARGED
1.009	14	37.723	1.053	0.000	0.17		10.3	SURCHARGED
5.000	15	38.497	0.843	0.000	1.53		24.9	FLOOD RISK
5.001	16	38.500	0.985	0.063	0.76		12.7	FLOOD
5.002	17	38.500	1.173	0.017	0.65		22.0	FLOOD
5.003	18	38.497	1.239	0.000	0.80		27.5	FLOOD RISK
6.000	19	38.500	0.900	0.166	0.40		6.5	FLOOD

PN	US/MH Name	Level Exceeded
1.000	1	
1.001	2	
1.002	3	
1.003	4	
1.004	5	
1.005	6	
2.000	7	
3.000	8	
1.006	9	
1.007	10	
1.008	11	
4.000	12	
4.001	13	
1.009	14	
5.000	15	
5.001	16	2
5.002	17	1
5.003	18	
6.000	19	2

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Appendix G Thames Water - Pre-Planning Enquiry Response



Mr James Scobie

Stantec
Caversham Bridge House
Waterman Place
Reading
RG1 8DB



21 February 2024

Pre-planning enquiry: Confirmation of sufficient capacity

Site Address: The Oracle - Yield Hall Place 1&2, Reading, RG1 2AG (Foul Water)

Dear James,

Thank you for providing information on your development.

Proposed site: mixed re-development. Proposed foul water connection by gravity Northern Area: Flats (218 units), 1 no. Office (254m²), 1 no. restaurants (242m²) drains to Thames Water manhole 6211. Southern Area: Flats (218 units), 1 no. Shopping Centre (344m²), Cinema (2439m²) drains to Thames Water manhole 7252.

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.

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've any further questions, please contact me on number below.

Yours sincerely

Natalya Bacon

Developer Services – Adoptions Engineer

Mobile: 07747 641 932

Clearwater Court, Vastern Road, Reading, RG1 8DB

Find us online at developers.thameswater.co.uk

Get advice on making your sewer connection correctly at connectright.org.uk