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 The proposed development plans by CallisonRTKL Ltd. are included in **Appendix B**.

2.2.4 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 C**. 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 of which the impermeable area is estimated to be 0.737ha.

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 of which the impermeable area is estimated to be 0.690ha.

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 D**. **Table 3.1**, provides a summary of the discharge rates for the YHP1 and YHP2 sites.

Return Period	Equivalent Greenfield Discharge Rate (l/s)		Existing Brownfield Discharge Rate (l/s)	
	YHP1	YHP2	YHP1	YHP2
1 in 1 year	0.3	0.46	40.6	52.2
1 in 30 year	0.81	1.25	96.9	117.1
1 in 100 year	1.12	1.73	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 C**. 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 surface water from the proposed building and external paved areas of Yield Hall Place 1 is collected into an underground piped network and conveyed to a 13 x 8 x 0.8m underground cellular water storage tanks 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.

5.1.2 Yield Hall Place 2 is partly covered by a green roof providing retention, attenuation, treatment of rainwater and promoting evapotranspiration. 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 25 x 5 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.

5.1.3 Stantec drawings 332110757-2001-003 and 332110757-2001-004 shows the proposed drainage layout for the development and these are contained in **Appendix E**.

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. The drainage strategy has been designed to attenuate surface water from the development to provide at least 60% 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.

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	15.7	20.8	61%	60%
1 in 30 year	96.9	117.1	16.0	28.8	83%	75%
1 in 100 year	120.0	146.7	16.0	28.8	87%	80%
1 in 100 year + 40% allowance for climate change	-	-	16.7	30.1	86%	79%

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 F**.

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 reduced by 5% (from 1.495ha to 1.427ha) 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 E and F** 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 G**. 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 50% allowance for climate change and surcharged outfalls. During this flood event 3.6m³ flooding occurs across the YHP1 network and 12.04m³ 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 G**.

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 As described in Section 5.2, discharge of surface water via infiltration is not considered a practicable due to the lack of space on the site and likely high groundwater levels. Therefore, a system which utilises cellular attenuation is proposed. This will still follow the principles of the NPPG SuDS requirements by reducing flood risk and removal of pollutants / contaminants through the use of trapped gullies and catchpits.

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 expectances 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, cellular crate storage, 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 drainage channel sumps, catchpits, 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 E**.

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 E**.

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 H** 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
Regular Maintenance			
Inspection	■	■	■
Litter and debris removal	■	□	
Weed and invasive plant control			■
Occasional Maintenance			
Sediment management[1]	■	■	
Vegetation replacement			■

Operation and Maintenance Activity	SuDS Components		
	Piped Network / Inspection Chambers / Catchpits	Cellular / Modular Storage	Green Roof
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

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. Surface water is attenuated within underground cellular storage tanks within the Yield Hall Place 1 and Yield Hall Place 2 networks. Part of the roof of the Yield Hall Place 2 development will be a Green Roof which will providing retention, attenuation, treatment of rainwater and promoting evapotranspiration.

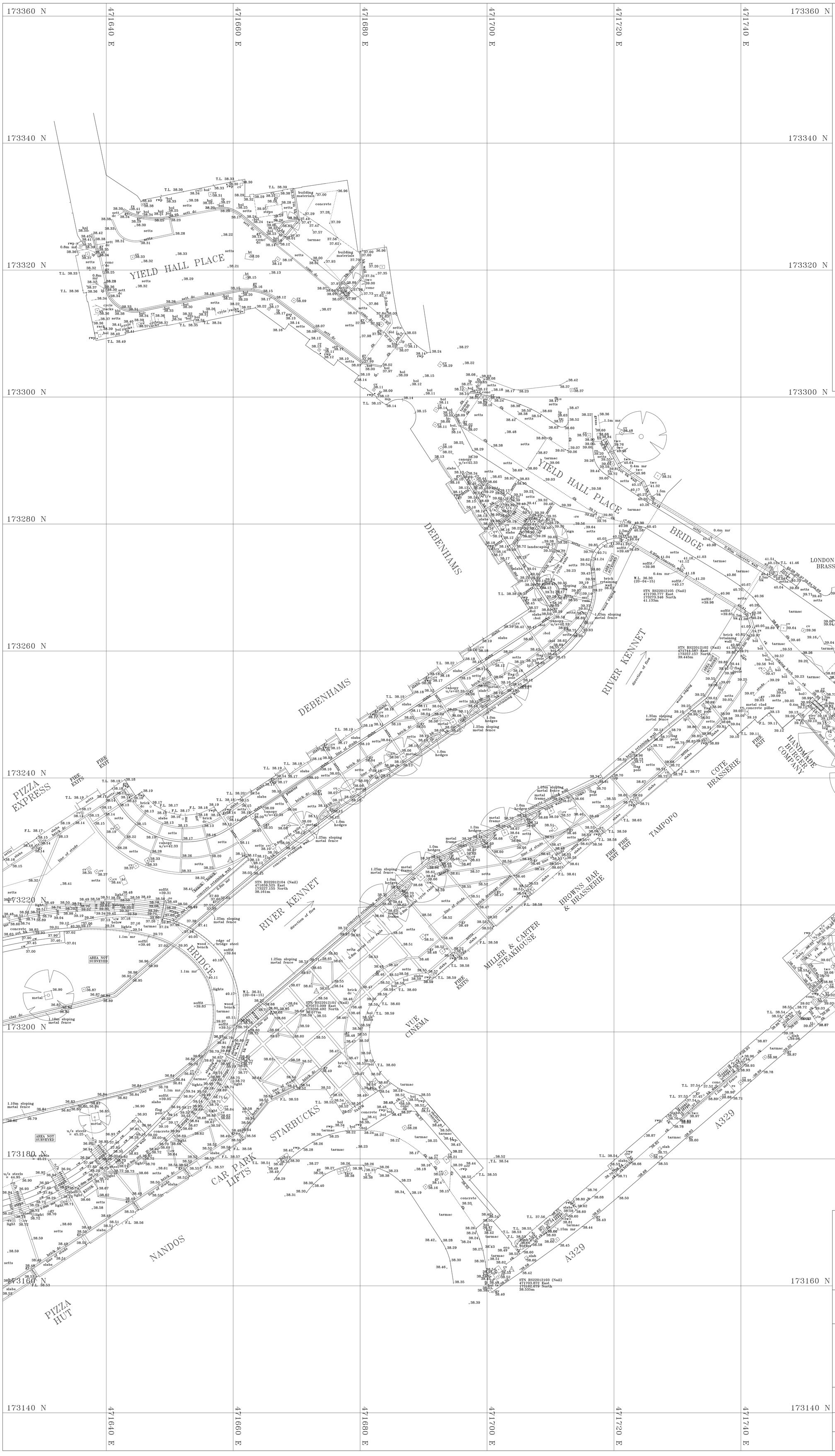
8.1.3 The drainage strategy has been designed to attenuate surface water from the development to provide more than 60% betterment compared to the existing condition for the 1 in 1 year, 1 in 30 year and 1 in 100 year with an allowance for climate change events. The network has been designed not to flood 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 A system which utilises a green roof and underground cellular attenuation is proposed. This will follow the principles of the NPPG SuDS requirements by reducing flood risk and removal of pollutants / contaminants through the use of trapped gullies, oil interceptors and catchpits / silt traps.

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



REV	REVISION	DATE	PROD	CKD
–	–	–	–	–

LEGEND

DRAINAGE

cv	cover
dc	drainage channel
fd	foul drain
gy	gully
I.C.	inspection chamber
M.H.	manhole
re	rodding eye
rwp	rainwater pipe
sd	storm drain
svp	soil vent pipe

LEVELS

C.L.	Cover Level
F.L.	Floor Level
I.L	Invert Level
OSBM	Ordnance Survey Bench Mark
T.L.	Threshold Level
W.L.	Water Level

SERVICES

bs	bus shelter
bt	British Telecom
catv	cable tv
ep	electricity pole
fh	fire hydrant
kl	keep left bollard
lp	lamp post
ohc	overhead cable
pk	phone kiosk
sv	stop valve
sy	stay wire
tl	traffic lights
tp	telegraph pole

FENCES

ba	barrier
bw	barbed wire
cb	closeboard
ci	corrugated iron
cl	chainlink
cp	concrete post
gt	gate
ll	larch lap
mp	metal post
mr	metal rail
pa	palisade
pr	post & rail
pw	post & wire
wf	wood fence
wp	wood post

ROADS

dk	drop kerbs
ek	edging kerbs
rs	road sign
ts	tactile slabs
we	wood edging
se	setts
sf	setts flush
sr	setts raised

WALLS

bk	brick wall
cw	concrete wall
es	edging stones
sw	stone wall
tw	top of wall

NOTE

GRID AND LEVELS TO ORDNANCE SURVEY.
GRID BASED ON STATION RS22012101 (471673.099 E; 173206.492 N). SCALE FACTOR NOT APPLIED.

RUXTON
SURVEYS

The Long Barn
Mitre Farm
Corse Lawn
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GL19 4NG

T: 01684 217217
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W: www.ruxtonsurveys.co.uk

LOCATION:
THE ORACLE
READING
BERKSHIRE

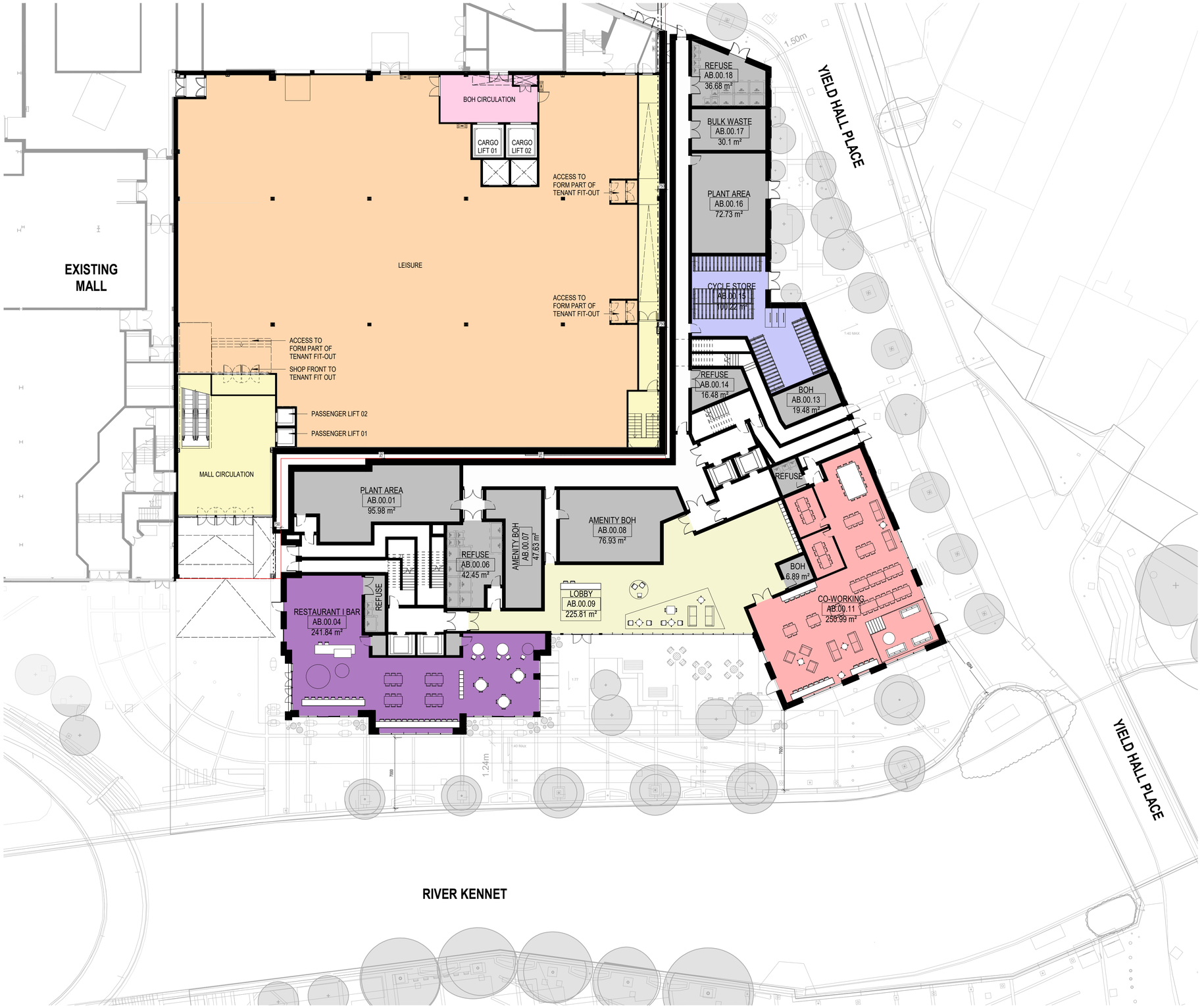
CLIENT:
THE ORACLE PARTNERSHIP

DRAWING TITLE:
SITE SURVEY

SCALE:	DATE:	SHEET SIZE:
1 to 200	JULY 2022	A0

DRAWING NUMBER:	DRAWN BY:
RS2200121/01	N.R./S.T./L.B.

Appendix B Proposed Site Layout, CallisonRTKL Ltd



1 GA PLAN - YIELD HALL PLACE 1 - A-B - LEVEL 00 - GF

SCALE: 1 : 200

1.5 0 1.5 3 4.5 6 7.5
SCALE 1:150 m

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P14	24-02-21	PLANNNG SUBMISSION	US	MD
P13	23-09-18	PLANNNG SUBMISSION	US	TP
P12	23-08-17	ISSUED FOR PLANNING	AB	PA
P11	23-07-07	Issued for Information	AB	TP
P10	22-12-13	PLANNING SUBMISSION	US	MD

KEY PLAN

PROJECT

The Oracle

Reading, UK

CLIENT

Hammerson
66 Seymour Street, London, W1H5BX

ARCHITECT

CALLISONRTKL

CallisonRTKL Ltd.
Blackbull Yard,
18 - 22 Hatton Wall, London, EC1N 8JH
CONTACT - Michael Dillon
PHONE - 020 7304 3520

SHEET IDENTIFICATION

TITLE

YIELD HALL PLACE 1 - PROPOSED PLAN - GF LEVEL

STATUS

PLANNING SUBMISSION

PROJECT NUMBER **050-210025**
SCALE @ A1: **1 : 200**
DATE DRAWN: **01/22/2024**
SUITABILITY CODE **S1**
DRAWN BY: **US**
REVISION **P14**
CHECKED BY: **MD**

PROJECT	ORIGIN	ZONE	LEVEL	TYPE	ROLE	NUMBER
TOR	CRL	A1	00	DR	AR	1201000

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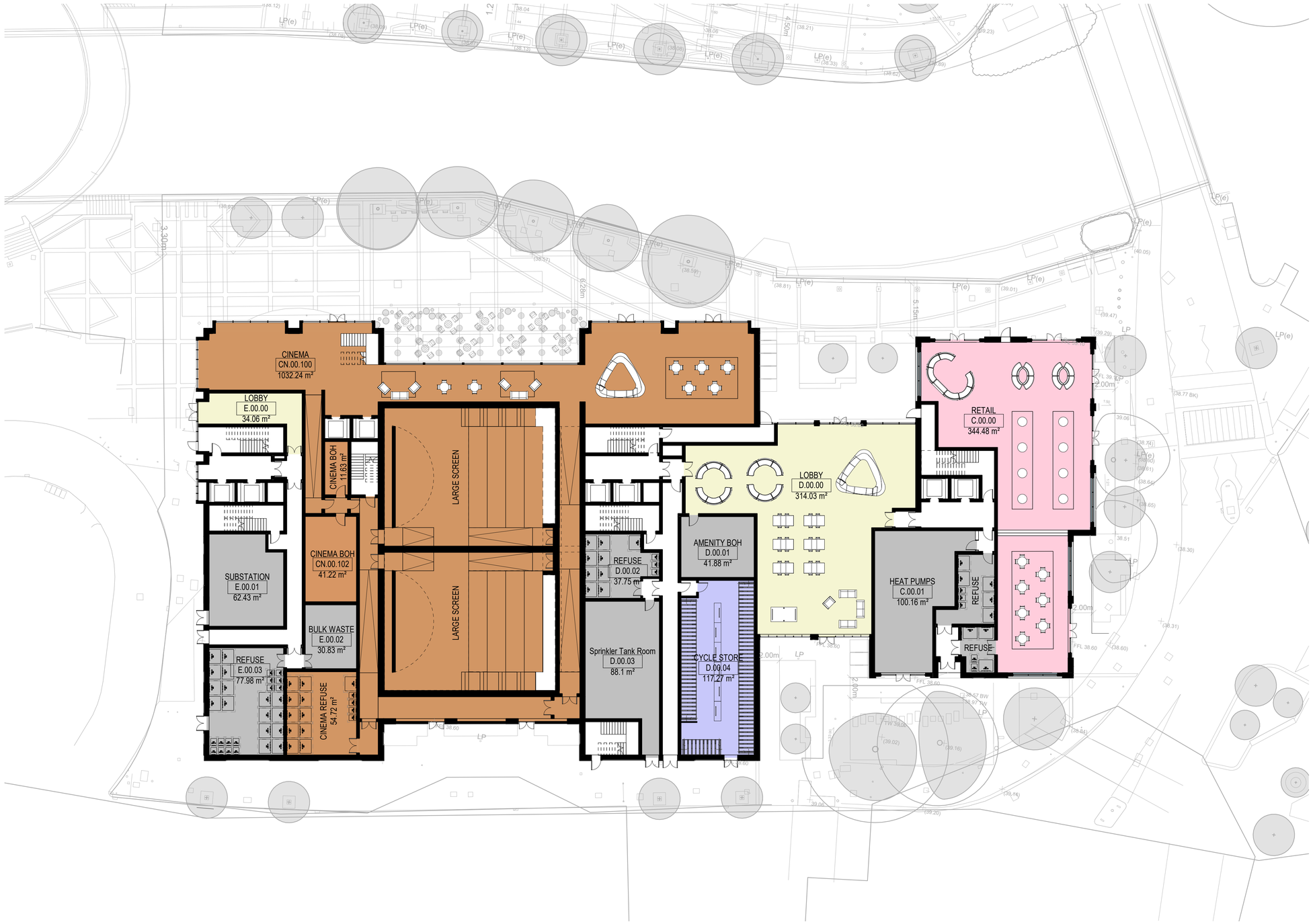

1 GA PLAN - YIELD HALL PLACE 2 - C-D-E - LEVEL 00 - GF

SCALE: 1 : 200

2 0 2 4 6 8 10
SCALE 1:200 m

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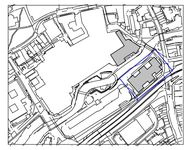
P13	23-09-18	PLANNNG SUBMISSION	US	TP
P12	23-08-17	ISSUED FOR PLANNING	AB	PA
P11	23-07-07	Issued for Information	AB	TP
P10	22-12-13	PLANNING SUBMISSION	US	MD

KEY PLAN



PROJECT

The Oracle

Reading, UK

CLIENT

Hammerson
66 Seymour Street, London, W1H5BX

ARCHITECT

CALLISONRTKL

CallisonRTKL Ltd.
Blackbull Yard,
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CONTACT - Michael Dillon
PHONE - 020 7304 3520

SHEET IDENTIFICATION

TITLE

YIELD HALL PLACE 2 - PROPOSED PLAN - GF LEVEL

STATUS

PLANNING SUBMISSION

PROJECT NUMBER **050-210025**
SUITABILITY CODE
REVISION **P14**
SCALE @ A1: **1 : 200**
DATE DRAWN: **01/22/2024**
DRAWN BY: **US**
CHECKED BY: **MD**

PROJECT ORIGIN ZONE LEVEL TYPE ROLE NUMBER
TOR - CRL - A2 - 00 - DR - AR - 1202000

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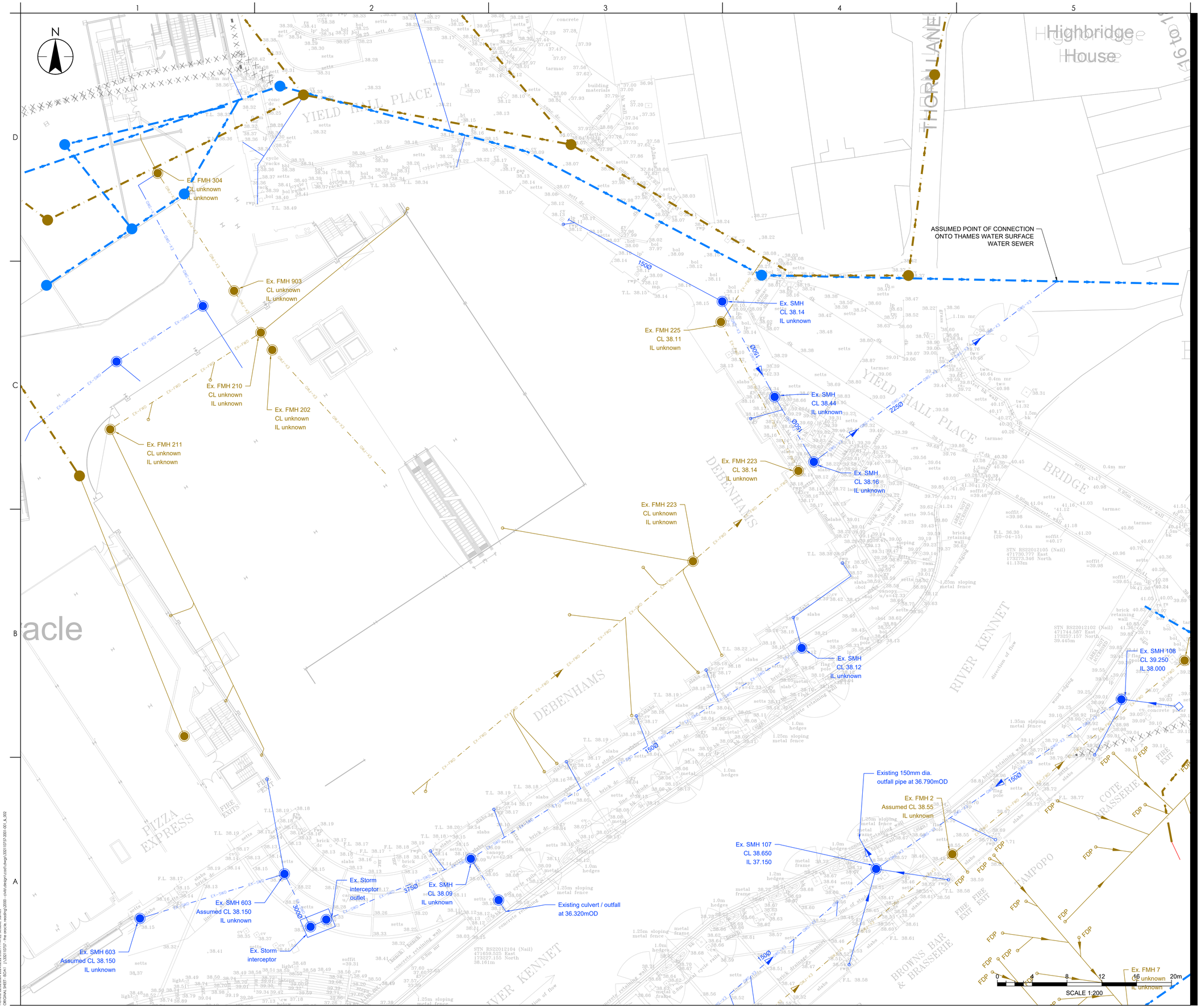
Appendix C Existing Drainage Drawing, Stantec 332110757-2001-001 and 332110757-2001-002



Stantec

Stantec UK Limited
Caversham Bridge House, Waterman Place
Reading
RG1 8DN
Tel. +44 1189 500 761
www.stantec.com/uk

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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

P01 FIRST ISSUE	JR	PJG	2024.02.22
Issued/Revision	By	Appd	YYYY.MM.DD
	JR	STB	JPS	2024.02.22
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

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YIELD HALL PLACE

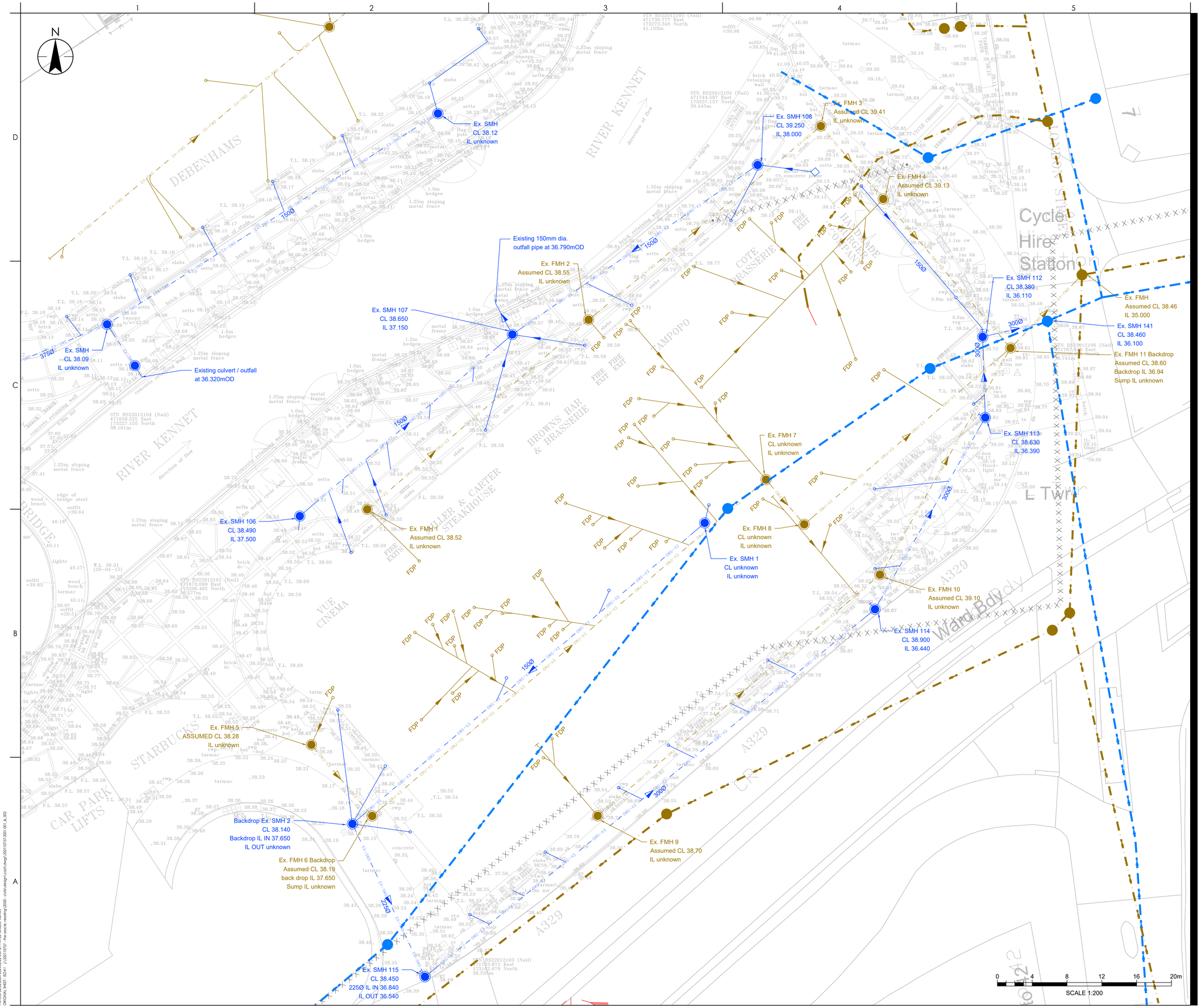
THE ORACLE

Title

EXISTING DRAINAGE LAYOUT
YIELD HALL PLACE 1

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

Plotted: 22/02/2024 2024.02.22 3:30:11 PM By: tjc.cobb, James
Drawing Name: (6x44) (332110757 - The Oracle, Reading)2000 - civils\drawings\north\dwgs\332110757-2001-001_A_002



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

Issued/Revision	By	Appd	
P01 FIRST ISSUE	JR	PJG	2024.02.22 YYYY.MM.DD

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YIELD HALL PLACE

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EXISTING DRAINAGE LAYOUT
YIELD HALL PLACE 2

Project No.	A1 Scale
332110757	1:200

Revision	Drawing No.
P01	332110757-2001-002

Plotted: 22.02.2024 2:50:42 PM By: Scottie. Jones
CADDATA: SHEET - ISO2A1 - (1:500,1:1000) - File: ORACLE - Modelling 2000 - civil3d - design\Local\Temp\332110757-2001-001_A_002

Appendix D Greenfield Runoff Estimation and Existing Brownfield Runoff Calculation

Stantec	The Oracle, Reading Surface Water Drainage Strategy Calculation of Equivalent Greenfield Discharge Rate	JOB No: 332110757		SHEET: 1 of 1
		DATE: 25.01.24	BY: JPS	CHECKED: 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	Size of catchment (excluding large open parkland that is to remain)
SAAR or AAR	642	mm	SAAR value from: https://www.uksuds.com/tools/greenfield-runoff-rate-estimation
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	Use 50ha for sites less than 50ha
$Q_{BAR(50)}$	82.35	l/s	Catchment mean annual peak flow for $A_{(50)}$ (50ha site)
Q_{BAR}	1.65	l/s	
$Q_{BAR(site)}/A_{(site)}$	1.65	l/s/ha	Mean annual peak flow per unit area (If less than 1 use 1 l/s/ha)
$Q_{throttle}$	5.00	l/s	Based on minimum litmit of discharge - refer to Page xvi, para 17
$Q_{throttle}/A_{(site)}$	5.00	l/s/ha	
$Q_{throttle}/3.5A_{(site)}$	1.43	l/s/ha	
Q_{BAR}/A	***1.65***	***l/s/ha***	Use greater value of $Q_{BAR(site)}/A_{(site)}$ and $Q_{throttle}/A_{(site)}$
GC_1	0.85		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***	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.800	Add Flow / Climate Change (%)	0
Ratio R	0.400	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

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
1.000	19.280	0.191	100.9	0.040	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	21.184	0.210	100.9	0.042	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	21.384	0.212	100.9	0.051	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	45.074	0.447	100.8	0.098	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	7.768	0.077	100.9	0.117	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.000	32.120	0.350	91.8	0.098	5.00	0.0	0.600	o	150	Pipe/Conduit	
4.000	34.286	0.850	40.3	0.057	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	4.256	0.360	11.8	0.086	0.00	0.0	0.600	o	150	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)
1.000	50.00	5.32	37.150	0.040	0.0	0.0	0.0	1.00	17.7	5.4
1.001	50.00	5.67	36.959	0.082	0.0	0.0	0.0	1.00	17.7	11.1
1.002	50.00	5.95	36.674	0.133	0.0	0.0	0.0	1.30	51.8	18.0
2.000	50.00	5.75	37.150	0.098	0.0	0.0	0.0	1.00	17.7	13.3
2.001	50.00	5.85	36.628	0.215	0.0	0.0	0.0	1.30	51.8	29.1
3.000	50.00	5.51	37.500	0.098	0.0	0.0	0.0	1.05	18.5	13.3
4.000	50.00	5.36	38.000	0.057	0.0	0.0	0.0	1.59	28.1	7.7
3.001	50.00	5.53	37.150	0.241	0.0	0.0	0.0	2.95	52.1	32.6

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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)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	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 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	14	38.380	36.110	1.970	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)
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 * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	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		

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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 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 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	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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1 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 / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
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	

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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 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 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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30 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 / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	37.392	0.092	0.000	0.71			11.8	SURCHARGED
1.001	2	37.299	0.190	0.000	1.37			22.8	SURCHARGED
1.002	3	36.832	-0.067	0.000	0.81			38.2	OK
2.000	4	37.853	0.553	0.000	1.44			24.8	SURCHARGED
2.001	5	36.949	0.096	0.000	1.50			58.7	SURCHARGED
3.000	6	38.400	0.750	0.000	1.34			23.9	FLOOD RISK
4.000	7	38.148	-0.002	0.000	0.64			17.4	OK
3.001	7	37.844	0.544	0.000	1.57			59.1	SURCHARGED
5.000	9	37.516	-0.044	0.000	0.80			13.9	OK
5.001	10	36.938	-0.095	0.000	0.61			28.4	OK
5.002	11	36.795	-0.045	0.000	0.87			35.2	OK
5.003	12	36.731	-0.009	0.000	1.00			43.7	OK
5.004	13	36.508	-0.182	0.000	0.33			43.7	OK
6.000	14	38.034	-0.116	0.000	0.11			5.4	OK
5.005	14	36.328	-0.082	0.000	0.85			58.0	OK

PN	US/MH Name	Level Exceeded
1.000	1	
1.001	2	
1.002	3	
2.000	4	2
2.001	5	
3.000	6	4
4.000	7	
3.001	7	
5.000	9	
5.001	10	
5.002	11	
5.003	12	
5.004	13	
6.000	14	
5.005	14	

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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 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 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	100	+0%	30/15 Summer			
1.001	2	15 Winter	100	+0%	30/15 Summer			
1.002	3	15 Winter	100	+0%				
2.000	4	15 Winter	100	+0%	30/15 Summer	100/15 Summer		
2.001	5	15 Winter	100	+0%	30/15 Summer			
3.000	6	15 Winter	100	+0%	30/15 Summer	100/15 Summer		
4.000	7	15 Winter	100	+0%	100/15 Summer			
3.001	7	15 Winter	100	+0%	30/15 Summer			
5.000	9	15 Winter	100	+0%	100/15 Winter			
5.001	10	15 Winter	100	+0%				
5.002	11	15 Winter	100	+0%	100/15 Summer			
5.003	12	15 Winter	100	+0%	100/15 Summer			
5.004	13	15 Winter	100	+0%				
6.000	14	15 Winter	100	+0%				
5.005	14	15 Winter	100	+0%	100/15 Summer			

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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 / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	37.655	0.355	0.000	0.88			14.6	SURCHARGED
1.001	2	37.514	0.405	0.000	1.69			28.2	SURCHARGED
1.002	3	36.881	-0.018	0.000	1.00			47.1	OK
2.000	4	38.201	0.901	0.703	1.70			29.2	FLOOD
2.001	5	37.047	0.194	0.000	1.86			72.9	SURCHARGED
3.000	6	38.493	0.843	2.766	1.63			29.1	FLOOD
4.000	7	38.550	0.400	0.000	0.75			20.3	SURCHARGED
3.001	7	38.126	0.826	0.000	1.80			67.8	SURCHARGED
5.000	9	37.583	0.023	0.000	1.01			17.4	SURCHARGED
5.001	10	37.020	-0.013	0.000	0.74			34.6	OK
5.002	11	36.917	0.077	0.000	1.09			44.3	SURCHARGED
5.003	12	36.787	0.047	0.000	1.43			62.7	SURCHARGED
5.004	13	36.535	-0.155	0.000	0.47			62.1	OK
6.000	14	38.039	-0.111	0.000	0.15			7.0	OK
5.005	14	36.425	0.015	0.000	1.15			78.9	SURCHARGED

PN	US/MH Name	Level Exceeded
1.000	1	
1.001	2	
1.002	3	
2.000	4	2
2.001	5	
3.000	6	4
4.000	7	
3.001	7	
5.000	9	
5.001	10	
5.002	11	
5.003	12	
5.004	13	
6.000	14	
5.005	14	

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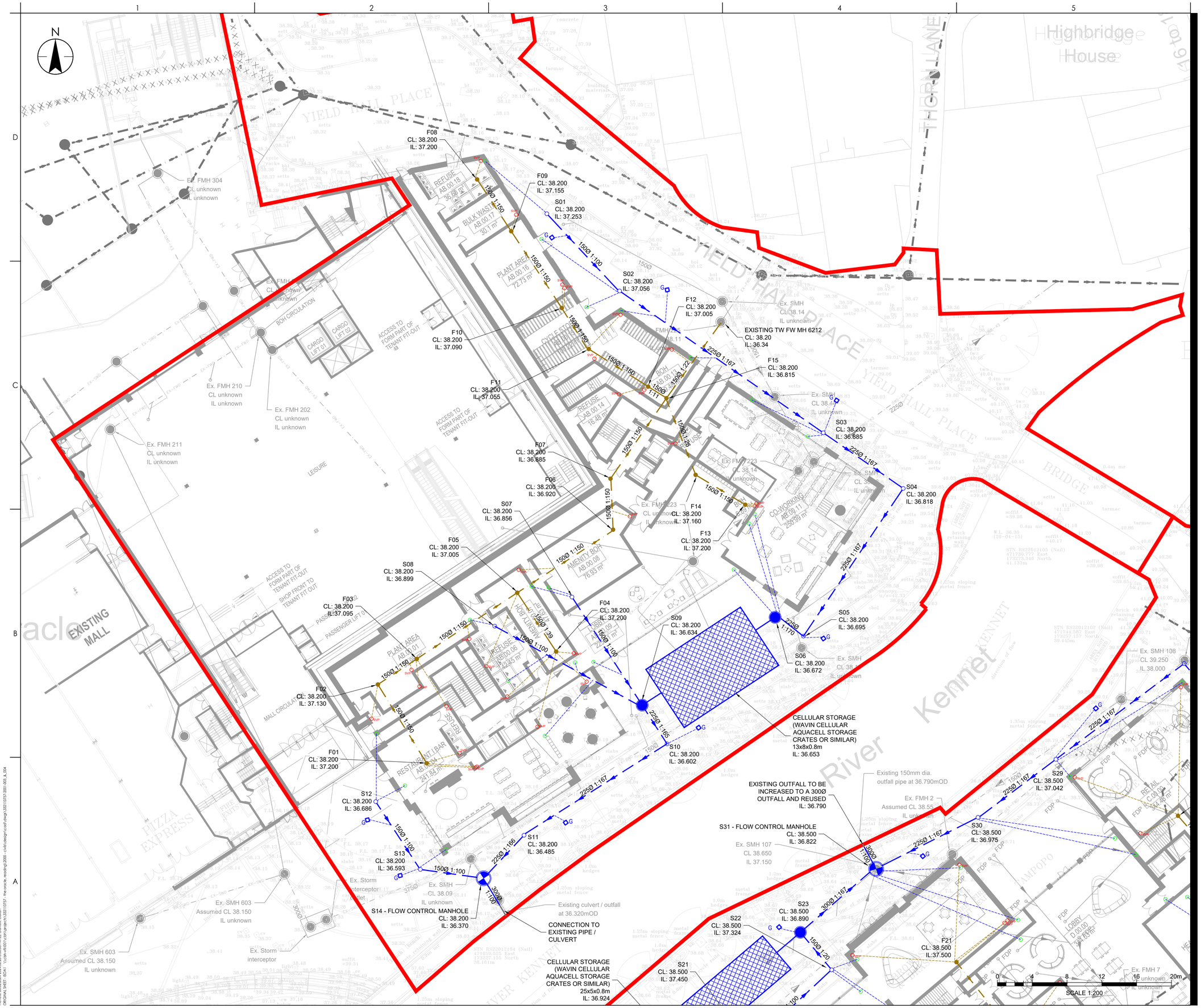
Appendix E Proposed Drainage Layouts, Stantec 332110757-2001-003 & 332110757-2001-004



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KEY:

- RED LINE 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
- 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

Issued/Revision	By	Appd	
P01 FIRST ISSUE	JR	PJG	2024.02.28 YYYY.MM.DD

	Dwn.	Dsgn.	Chkd.	
	JR	STB	JPS	2024.02.22 YYYY.MM.DD

Issue Status

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Client/Project

YIELD HALL PLACE

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Title

PROPOSED DRAINAGE LAYOUT
YIELD HALL PLACE 1

Project No.	A1 Scale
332110757	1:200

Revision	Drawing No.
P01	332110757-2001-003

Plotted: 28.02.2024 02:44:28 3:45:18 PM By: Daniels, Colton
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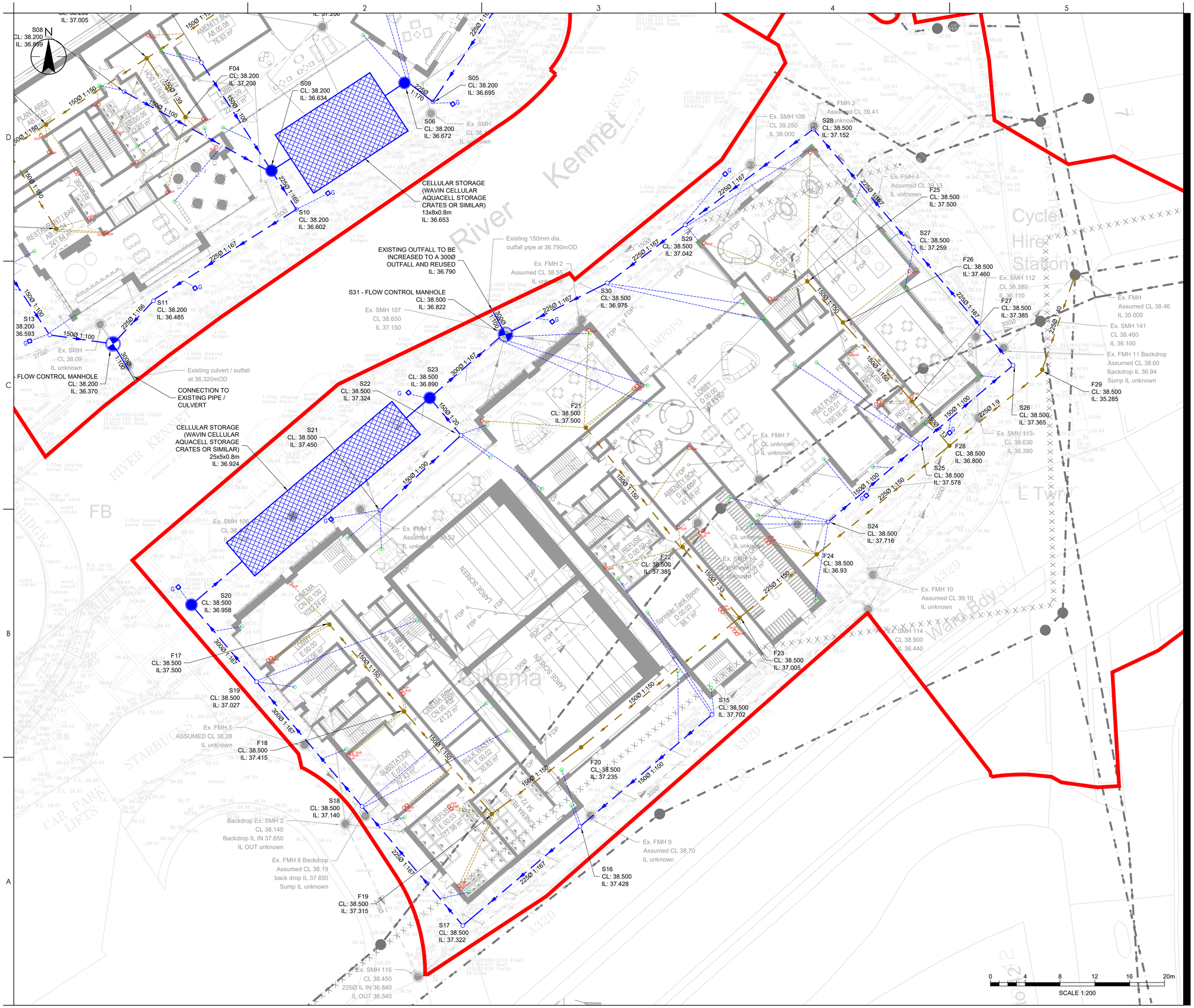

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KEY:

- RED LINE 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
- 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

P01	FIRST ISSUE	JR	PJG	2024.02.28
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Issue Status

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Client/Project

YIELD HALL PLACE

THE ORACLE

Title

PROPOSED DRAINAGE LAYOUT
YIELD HALL PLACE 2

Project No.
332110757

A1 Scale
1:200

Revision
P01

Drawing No.
332110757-2001-004

Appendix F Proposed Surface Water Drainage Strategy MicroDrainage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.800	Add Flow / Climate Change (%)	0
Ratio R	0.400	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

- Indicates pipe length does not match coordinates

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
1.000	12.184	0.122	99.9	0.028	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	39.708	0.238	166.8	0.041	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	20.477	0.123	166.5	0.050	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	3.908	0.023	169.9	0.044	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	5.377#	0.038	141.5	0.046	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	14.809	0.147	100.7	0.017	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	19.209	0.190	101.1	0.030	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.005	5.281	0.032	165.0	0.000	0.00	0.0	0.600	o	225	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)
1.000	50.00	5.20	37.253	0.028	0.0	0.0	0.0	1.01	17.8	3.8
1.001	50.00	5.86	37.056	0.069	0.0	0.0	0.0	1.01	40.1	9.3
1.002	50.00	6.20	36.818	0.119	0.0	0.0	0.0	1.01	40.2	16.1
1.003	50.00	6.26	36.695	0.163	0.0	0.0	0.0	1.00	39.8	22.1
1.004	50.00	6.34	36.672	0.209	0.0	0.0	0.0	1.10	43.6	28.3
2.000	50.00	5.25	36.856	0.017	0.0	0.0	0.0	1.00	17.7	2.3
3.000	50.00	5.32	36.899	0.030	0.0	0.0	0.0	1.00	17.7	4.1
1.005	50.00	6.43	36.634	0.256	0.0	0.0	0.0	1.01	40.4	34.7

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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
1.006	19.494	0.117	166.6	0.015	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.007	6.787	0.041	165.5	0.024	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	9.324	0.093	100.3	0.052	5.00	0.0	0.600	o	150	Pipe/Conduit	
4.001	7.341	0.073	100.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.008	5.032	0.050	100.6	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.000	11.847	0.118	100.4	0.042	5.00	0.0	0.600	o	150	Pipe/Conduit	
5.001	31.411	0.188	167.0	0.045	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.002	24.141	0.145	167.0	0.050	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.003	24.141	0.145	166.5	0.045	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.004	11.260#	0.068	165.6	0.058	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.000	12.689	0.126	100.7	0.033	5.00	0.0	0.600	o	150	Pipe/Conduit	
6.001	5.610	0.284	19.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
5.005	11.345	0.068	166.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
7.000	13.929	0.138	100.9	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
7.001	13.929	0.138	100.9	0.028	0.00	0.0	0.600	o	150	Pipe/Conduit	
7.002	17.763	0.106	167.0	0.041	0.00	0.0	0.600	o	225	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)
1.006	50.00	6.75	36.602	0.271	0.0	0.0	0.0	1.01	40.2	36.7
1.007	50.00	6.86	36.485	0.295	0.0	0.0	0.0	1.01	40.3	39.9
4.000	50.00	5.15	36.686	0.052	0.0	0.0	0.0	1.00	17.7	7.0
4.001	50.00	5.28	36.593	0.052	0.0	0.0	0.0	1.00	17.7	7.0
1.008	50.00	6.92	36.370	0.347	0.0	0.0	0.0	1.57	110.8	47.0
5.000	50.00	5.20	37.704	0.042	0.0	0.0	0.0	1.00	17.7	5.7
5.001	50.00	5.72	37.511	0.087	0.0	0.0	0.0	1.01	40.1	11.8
5.002	50.00	6.11	37.323	0.137	0.0	0.0	0.0	1.01	40.1	18.6
5.003	50.00	6.45	37.103	0.182	0.0	0.0	0.0	1.22	85.9	24.6
5.004	50.00	6.60	36.958	0.240	0.0	0.0	0.0	1.22	86.2	32.5
6.000	50.00	5.21	37.450	0.033	0.0	0.0	0.0	1.00	17.7	4.5
6.001	50.00	5.25	37.324	0.033	0.0	0.0	0.0	2.28	40.2	4.5
5.005	50.00	6.76	36.890	0.273	0.0	0.0	0.0	1.21	85.8	37.0
7.000	50.00	5.23	37.716	0.000	0.0	0.0	0.0	1.00	17.7	0.0
7.001	50.00	5.46	37.578	0.028	0.0	0.0	0.0	1.00	17.7	3.8
7.002	50.00	5.76	37.365	0.069	0.0	0.0	0.0	1.01	40.1	9.3

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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
7.003	17.763	0.106	167.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
7.004	29.561	0.177	167.0	0.045	0.00	0.0	0.600	o	225	Pipe/Conduit	
7.005	13.118	0.079	167.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.006	3.245	0.032	101.4	0.071	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)
7.003	50.00	6.05	37.259	0.069	0.0	0.0	0.0	1.01	40.1	9.3
7.004	50.00	6.54	37.152	0.114	0.0	0.0	0.0	1.01	40.1	15.4
7.005	50.00	6.76	36.975	0.114	0.0	0.0	0.0	1.01	40.1	15.4
5.006	50.00	6.79	36.822	0.458	0.0	0.0	0.0	1.56	110.4	62.0

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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	0.947	Open Manhole	1200	1.000	37.253	150				
2	38.200	1.144	Open Manhole	1200	1.001	37.056	225	1.000	37.131	150	
3	38.200	1.382	Open Manhole	1200	1.002	36.818	225	1.001	36.818	225	
4	38.200	1.505	Open Manhole	1200	1.003	36.695	225	1.002	36.695	225	
5	38.200	1.528	Open Manhole	1200	1.004	36.672	225	1.003	36.672	225	
6	38.200	1.344	Open Manhole	1200	2.000	36.856	150				
7	38.200	1.301	Open Manhole	1200	3.000	36.899	150				
8	38.200	1.566	Open Manhole	1200	1.005	36.634	225	1.004	36.634	225	
								2.000	36.709	150	
								3.000	36.709	150	
9	38.200	1.598	Open Manhole	1200	1.006	36.602	225	1.005	36.602	225	
10	38.200	1.715	Open Manhole	1200	1.007	36.485	225	1.006	36.485	225	
11	38.200	1.514	Open Manhole	1200	4.000	36.686	150				
12	38.200	1.607	Open Manhole	1200	4.001	36.593	150	4.000	36.593	150	
13	38.200	1.830	Open Manhole	1200	1.008	36.370	300	1.007	36.444	225	
								4.001	36.520	150	
	38.200	1.880	Open Manhole	0		OUTFALL		1.008	36.320	300	
14	38.500	0.796	Open Manhole	1200	5.000	37.704	150				
15	38.500	0.989	Open Manhole	1200	5.001	37.511	225	5.000	37.586	150	
16	38.500	1.177	Open Manhole	1200	5.002	37.323	225	5.001	37.323	225	
17	38.500	1.397	Open Manhole	1200	5.003	37.103	300	5.002	37.178	225	
18	38.500	1.542	Open Manhole	1200	5.004	36.958	300	5.003	36.958	300	
19	38.500	1.050	Open Manhole	1200	6.000	37.450	150				
20	38.500	1.176	Open Manhole	1200	6.001	37.324	150	6.000	37.324	150	
21	38.500	1.610	Open Manhole	1200	5.005	36.890	300	5.004	36.890	300	
								6.001	37.040	150	
22	38.500	0.784	Open Manhole	1200	7.000	37.716	150				
23	38.500	0.922	Open Manhole	1200	7.001	37.578	150	7.000	37.578	150	
24	38.500	1.135	Open Manhole	1200	7.002	37.365	225	7.001	37.440	150	
25	38.500	1.241	Open Manhole	1200	7.003	37.259	225	7.002	37.259	225	
26	38.500	1.348	Open Manhole	1200	7.004	37.152	225	7.003	37.152	225	
27	38.500	1.525	Open Manhole	1200	7.005	36.975	225	7.004	36.975	225	
28	38.500	1.678	Open Manhole	1200	5.006	36.822	300	5.005	36.822	300	
								7.005	36.897	225	
	38.500	1.710	Open Manhole	0		OUTFALL		5.006	36.790	300	

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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)
1	471671.825	173308.081	471671.825	173308.081	Required	
2	471680.180	173299.213	471680.180	173299.213	Required	
3	471712.767	173276.522	471712.767	173276.522	Required	
4	471701.301	173259.555	471701.301	173259.555	Required	
5	471698.044	173261.713	471698.044	173261.713	Required	
6	471674.713	173264.046	471674.713	173264.046	Required	
7	471665.841	173260.696	471665.841	173260.696	Required	
8	471682.772	173251.622	471682.772	173251.622	Required	
9	471685.627	173247.179	471685.627	173247.179	Required	
10	471669.203	173236.679	471669.203	173236.679	Required	
11	471652.163	173240.538	471652.163	173240.538	Required	
12	471657.290	173232.751	471657.290	173232.751	Required	
13	471664.560	173231.729	471664.560	173231.729	Required	
	471667.135	173227.406			No Entry	
14	471737.755	173192.848	471737.755	173192.848	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)
15	471728.728	173185.176	471728.728	173185.176	Required	
16	471704.744	173164.892	471704.744	173164.892	Required	
17	471689.154	173183.324	471689.154	173183.324	Required	
18	471673.564	173201.755	471673.564	173201.755	Required	
19	471695.255	173212.571	471695.255	173212.571	Required	
20	471704.544	173221.215	471704.544	173221.215	Required	
21	471700.949	173225.521	471700.949	173225.521	Required	
22	471746.705	173211.267	471746.705	173211.267	Required	
23	471757.335	173220.266	471757.335	173220.266	Required	
24	471767.966	173229.265	471767.966	173229.265	Required	
25	471756.506	173242.836	471756.506	173242.836	Required	
26	471745.045	173256.406	471745.045	173256.406	Required	
27	471721.349	173238.733	471721.349	173238.733	Required	
28	471709.646	173232.806	471709.646	173232.806	Required	
	471708.112	173235.666			No Entry	

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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	37.253	0.797	Open Manhole	1200
1.001	o	225	2	38.200	37.056	0.919	Open Manhole	1200
1.002	o	225	3	38.200	36.818	1.157	Open Manhole	1200
1.003	o	225	4	38.200	36.695	1.280	Open Manhole	1200
1.004	o	225	5	38.200	36.672	1.303	Open Manhole	1200
2.000	o	150	6	38.200	36.856	1.194	Open Manhole	1200
3.000	o	150	7	38.200	36.899	1.151	Open Manhole	1200
1.005	o	225	8	38.200	36.634	1.341	Open Manhole	1200
1.006	o	225	9	38.200	36.602	1.373	Open Manhole	1200
1.007	o	225	10	38.200	36.485	1.490	Open Manhole	1200
4.000	o	150	11	38.200	36.686	1.364	Open Manhole	1200
4.001	o	150	12	38.200	36.593	1.457	Open Manhole	1200
1.008	o	300	13	38.200	36.370	1.530	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	12.184	99.9	2	38.200	37.131	0.919	Open Manhole	1200
1.001	39.708	166.8	3	38.200	36.818	1.157	Open Manhole	1200
1.002	20.477	166.5	4	38.200	36.695	1.280	Open Manhole	1200
1.003	3.908	169.9	5	38.200	36.672	1.303	Open Manhole	1200
1.004	5.377#	141.5	8	38.200	36.634	1.341	Open Manhole	1200
2.000	14.809	100.7	8	38.200	36.709	1.341	Open Manhole	1200
3.000	19.209	101.1	8	38.200	36.709	1.341	Open Manhole	1200
1.005	5.281	165.0	9	38.200	36.602	1.373	Open Manhole	1200
1.006	19.494	166.6	10	38.200	36.485	1.490	Open Manhole	1200
1.007	6.787	165.5	13	38.200	36.444	1.531	Open Manhole	1200
4.000	9.324	100.3	12	38.200	36.593	1.457	Open Manhole	1200
4.001	7.341	100.6	13	38.200	36.520	1.530	Open Manhole	1200
1.008	5.032	100.6		38.200	36.320	1.580	Open Manhole	0

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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)
5.000	o	150	14	38.500	37.704	0.646	Open Manhole	1200
5.001	o	225	15	38.500	37.511	0.764	Open Manhole	1200
5.002	o	225	16	38.500	37.323	0.952	Open Manhole	1200
5.003	o	300	17	38.500	37.103	1.097	Open Manhole	1200
5.004	o	300	18	38.500	36.958	1.242	Open Manhole	1200
6.000	o	150	19	38.500	37.450	0.900	Open Manhole	1200
6.001	o	150	20	38.500	37.324	1.026	Open Manhole	1200
5.005	o	300	21	38.500	36.890	1.310	Open Manhole	1200
7.000	o	150	22	38.500	37.716	0.634	Open Manhole	1200
7.001	o	150	23	38.500	37.578	0.772	Open Manhole	1200
7.002	o	225	24	38.500	37.365	0.910	Open Manhole	1200
7.003	o	225	25	38.500	37.259	1.016	Open Manhole	1200
7.004	o	225	26	38.500	37.152	1.123	Open Manhole	1200
7.005	o	225	27	38.500	36.975	1.300	Open Manhole	1200
5.006	o	300	28	38.500	36.822	1.378	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)
5.000	11.847	100.4	15	38.500	37.586	0.764	Open Manhole	1200
5.001	31.411	167.0	16	38.500	37.323	0.952	Open Manhole	1200
5.002	24.141	167.0	17	38.500	37.178	1.097	Open Manhole	1200
5.003	24.141	166.5	18	38.500	36.958	1.242	Open Manhole	1200
5.004	11.260#	165.6	21	38.500	36.890	1.310	Open Manhole	1200
6.000	12.689	100.7	20	38.500	37.324	1.026	Open Manhole	1200
6.001	5.610	19.8	21	38.500	37.040	1.310	Open Manhole	1200
5.005	11.345	166.8	28	38.500	36.822	1.378	Open Manhole	1200
7.000	13.929	100.9	23	38.500	37.578	0.772	Open Manhole	1200
7.001	13.929	100.9	24	38.500	37.440	0.910	Open Manhole	1200
7.002	17.763	167.0	25	38.500	37.259	1.016	Open Manhole	1200
7.003	17.763	167.0	26	38.500	37.152	1.123	Open Manhole	1200
7.004	29.561	167.0	27	38.500	36.975	1.300	Open Manhole	1200
7.005	13.118	167.0	28	38.500	36.897	1.378	Open Manhole	1200
5.006	3.245	101.4		38.500	36.790	1.410	Open Manhole	0

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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	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	2
Number of Online Controls	2	Number of Time/Area Diagrams	2
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: 13, DS/PN: 1.008, Volume (m³): 2.4

Unit Reference	MD-SHE-0174-1600-1400-1600
Design Head (m)	1.400
Design Flow (l/s)	16.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	174
Invert Level (m)	36.370
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	16.0
Flush-Flo™	0.416	16.0
Kick-Flo®	0.911	13.1
Mean Flow over Head Range	-	13.8

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	6.2	1.200	14.9	3.000	23.0	7.000	34.6
0.200	14.7	1.400	16.0	3.500	24.8	7.500	35.8
0.300	15.7	1.600	17.0	4.000	26.4	8.000	36.9
0.400	16.0	1.800	18.0	4.500	28.0	8.500	38.0
0.500	15.9	2.000	19.0	5.000	29.4	9.000	39.1
0.600	15.7	2.200	19.8	5.500	30.8	9.500	40.1
0.800	14.6	2.400	20.7	6.000	32.1		
1.000	13.6	2.600	21.5	6.500	33.4		

Hydro-Brake® Optimum Manhole: 28, DS/PN: 5.006, Volume (m³): 3.1

Unit Reference	MD-SHE-0228-2900-1400-2900
Design Head (m)	1.400
Design Flow (l/s)	29.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	228
Invert Level (m)	36.822
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

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Hydro-Brake® Optimum Manhole: 28, DS/PN: 5.006, Volume (m³): 3.1

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	29.0
Flush-Flo™	0.444	28.9
Kick-Flo®	0.964	24.2
Mean Flow over Head Range	-	24.7

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	7.6	1.200	26.9	3.000	41.8	7.000	63.0
0.200	22.8	1.400	29.0	3.500	45.0	7.500	65.1
0.300	28.2	1.600	30.9	4.000	48.0	8.000	67.2
0.400	28.8	1.800	32.7	4.500	50.8	8.500	69.2
0.500	28.8	2.000	34.4	5.000	53.5	9.000	71.1
0.600	28.5	2.200	36.0	5.500	56.0	9.500	73.0
0.800	27.3	2.400	37.5	6.000	58.4		
1.000	24.7	2.600	39.0	6.500	60.7		

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Storage Structures for Storm

Cellular Storage Manhole: 8, DS/PN: 1.005

Invert Level (m) 36.634 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	104.0	104.0	0.801	0.0	137.6
0.800	104.0	137.6			

Cellular Storage Manhole: 21, DS/PN: 5.005

Invert Level (m) 36.890 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	125.0	125.0	0.801	0.0	173.0
0.800	125.0	173.0			

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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 2
Number of Online Controls 2 Number of Time/Area Diagrams 2
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 ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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.	Water Level (m)
1.000	1	15 Winter	100	+0%	100/15 Summer				37.604
1.001	2	15 Winter	100	+0%	30/15 Winter				37.553
1.002	3	15 Winter	100	+0%	30/15 Summer				37.456
1.003	4	15 Winter	100	+0%	30/15 Summer				37.305
1.004	5	60 Winter	100	+0%	30/15 Summer				37.212
2.000	6	60 Winter	100	+0%	30/30 Winter				37.197
3.000	7	60 Winter	100	+0%	100/15 Winter				37.200
1.005	8	60 Winter	100	+0%	30/15 Summer				37.194
1.006	9	60 Winter	100	+0%	30/15 Summer				37.185
1.007	10	60 Winter	100	+0%	30/15 Summer				37.162
4.000	11	15 Winter	100	+0%	30/15 Summer				37.221
4.001	12	60 Winter	100	+0%	30/15 Summer				37.158
1.008	13	60 Winter	100	+0%	30/15 Summer				37.150
5.000	14	15 Winter	100	+0%	100/15 Summer				37.943
5.001	15	15 Winter	100	+0%	100/15 Summer				37.823
5.002	16	15 Winter	100	+0%	30/15 Summer				37.683
5.003	17	60 Winter	100	+0%	100/15 Summer				37.565
5.004	18	60 Winter	100	+0%	30/15 Winter				37.523
6.000	19	15 Winter	100	+0%					37.557
6.001	20	60 Winter	100	+0%					37.474
5.005	21	60 Winter	100	+0%	30/15 Winter				37.470
7.000	22	30 Winter	100	+0%					37.747

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

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
1.000	1	0.201	0.000	0.67			10.9	SURCHARGED	
1.001	2	0.272	0.000	0.63			23.8	SURCHARGED	
1.002	3	0.413	0.000	1.10			39.9	SURCHARGED	
1.003	4	0.385	0.000	2.05			55.8	SURCHARGED	
1.004	5	0.315	0.000	1.31			39.3	SURCHARGED	
2.000	6	0.191	0.000	0.21			3.4	SURCHARGED	
3.000	7	0.151	0.000	0.39			6.4	SURCHARGED	
1.005	8	0.335	0.000	0.51		50	15.2	SURCHARGED	
1.006	9	0.358	0.000	0.42			15.3	SURCHARGED	
1.007	10	0.452	0.000	0.52			15.6	SURCHARGED	
4.000	11	0.385	0.000	1.22			19.1	SURCHARGED	
4.001	12	0.415	0.000	0.64			9.7	SURCHARGED	
1.008	13	0.480	0.000	0.26			16.0	SURCHARGED	
5.000	14	0.089	0.000	1.01			16.3	SURCHARGED	
5.001	15	0.087	0.000	0.85			32.1	SURCHARGED	
5.002	16	0.135	0.000	1.36			50.1	SURCHARGED	
5.003	17	0.161	0.000	0.47			36.0	SURCHARGED	
5.004	18	0.265	0.000	0.66			43.3	SURCHARGED	
6.000	19	-0.043	0.000	0.84			13.6	OK	
6.001	20	0.000	0.000	0.21			7.1	OK	
5.005	21	0.280	0.000	0.40		38	25.9	SURCHARGED	
7.000	22	-0.119	0.000	0.10			1.5	OK	

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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)
7.001	23	15 Winter	100	+0%	100/15 Winter				37.733
7.002	24	15 Winter	100	+0%	100/15 Summer				37.682
7.003	25	15 Winter	100	+0%	100/15 Summer				37.608
7.004	26	15 Winter	100	+0%	30/15 Summer				37.534
7.005	27	60 Winter	100	+0%	30/15 Summer				37.475
5.006	28	60 Winter	100	+0%	30/15 Summer				37.461

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
7.001	23	0.005	0.000	0.73			11.8	SURCHARGED	
7.002	24	0.092	0.000	0.76			27.3	SURCHARGED	
7.003	25	0.124	0.000	0.68			24.3	SURCHARGED	
7.004	26	0.157	0.000	1.05			39.1	SURCHARGED	
7.005	27	0.275	0.000	0.65			22.5	SURCHARGED	
5.006	28	0.339	0.000	0.47			28.8	SURCHARGED	

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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 2
Number of Online Controls 2 Number of Time/Area Diagrams 2
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 ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 100
Climate Change (%) 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	100	+40%	100/15 Summer				38.179
1.001	2	15 Winter	100	+40%	100/15 Summer				38.104
1.002	3	60 Winter	100	+40%	100/15 Summer				37.975
1.003	4	60 Winter	100	+40%	100/15 Summer				37.963
1.004	5	60 Winter	100	+40%	100/15 Summer				37.959
2.000	6	60 Winter	100	+40%	100/15 Summer				37.954
3.000	7	60 Winter	100	+40%	100/15 Summer				37.957
1.005	8	60 Winter	100	+40%	100/15 Summer				37.950
1.006	9	60 Winter	100	+40%	100/15 Summer				37.941
1.007	10	60 Winter	100	+40%	100/15 Summer				37.914
4.000	11	60 Winter	100	+40%	100/15 Summer				37.916
4.001	12	60 Winter	100	+40%	100/15 Summer				37.908
1.008	13	60 Winter	100	+40%	100/15 Summer				37.900
5.000	14	15 Winter	100	+40%	100/15 Summer				38.466
5.001	15	60 Winter	100	+40%	100/15 Summer				38.414
5.002	16	60 Winter	100	+40%	100/15 Summer				38.401
5.003	17	60 Winter	100	+40%	100/15 Summer				38.383
5.004	18	60 Winter	100	+40%	100/15 Summer				38.371
6.000	19	60 Winter	100	+40%	100/15 Summer				38.372
6.001	20	60 Winter	100	+40%	100/15 Summer				38.365
5.005	21	60 Winter	100	+40%	100/15 Summer				38.360
7.000	22	60 Winter	100	+40%	100/15 Summer				38.424

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

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
1.000	1	0.776	0.000	0.90			14.5	FLOOD RISK	
1.001	2	0.823	0.000	0.81			30.7	FLOOD RISK	
1.002	3	0.932	0.000	0.84			30.7	FLOOD RISK	
1.003	4	1.043	0.000	1.55			42.4	FLOOD RISK	
1.004	5	1.062	0.000	1.83			54.6	FLOOD RISK	
2.000	6	0.948	0.000	0.25			4.1	FLOOD RISK	
3.000	7	0.908	0.000	0.47			7.7	FLOOD RISK	
1.005	8	1.091	0.000	0.60		74	17.7	FLOOD RISK	
1.006	9	1.114	0.000	0.45			16.2	FLOOD RISK	
1.007	10	1.204	0.000	0.52			15.6	FLOOD RISK	
4.000	11	1.080	0.000	0.90			14.1	FLOOD RISK	
4.001	12	1.165	0.000	0.87			13.2	FLOOD RISK	
1.008	13	1.230	0.000	0.27			16.7	FLOOD RISK	
5.000	14	0.612	0.000	1.30			20.9	FLOOD RISK	
5.001	15	0.678	0.000	0.64			24.1	FLOOD RISK	
5.002	16	0.853	0.000	0.96			35.3	FLOOD RISK	
5.003	17	0.979	0.000	0.62			47.1	FLOOD RISK	
5.004	18	1.112	0.000	0.96			62.7	FLOOD RISK	
6.000	19	0.772	0.000	0.61			9.9	FLOOD RISK	
6.001	20	0.891	0.000	0.29			9.7	FLOOD RISK	
5.005	21	1.170	0.000	0.40		62	26.2	FLOOD RISK	
7.000	22	0.558	0.000	0.14			2.3	FLOOD RISK	

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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)
7.001	23	60 Winter	100	+40%	100/15 Summer				38.418
7.002	24	60 Winter	100	+40%	100/15 Summer				38.406
7.003	25	60 Winter	100	+40%	100/15 Summer				38.395
7.004	26	60 Winter	100	+40%	100/15 Summer				38.385
7.005	27	60 Winter	100	+40%	100/15 Summer				38.365
5.006	28	60 Winter	100	+40%	100/15 Summer				38.349

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
7.001	23	0.690	0.000	0.59			9.5	FLOOD RISK	
7.002	24	0.816	0.000	0.55			19.7	FLOOD RISK	
7.003	25	0.912	0.000	0.48			17.2	FLOOD RISK	
7.004	26	1.008	0.000	0.78			29.2	FLOOD RISK	
7.005	27	1.165	0.000	0.88			30.7	FLOOD RISK	
5.006	28	1.227	0.000	0.49			30.1	FLOOD RISK	

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

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008		38.200	36.320	0.000	0	0

Datum (m) 0.000 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
15	37.540	495	37.540	975	37.540	1455	37.540	1935	37.540	2415	37.540
30	37.540	510	37.540	990	37.540	1470	37.540	1950	37.540	2430	37.540
45	37.540	525	37.540	1005	37.540	1485	37.540	1965	37.540	2445	37.540
60	37.540	540	37.540	1020	37.540	1500	37.540	1980	37.540	2460	37.540
75	37.540	555	37.540	1035	37.540	1515	37.540	1995	37.540	2475	37.540
90	37.540	570	37.540	1050	37.540	1530	37.540	2010	37.540	2490	37.540
105	37.540	585	37.540	1065	37.540	1545	37.540	2025	37.540	2505	37.540
120	37.540	600	37.540	1080	37.540	1560	37.540	2040	37.540	2520	37.540
135	37.540	615	37.540	1095	37.540	1575	37.540	2055	37.540	2535	37.540
150	37.540	630	37.540	1110	37.540	1590	37.540	2070	37.540	2550	37.540
165	37.540	645	37.540	1125	37.540	1605	37.540	2085	37.540	2565	37.540
180	37.540	660	37.540	1140	37.540	1620	37.540	2100	37.540	2580	37.540
195	37.540	675	37.540	1155	37.540	1635	37.540	2115	37.540	2595	37.540
210	37.540	690	37.540	1170	37.540	1650	37.540	2130	37.540	2610	37.540
225	37.540	705	37.540	1185	37.540	1665	37.540	2145	37.540	2625	37.540
240	37.540	720	37.540	1200	37.540	1680	37.540	2160	37.540	2640	37.540
255	37.540	735	37.540	1215	37.540	1695	37.540	2175	37.540	2655	37.540
270	37.540	750	37.540	1230	37.540	1710	37.540	2190	37.540	2670	37.540
285	37.540	765	37.540	1245	37.540	1725	37.540	2205	37.540	2685	37.540
300	37.540	780	37.540	1260	37.540	1740	37.540	2220	37.540	2700	37.540
315	37.540	795	37.540	1275	37.540	1755	37.540	2235	37.540	2715	37.540
330	37.540	810	37.540	1290	37.540	1770	37.540	2250	37.540	2730	37.540
345	37.540	825	37.540	1305	37.540	1785	37.540	2265	37.540	2745	37.540
360	37.540	840	37.540	1320	37.540	1800	37.540	2280	37.540	2760	37.540
375	37.540	855	37.540	1335	37.540	1815	37.540	2295	37.540	2775	37.540
390	37.540	870	37.540	1350	37.540	1830	37.540	2310	37.540	2790	37.540
405	37.540	885	37.540	1365	37.540	1845	37.540	2325	37.540	2805	37.540
420	37.540	900	37.540	1380	37.540	1860	37.540	2340	37.540	2820	37.540
435	37.540	915	37.540	1395	37.540	1875	37.540	2355	37.540	2835	37.540
450	37.540	930	37.540	1410	37.540	1890	37.540	2370	37.540	2850	37.540
465	37.540	945	37.540	1425	37.540	1905	37.540	2385	37.540	2865	37.540
480	37.540	960	37.540	1440	37.540	1920	37.540	2400	37.540	2880	37.540

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
5.006		38.500	36.790	0.000	0	0

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Surcharged Outfall Details for Storm

Datum (m) 0.000 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
15	37.540	495	37.540	975	37.540	1455	37.540	1935	37.540	2415	37.540
30	37.540	510	37.540	990	37.540	1470	37.540	1950	37.540	2430	37.540
45	37.540	525	37.540	1005	37.540	1485	37.540	1965	37.540	2445	37.540
60	37.540	540	37.540	1020	37.540	1500	37.540	1980	37.540	2460	37.540
75	37.540	555	37.540	1035	37.540	1515	37.540	1995	37.540	2475	37.540
90	37.540	570	37.540	1050	37.540	1530	37.540	2010	37.540	2490	37.540
105	37.540	585	37.540	1065	37.540	1545	37.540	2025	37.540	2505	37.540
120	37.540	600	37.540	1080	37.540	1560	37.540	2040	37.540	2520	37.540
135	37.540	615	37.540	1095	37.540	1575	37.540	2055	37.540	2535	37.540
150	37.540	630	37.540	1110	37.540	1590	37.540	2070	37.540	2550	37.540
165	37.540	645	37.540	1125	37.540	1605	37.540	2085	37.540	2565	37.540
180	37.540	660	37.540	1140	37.540	1620	37.540	2100	37.540	2580	37.540
195	37.540	675	37.540	1155	37.540	1635	37.540	2115	37.540	2595	37.540
210	37.540	690	37.540	1170	37.540	1650	37.540	2130	37.540	2610	37.540
225	37.540	705	37.540	1185	37.540	1665	37.540	2145	37.540	2625	37.540
240	37.540	720	37.540	1200	37.540	1680	37.540	2160	37.540	2640	37.540
255	37.540	735	37.540	1215	37.540	1695	37.540	2175	37.540	2655	37.540
270	37.540	750	37.540	1230	37.540	1710	37.540	2190	37.540	2670	37.540
285	37.540	765	37.540	1245	37.540	1725	37.540	2205	37.540	2685	37.540
300	37.540	780	37.540	1260	37.540	1740	37.540	2220	37.540	2700	37.540
315	37.540	795	37.540	1275	37.540	1755	37.540	2235	37.540	2715	37.540
330	37.540	810	37.540	1290	37.540	1770	37.540	2250	37.540	2730	37.540
345	37.540	825	37.540	1305	37.540	1785	37.540	2265	37.540	2745	37.540
360	37.540	840	37.540	1320	37.540	1800	37.540	2280	37.540	2760	37.540
375	37.540	855	37.540	1335	37.540	1815	37.540	2295	37.540	2775	37.540
390	37.540	870	37.540	1350	37.540	1830	37.540	2310	37.540	2790	37.540
405	37.540	885	37.540	1365	37.540	1845	37.540	2325	37.540	2805	37.540
420	37.540	900	37.540	1380	37.540	1860	37.540	2340	37.540	2820	37.540
435	37.540	915	37.540	1395	37.540	1875	37.540	2355	37.540	2835	37.540
450	37.540	930	37.540	1410	37.540	1890	37.540	2370	37.540	2850	37.540
465	37.540	945	37.540	1425	37.540	1905	37.540	2385	37.540	2865	37.540
480	37.540	960	37.540	1440	37.540	1920	37.540	2400	37.540	2880	37.540

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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 2
Number of Online Controls 2 Number of Time/Area Diagrams 2
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 ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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.

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	240 Winter	30	+35%	30/15 Summer				38.034
1.001	2	240 Winter	30	+35%	30/15 Summer				38.029
1.002	3	240 Winter	30	+35%	30/15 Summer				38.020
1.003	4	240 Winter	30	+35%	30/15 Summer				38.009
1.004	5	240 Winter	30	+35%	30/15 Summer				38.004
2.000	6	240 Winter	30	+35%	30/15 Summer				38.000
3.000	7	240 Winter	30	+35%	30/15 Summer				38.003
1.005	8	240 Winter	30	+35%	30/15 Summer				37.996
1.006	9	240 Winter	30	+35%	30/15 Summer				37.987
1.007	10	240 Winter	30	+35%	30/15 Summer				37.962
4.000	11	240 Winter	30	+35%	30/15 Summer				37.963
4.001	12	240 Winter	30	+35%	30/15 Summer				37.955
1.008	13	240 Winter	30	+35%	30/15 Summer				37.948
5.000	14	120 Winter	30	+35%	30/15 Summer				38.234
5.001	15	120 Winter	30	+35%	30/15 Summer				38.224
5.002	16	120 Winter	30	+35%	30/15 Summer				38.211
5.003	17	120 Winter	30	+35%	30/15 Summer				38.193
5.004	18	120 Winter	30	+35%	30/15 Summer				38.182
6.000	19	120 Winter	30	+35%	30/30 Winter				38.183

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

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
1.000	1	0.631	0.000	0.14			2.2	FLOOD RISK	
1.001	2	0.748	0.000	0.12			4.8	FLOOD RISK	
1.002	3	0.977	0.000	0.22			8.2	FLOOD RISK	
1.003	4	1.089	0.000	0.42			11.4	FLOOD RISK	
1.004	5	1.107	0.000	0.49			14.7	FLOOD RISK	
2.000	6	0.994	0.000	0.06			1.1	FLOOD RISK	
3.000	7	0.954	0.000	0.12			2.1	FLOOD RISK	
1.005	8	1.137	0.000	0.40			12.0	FLOOD RISK	
1.006	9	1.160	0.000	0.35			12.6	FLOOD RISK	
1.007	10	1.252	0.000	0.46			13.7	FLOOD RISK	
4.000	11	1.127	0.000	0.24			3.8	FLOOD RISK	
4.001	12	1.212	0.000	0.23			3.5	FLOOD RISK	
1.008	13	1.278	0.000	0.26			16.0	FLOOD RISK	
5.000	14	0.380	0.000	0.35			5.6	FLOOD RISK	
5.001	15	0.488	0.000	0.29			11.1	FLOOD RISK	
5.002	16	0.663	0.000	0.42			15.6	FLOOD RISK	
5.003	17	0.790	0.000	0.27			20.8	SURCHARGED	
5.004	18	0.923	0.000	0.43			27.8	SURCHARGED	
6.000	19	0.583	0.000	0.27			4.4	SURCHARGED	

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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	120 Winter	30	+35%	30/30 Summer				38.176
5.005	21	120 Winter	30	+35%	30/15 Summer				38.172
7.000	22	120 Winter	30	+35%	30/60 Winter				38.228
7.001	23	120 Winter	30	+35%	30/15 Summer				38.223
7.002	24	120 Winter	30	+35%	30/15 Summer				38.213
7.003	25	120 Winter	30	+35%	30/15 Summer				38.203
7.004	26	120 Winter	30	+35%	30/15 Summer				38.193
7.005	27	120 Winter	30	+35%	30/15 Summer				38.175
5.006	28	120 Winter	30	+35%	30/15 Summer				38.160

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	0.702	0.000	0.11			3.7	SURCHARGED	
5.005	21	0.982	0.000	0.26			16.9	SURCHARGED	
7.000	22	0.362	0.000	0.09			1.5	FLOOD RISK	
7.001	23	0.495	0.000	0.27			4.3	FLOOD RISK	
7.002	24	0.623	0.000	0.25			8.8	FLOOD RISK	
7.003	25	0.719	0.000	0.24			8.6	FLOOD RISK	
7.004	26	0.816	0.000	0.38			14.1	SURCHARGED	
7.005	27	0.975	0.000	0.44			15.2	SURCHARGED	
5.006	28	1.038	0.000	0.47			28.8	SURCHARGED	

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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 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 2
Number of Online Controls 2 Number of Time/Area Diagrams 2
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 ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 100
Climate Change (%) 50

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
1.001	2	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
1.002	3	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
1.003	4	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
1.004	5	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
2.000	6	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
3.000	7	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
1.005	8	60 Winter	100	+50%	100/15 Summer			
1.006	9	60 Winter	100	+50%	100/15 Summer			
1.007	10	60 Winter	100	+50%	100/15 Summer			
4.000	11	60 Winter	100	+50%	100/15 Summer			
4.001	12	60 Winter	100	+50%	100/15 Summer			
1.008	13	60 Winter	100	+50%	100/15 Summer			
5.000	14	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
5.001	15	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
5.002	16	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
5.003	17	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
5.004	18	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
6.000	19	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
6.001	20	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
5.005	21	60 Winter	100	+50%	100/15 Summer	100/60 Winter		

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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 / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	38.200	0.797	0.266	0.74			12.0	FLOOD
1.001	2	38.202	0.921	1.709	0.49			18.6	FLOOD
1.002	3	38.201	1.158	1.117	0.90			32.7	FLOOD
1.003	4	38.200	1.280	0.292	1.66			45.1	FLOOD
1.004	5	38.200	1.303	0.026	1.95			58.2	FLOOD
2.000	6	38.200	1.194	0.052	0.27			4.4	FLOOD
3.000	7	38.200	1.151	0.203	0.50			8.3	FLOOD
1.005	8	38.196	1.337	0.000	0.66		94	19.7	FLOOD RISK
1.006	9	38.192	1.365	0.000	0.52			18.8	FLOOD RISK
1.007	10	38.178	1.468	0.000	0.63			18.8	FLOOD RISK
4.000	11	38.188	1.352	0.000	0.96			15.0	FLOOD RISK
4.001	12	38.174	1.431	0.000	0.93			14.1	FLOOD RISK
1.008	13	38.165	1.495	0.000	0.29			17.9	FLOOD RISK
5.000	14	38.504	0.650	3.846	0.90			14.5	FLOOD
5.001	15	38.503	0.767	2.820	0.66			24.9	FLOOD
5.002	16	38.502	0.954	1.932	1.03			37.8	FLOOD
5.003	17	38.501	1.097	0.728	0.66			50.5	FLOOD
5.004	18	38.500	1.242	0.281	1.03			67.2	FLOOD
6.000	19	38.500	0.900	0.438	0.66			10.6	FLOOD
6.001	20	38.500	1.026	0.023	0.29			9.8	FLOOD
5.005	21	38.493	1.303	0.022	0.40		76	26.2	FLOOD

PN	US/MH Name	Level Exceeded
1.000	1	1
1.001	2	2
1.002	3	2
1.003	4	1
1.004	5	1
2.000	6	1
3.000	7	1
1.005	8	
1.006	9	
1.007	10	
4.000	11	
4.001	12	
1.008	13	
5.000	14	1
5.001	15	1
5.002	16	2
5.003	17	1
5.004	18	1
6.000	19	1
6.001	20	1

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

PN	US/MH Name	Level Exceeded
5.005	21	

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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) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
7.000	22	60 Winter	100	+50%	100/15 Summer			
7.001	23	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
7.002	24	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
7.003	25	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
7.004	26	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
7.005	27	60 Winter	100	+50%	100/15 Summer	100/60 Winter		
5.006	28	60 Winter	100	+50%	100/15 Summer	100/60 Winter		

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
7.000	22	38.500	0.634	0.000	0.64			10.5	FLOOD RISK
7.001	23	38.500	0.772	0.350	0.65			10.5	FLOOD
7.002	24	38.501	0.911	1.246	0.54			19.5	FLOOD
7.003	25	38.500	1.016	0.120	0.50			18.0	FLOOD
7.004	26	38.500	1.123	0.225	0.82			30.7	FLOOD
7.005	27	38.500	1.300	0.052	0.93			32.3	FLOOD
5.006	28	38.483	1.361	0.002	0.50			30.8	FLOOD

PN	US/MH Name	Level Exceeded
7.000	22	
7.001	23	1
7.002	24	2
7.003	25	1
7.004	26	1
7.005	27	1
5.006	28	

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Appendix H Thames Water - Pre-Planning Enquiry Response

Mr James Scobie

Stantec
Caversham Bridge House
Waterman Place
Reading
RG1 8DB

Wastewater pre-planning
Our ref DS6112332

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