Stag Brewery, Mortlake

Drainage Strategy

For Reselton Properties

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This document has been prepared and checked in accordance with
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Executive Summary

This Drainage Strategy has been prepared by Waterman Infrastructure & Environment ('Waterman IE') on behalf of Reselton Properties Limited ('the Applicant') in support of three linked planning applications for the comprehensive redevelopment of the former Stag Brewery Site in Mortlake ('the Site') within the London Borough of Richmond Upon Thames ('LBRuT').

The former Stag Brewery Site is bounded by Lower Richmond Road to the south, the river Thames and the Thames Bank to the north, Williams Lane to the east and Bulls Alley (off Mortlake High Street) to the west. The Site is bisected by Ship Lane. The Site currently comprises a mixture of large scale industrial brewing structures, large areas of hardstanding and playing fields.

The redevelopment would provide homes (including affordable homes), complementary commercial uses, community facilities, a new secondary school alongside new open and green spaces throughout. Associated highway improvements are also proposed, which include works at Chalkers Corner junction.

The three planning applications are as follows:

- Application A – hybrid planning application for comprehensive mixed use redevelopment of the former Stag Brewery site consisting of:
    i. Land to the east of Ship Lane applied for in detail; and
    ii. Land to the west of Ship Lane (excluding the school) applied for in outline.
- Application B – detailed planning application for the school (on land to the west of Ship Lane).
- Application C – detailed planning application for highways and landscape works at Chalkers Corner.

Full details and scope of all three planning applications are described in the submitted Planning Statement, prepared by Gerald Eve LLP.

This Drainage Strategy has been produced to cover the Stag Brewery component of the Site (Applications A and B) (refer to **Figure 1).** Drainage associated with highways and surface water run-off from the highway drainage associated with the Chalkers Corner part of the Site (Application C) will be addressed as part of the wider highways drainage and would be discharged to the sewer as existing, will not be attenuated, and would continue to be managed by the local highways authority. It is therefore considered to be appropriate and robust to focus the Drainage Strategy on the Stag Brewery part of the Site herein.

Surface water runoff from the northeast of the Application A site (Stag Brewery component of the Site) would discharge by gravity to the River Thames (adjacent to the northern boundary of the Site) via three outfalls. As the River Thames is tidal in this location, direct discharge to the River would be unrestricted. Surface water runoff from the remainder of the Stag Brewery component of the Site would discharge via gravity to the Thames Water sewer network in the surrounding

highways, at 50% (or 405.0 l/s) of the existing rate. The highways team at London Borough of Richmond upon Thames have confirmed this approach to be acceptable.

Based on a restriction to 405.0 l/s, approximately 2655m^3 of attenuation would be required. This has been calculated using a WinDes Quick Storage Estimate which includes for all storm durations and takes account of a 40% increase in rainfall intensity to account for climate change.

Appropriate treatment would be incorporated into the drainage system to ensure that the quality of water discharged is acceptable. This would be achieved through the incorporation of green roofs, and the potential inclusion of rainwater harvesting and permeable paving. A biomat filtration system within the attenuation tanks and downstream defenders or similar hard engineered solution would also be incorporated to ensure discharge is appropriately treated.

Foul flows from the Stag Brewery component of the Site (Application A and B) to would discharge by gravity the Thames Water sewer network. The existing and proposed foul discharge rates have been calculated using the water consumption method at 14.4l/s and 25.5 l/s respectively.

A Pre-Development enquiry has been submitted to Thames Water to ensure sufficient capacity is available in the foul and surface water sewer networks to accept the proposed flows.

The on-Site drainage networks and Sustainable Drainage Systems would be privately managed and maintained for the lifetime of the Stag Brewery component of the Development (Applications A and B), ensuring they remain fit for purpose and function appropriately. The management company / operator would be appointed post-planning. The school drainage system (Application B) would be delivered and maintained separately from the Application A and C sites.

This report confirms that surface water runoff from the Stag Brewery component of the Site (Applications A and B) can be managed sustainably to ensure that flood risk is not increased elsewhere. It is considered that the information provided within this report satisfies the requirements of the National Planning Policy Framework (NPPF) and the London Plan.

1. Introduction

1.1. This Drainage Strategy has been prepared by Waterman Infrastructure & Environment ('Waterman IE') on behalf of Reselton Properties Limited ('the Applicant') in support of three linked planning applications for the comprehensive redevelopment of the former Stag Brewery Site in Mortlake ('the Site') within the London Borough of Richmond Upon Thames ('LBRuT').

1.2. The redevelopment will provide homes (including affordable homes), complementary commercial uses, community facilities, a new secondary school alongside new open and green spaces throughout. Associated highway improvements are also proposed, which include works at Chalkers Corner junction.

1.3. The three planning applications are as follows:

- Application A – hybrid planning application for comprehensive mixed use redevelopment of the former Stag Brewery site consisting of:
  - i. Land to the east of Ship Lane applied for in detail; and
  - ii. Land to the west of Ship Lane (excluding the school) applied for in outline.
- Application B – detailed planning application for the school (on land to the west of Ship Lane).
- Application C – detailed planning application for highways and landscape works at Chalkers Corner.

1.4. Full details and scope of all three planning applications are described in the submitted Planning Statement, prepared by Gerald Eve LLP.

1.5. This Drainage Strategy has been developed for Applications A and B only (hereafter referred to as 'the Stag Brewery component of the Site'). As Application C (hereafter referred to as 'the Chalkers Corner component of the Site') comprises highway land, drainage will be addressed as part of wider highways drainage design under the responsibility of the local highway authority. The surface water run-off from the highway drainage will be discharged to the sewer as existing and will not be attenuated. As a result, Chalkers Corner is not included in this Drainage Strategy. Even though a drainage strategy is provided only for the areas covered in Applications A and B, this Drainage Strategy supports all three applications as they cannot be implemented separately from one another.

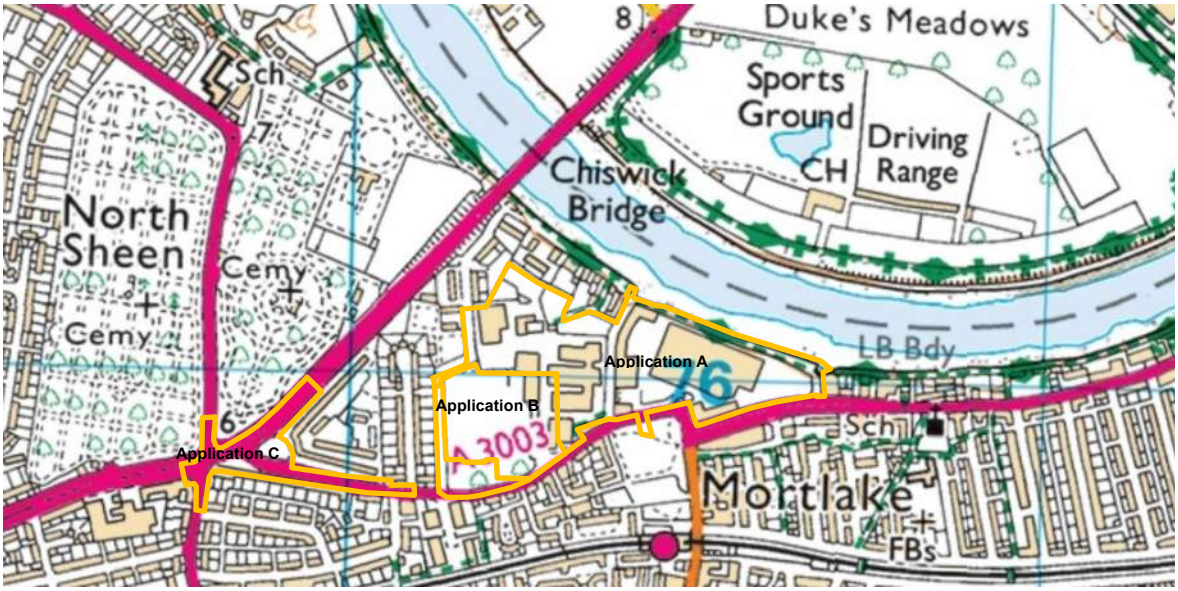
Site Description

1.6. The overall Site comprises two components as follows:

- The Stag Brewery (Application A and B) – an approximately 9.25 ha parcel of land predominantly occupied by the former Stag Brewery; and
- Chalkers Corner (Application C) – an approximately 1.4 ha of highway and associated landscaping referred to as Chalkers Corner junction which includes the junction A316 (Clifford Avenue), A3003 (Lower Richmond Road) and A205 (South Circular).

1.7. The former Stag Brewery Site is bounded by Lower Richmond Road to the south, the river Thames and the Thames Bank to the north, Williams Lane to the east and Bulls Alley (off Mortlake High Street) to the west. The Site is bisected by Ship Lane. The Site currently comprises a mixture of large scale industrial brewing structures, large areas of hardstanding and playing fields. The Site is centred on National Grid Reference 520380, 176003, as shown in Figure 1.

Figure 1: Site Location



Key

Development Location

Source: www.bing.com/maps

2. Planning Policy and Guidance

National Planning Policy Framework and Planning Practice Guidance

2.1. The National Planning Policy Framework[i] (NPPF) was published by the Department of Communities and Local Government in March 2012 and is the current national policy on flood risk and drainage. In relation to drainage it states that local planning authorities should only consider development when priority is given to the use of Sustainable Drainage Systems (SuDS).

2.2. The associated Planning Practice Guidance (PPG)[ii] provides additional guidance to the NPPF. The PPG requires drainage systems for new development to treat surface water at source using SuDS where practicable, to mimic natural conditions.

2.3. The PPG sets out that SuDS should be considered on a site-specific basis and should be provided unless it is demonstrated that they would be inappropriate. It goes on to set out that the local planning authority should be satisfied that the proposed minimum standards of operation are appropriate and that arrangements for ongoing maintenance are clear. This should be commensurate with the nature and scale of the proposed development.

Non-statutory Technical Standards for Sustainable Drainage Systems

2.4. The Non-statutory Technical Standards for Sustainable Drainage Systems[iii] was published in March 2015 and is the current guidance for the design, maintenance and operation of SuDS.

2.5. The standards set out that the peak runoff rates should be as close as is reasonably practicable to the greenfield rate, but should never exceed the pre-development runoff rate.

2.6. The standards also set out that the drainage system should be designed so that flooding does not occur on any part of the Site for a 1 in 30 year rainfall event, and that no flooding of a building (including basement) would occur during a 1 in 100 year rainfall event.

2.7. It is also noted within the standards that pumping should only be used when it is not reasonably practicable to discharge by gravity.

London Plan and London Plan Supplementary Planning Guidance

2.8. The London Plan[iv] published in March 2016 sets out the Mayor's policies for development in London.

2.9. The London Plan states that the frequency and consequence of fluvial, surface water and sewer flooding are likely to increase as a result of climate change and identifies SuDS as one of the key ways of ensuring that long-term flood risk is managed. Policy 5.13 promotes the use of SuDS to reduce the contribution of climate change to flooding, and seeks to ensure that surface water runoff is managed as close to its source as possible. Policy 5.11 specifically promotes the inclusion of roof, wall and site planting, where feasible.

2.10. The London Plan Supplementary Planning Guidance[v] (SPG) entitled 'Sustainable Design and Construction', published in April 2014, provides further information on how to achieve the objectives of the London Plan. Regarding the control of surface water runoff, the SPG states:

- Developers should aim to achieve 100% attenuation of the site's undeveloped surface water runoff rate i.e. achieve greenfield runoff rates; and
- Where greenfield rates cannot be achieved, a minimum of 50% attenuation of the undeveloped sites surface water runoff is expected.

2.11. The SPG also states the SuDS should be utilised for all developments, wherever practical, and should aim to provide additional benefits to a scheme as well as reduce flood risk.

Water Industry Act

2.12. Thames Water is the local Sewerage Undertaker and provides sewerage services under the guidance of the Water Industry Act 1991.

2.13. Under Section 106 of the Water Industry Act, the developer currently maintains the automatic right to 'communicate' with the public foul water sewer system.

LBRuT Local Development Framework

2.14. LBRuT's published a Local Development Framework – Development Management Plan[vi], adopted in November 2011. Policy DM SD 5 encourages the use of living roofs into new developments where they are technically feasible and subject to considerations of visual impact.

2.15. Policy DM SD 7 from the LBRuT Development Management Plan:

"*All development proposals are required to follow the drainage hierarchy when disposing of surface water and must utilise Sustainable Drainage Systems (SuDS) wherever practical. Any discharge should be reduced to greenfield run-off rate wherever feasible. When discharging surface water to a public sewer, developers will be required to provide evidence that capacity exists in the public sewerage network to serve their development.*"

2.16. The Development Management Plan states that to reduce the risk of surface water and sewer flooding, all development proposals in this borough are required to follow the London Plan drainage hierarchy:

- Store rainwater for later use;
- Use infiltration techniques, such as porous surfaces in non-clay areas;
- Attenuate rainwater in ponds or open water features for gradual release to a watercourse;
- Attenuate rainwater by storing in tanks or sealed water features for gradual release to a watercourse;
- Discharge rainwater direct to a watercourse;
- Discharge rainwater to a surface water drain; and
- Discharge rainwater to the combined sewer.

2.17. LBRuT published a Planning Guidance Document – Delivering SuDS in Richmond[vii] in 2015, which provides further guidance on the implementation of SuDS.

2.18. In addition, LBRuT's draft Local Plan (January 2017)[viii], due to be adopted in 2018, contains draft Policy LP21 'Flood Risk and Sustainable Drainage':

"*C. The Council will require the use of Sustainable Drainage Systems (SuDS) in all development proposals. Applicants will have to demonstrate that their proposal complies with the following:*

1. A reduction in surface water discharge to greenfield run-off rates wherever feasible.

2. Where greenfield run-off rates are not feasible, this will need to be demonstrated by the applicant, and in such instances, the minimum requirement is to achieve at least a 50% attenuation of the site's surface water runoff at peak times based on the levels existing prior to the development."

3. Existing Drainage

3.1. Thames Water sewer records (Appendix B) indicate that several sewers are present in the vicinity of and crossing the Stag Brewery component of the Site, as indicated in Table 1.

Table 1: Existing Sewers Associated with the Stag Brewery Component of the Site

Location	Sewer
Crossing through the north-west of the Stag Brewery component of the Site.	225mm diameter Thames Water foul sewer.
Within north-west of the Stag Brewery component of the Site.	Two Thames Water foul rising mains.
Along north-eastern boundary of the Stag Brewery component of the along Thames towpath.	686mm diameter combined Thames Water sewer.
West of Stag Brewery component of the Site along Willams Lane.	900mm diameter Thames Water surface water sewer.
South of Stag Brewery component of the Site along Lower Richmond Road.	600mm diameter Thames Water surface water sewer.
	750mm diameter and 225mm diameter Thames Water foul water sewer.
Centre of Stag Brewery component of the Site along Ship Lane.	600mm diameter Thames Water surface water sewer.
	225mm diameter Thames Water foul water sewer.

3.2. Following review of the existing onsite drainage records for the Stag Brewery component of the Site (Appendix C) it is understood that existing drainage scenario is as follows:

- Existing foul flows discharge to the Thames Water sewer network;
- Existing surface water flows from the north-east of the Stag Brewery component of the Site discharge into the Thames via an existing outfall; and
- Existing surface water flows from the remainder of the Stag Brewery component of the Site discharge to the Thames Water sewer network at various connection points.

3.3. The existing drainage and connections would be confirmed by a CCTV drainage survey post planning.

4. Surface Water Drainage

4.1. As noted previously, the Chalkers Corner component of the Site comprises predominantly highway land, with surface water run-off from the highway drainage discharging into the sewer as existing without attenuation. Drainage design here will be addressed as part of wider highways drainage design under the responsibility of the local highway authority. Accordingly, the proposed drainage strategy included herein covers the Stag Brewery component of the Site only. Any existing highways within Application Boundary A would also discharge as existing.

4.2. The proposed surface water drainage system would be designed to convey surface water only, with foul water being discharged separately. The design would be in accordance with BS EN 752 – Drain and Sewer Systems Outside Buildings[ix], BS EN 12056 – Gravity Drainage Systems Inside Buildings[x], and Approved Document H of Building Regulations[xi].

4.3. In line with Building Regulations and the PPG, the following hierarchy of surface water disposal should be adhered to, in decreasing order of preference.

i. Discharge to ground;
ii. Discharge to a surface water body;
iii. Discharge to a surface water sewer; and
iv. Discharge to a combined sewer.

Discharge to Ground

4.4. LBRuT's preferred drainage solution would be to discharge surface water runoff to the ground. According to the Preliminary Environment Risk Assessment by Waterman[xii] (February 2018), the Stag Brewery component of the Site is underlain by clay, with the likelihood of high groundwater due to the Site's proximity to the River Thames. The report also states the possibility of contamination due to the previous industrial uses on Site. Therefore, the use of infiltration techniques is unlikely to be feasible.

Discharge to a Surface Water Body

4.5. The second most sustainable option would be to discharge directly to a surface water body. Due to the proximity to the River Thames, the north-eastern part of the Stag Brewery component of the Site would be able to discharge directly into the River.

4.6. An existing residential area lies between the western part of the Stag Brewery component of the Site and the River Thames. As such, there is no means to provide a connection directly into the Thames from the western or south-eastern part of the Stag Brewery component of the Site.

Discharge to a Sewer

4.7. Thames Water sewer records (Appendix B) indicate that several surface water sewers are present in the vicinity of the Stag Brewery component of the Site, which ultimately connect into the River Thames. The on-Site sewer records (Appendix C) show that some areas of the Stag Brewery component of the Site currently drain to the Thames Water surface water sewer network.

4.8. Areas of the Stag Brewery component of the Site that cannot make a direct connection to the River Thames would instead connect to the Thames Water sewer network as per the existing situation.

Sustainable Drainage Systems

4.9. The most sustainable way to drain surface water runoff is through the use of Sustainable Urban Drainage Systems (SuDS), which need to be considered in relation to Site-specific constraints.

4.10. SuDS mimic the natural drainage system and provide a method of surface water drainage which can decrease the quantity of water discharged, and hence reduce the risk of flooding. In addition to reducing flood risk, SuDS features improve water quality, and provide biodiversity and amenity benefits.

4.11. The potential for SuDS was considered throughout the design process with workshops being held by the design team to discuss the various constraints and opportunites for each of the SuDS devices, as outlined in Table 2 below.

Table 2: Sustainable Drainage Techniques

Device	Description	Constraints/Comments	✓/✗
Green / brown roofs (source control).	Provide soft landscaping at roof level which reduces surface water runoff.	There are no constraints to the incorporation of green / brown roofs. The location of green roofs proposed is shown on the scheme plans (Appendix A).	✓
Infiltration devices & Soakaways (source control).	Store runoff and allow water to percolate into the ground via natural infiltration.	The underlying geology, high groundwater levels, and potential contamination risks preclude the potential for infiltration.	✗
Pervious surfaces (source control).	Storm water is allowed to infiltrate through the surface into a storage layer, from which it can either infiltrate and / or slowly release to sewers.	The underlying geology, high groundwater levels, and potential contamination risks preclude the potential for infiltration. The area viable for permeable paving is constrained by the proposed basement extents and the fact that some roads and pavements are to be offered up for adoption. However, the inclusion of lined permeable paving / sub-base storage is encouraged and would be further investigated at detailed design stage.	✓
Rainwater harvesting (source control).	Reduces the annual average rate of runoff from a site by reusing water for non-potable uses e.g. toilet flushing or water butts.	There are no constraints to the incorporation of rainwater harvesting. However, the reduction of surface water runoff cannot be quantified with certainty as this would be dependent on the demand for harvested rainwater.	✓
Swales (permeable conveyance).	Broad shallow channels that convey / store runoff, and allow infiltration (ground conditions permitting).	The underlying geology, high groundwater level, and potential contamination risks preclude the potential for infiltration. The tight urban nature of the Stag Brewery component of the Site precludes the inclusion of swales.	✗

Device	Description	Constraints/Comments	✓/✗
Filter drains & perforated pipes (permeable conveyance).	Trenches filled with granular materials (which are designed to take flows from adjacent impermeable areas) that convey runoff while allowing infiltration (ground conditions permitting).	The underlying geology, high groundwater level, and potential contamination risks preclude the potential for filter drains.	✗
Filter Strips (permeable conveyance).	Wide gently sloping areas of grass or dense vegetation that remove pollutants from runoff from adjacent areas.	The underlying geology, high groundwater level, and potential contamination risks preclude the potential for infiltration.	✗
Infiltration basins (end of pipe treatment).	Depressions in the surface designed to store runoff and allow infiltration through the base.	The underlying geology, high groundwater level, and potential contamination risks preclude the potential for infiltration.	✗
Bioretention Systems / Rain Garden (end of pipe treatment).	A shallow landscaped depression which allows runoff to pond temporarily on the surface before filtering through vegetation and underlying soils.	The underlying geology, high groundwater and potential contamination risks preclude the potential for infiltration.	✗
Dry ponds (end of pipe treatment)	Depressions in the surface designed to store runoff without infiltration through the base.	Due to the proposed basement extents, the incorporation of ponds would not be feasible.	✗
Attenuation underground (end of pipe treatment)	Oversized pipes or geo-cellular tanks designed to store water below ground level.	Due to the tight urban nature of the site, attenuation tanks are the only feasible option to restrict runoff to the required rates.	✓

Green Roofs

4.12. Green roofs would provide a bio-diverse habitat in addition to capturing rainwater and naturally slowing the rate of runoff. The proposed locations for green roofs are shown on the development proposals in Appendix A.

Rainwater Harvesting

4.13. The inclusion of rainwater harvesting would decrease the demand on potable water, and could be used for irrigation of the proposed landscaping. However, it cannot be guaranteed that there would always be sufficient demand for recycled water to ensure an empty tank is available prior to a high intensity rainfall event, when the storage is most required. Therefore, rainwater harvesting has not been taken into account in the surface water runoff calculations presented later in the drainage

strategy. Rainwater harvesting is proposed throughout the development in the form of rainwater butts, as a simple means to increase water efficiency and reduce the amount of surface water runoff. Further details would be provided at detailed design stage.

Permeable Paving

4.14. Permeable paving would provide water quality benefits as well as attenuating flows within the lined sub-base structure. The inclusion of permeable paving is suggested throughout the development, particularly within areas that are to be remain private. Further details would be provided at detailed design stage.

Underground Attenuation

4.15. Due to the constrained urban nature of the Site, the only feasible option to restrict surface water runoff sufficiently would be through the use of lined geo-cellular attenuation tanks. These will include pollutant-intercepting biomats, which float on the water and are designed to intercept and treat any potential residual emulsified oils (residual hydrocarbons) that may be present within the surface water. These provide a sutainable solution as it is self-maintaining and 100% recyclable.

Proposed Surface Water Drainage Strategy

Discharge to River Thames

4.16. In line with the drainage hierarchy, it is proposed to discharge surface water runoff from the north-east part of the Stag Brewery component of the Site into the adjacent River Thames. Due to the tidal nature of the Thames in this location, LBRuT accept that surface water runoff can discharge to it unrestricted (Appendix D).

4.17. It is important to include the potential for tide locking in the assessment, to ensure that if the outfall into the Thames becomes surcharged (i.e. if the water level in the river rises above the level of the outfall), any rain falling on the Stag Brewery component of the Site during this time would not cause flooding within the Development. For the purpose of this assessment the Mean High Water Spring Level (MHWS) of 4.13m AOD has been used (as indicated in the 2017 PLA Tide Table in Appendix E), plus an 1.1m for sea level rise over the next 100 years (in accordance with EA guidance). This gives a tide locking design level to be 5.23m AOD. At this design level, the outfall would be surcharged for 5.4 hours during a tidal surge (Appendix F includes tide locking calculations).

4.18. The north-east of the Stag Brewery component of the Site would discharge unrestricted into the River Thames via three outfalls; the existing outfall would be reused if possible subject to CCTV survey and detailed design.

4.19. A proposed basement extends across the majority of the eastern part of the Stag Brewery component of the Site, restricting potential drainage routes to the River Thames and therefore the size of the catchment that could drain to the River Thames. In order to maximise the size of the catchment that could drain to the River Thames, a shallow channel system made up of permavoid tanks is proposed to convey surface water towards the River (note this is for conveyance, not attenuation).

4.20. The channels would be 150mm deep and 3200mm in width (subject to detailed design) and laid flat above the ground floor slab. At the boundary of the basement the channels would be picked up by traditional below ground drainage and directed to the River Thames.

4.21. To ensure this system would work under storm conditions, a Microdrainage network model has been developed. The worst-case scenario (longest channel with largest incoming catchment area) has been assessed and the potential for tide-locking has been incorporated in the analysis. The results (Appendix G) indicate no flooding for the 1 in 100 year plus 40% climate change storm event.

Discharge to Thames Water Sewers

4.22. It is proposed to discharge surface water runoff from the remaining areas of the Stag Brewery component of the Site (that cannot reach the River Thames directly) to the existing Thames Water network. The London Plan ideally requires developments to restrict surface water runoff to the greenfield rate. However, it states that where it can be justified that this volume cannot be incorporated within the development, 50% of the existing rate can be acceptable.

4.23. The potential to restrict runoff to the greenfield runoff rate has been considered throughout the design process. However, the Stag Brewery component of the Site is spatially constrained by the proposed basement extents and level of the existing sewers. To restrict runoff to greenfield rates, the attenuation features would be required to be considerably deeper to accommodate a larger volume. As a result, discharge to sewers by gravity would not be possible. To avoid pumping requirements for most of the proposed attenuation tanks across the Site, it is proposed to restrict runoff to the public sewer network to 50% of the existing rate. This has been agreed with the LBRuT (Appendix D).

4.24. The total drained area of the Stag Brewery component of the Site is 5.69ha. This excludes the existing green area in the south-west of the Stag Brewery Site, to the south of the proposed school, as it would remain a green park area as part of the Development. It also excludes the north-east part of the Stag Brewery Site which would drain directly to the River Thames.

4.25. The existing runoff rate has been calculated for the 1 in 100 year 60 minute event using the Modified Rational Method. This gives an existing runoff rate off 812.3 l/s (Appendix H) for the Stag Brewery component of the Site. Runoff would therefore be restricted to 405.0 l/s, representing slightly more than a 50% restriction of the existing rate.

4.26. Based on a restriction to 405.0 l/s, 2655m^3 of attenuation would be required. This attenuation volume has been calculated for each of the drainage catchments (drainage catchment drawing included in Appendix I) using a WinDes Quick Storage Estimate which includes for all storm durations (Appendix H) and takes account of a 40% increase in rainfall intensity to account for climate change. As a worst-case, the current strategy assumes that all of the 5.69ha draining to the public sewer network would be positively drained. This ensures that the scheme is robust going forward.

4.27. The Development (Applications A and B) has been divided into drainage catchments, mimicking the existing scenario as much as practicable. The attenuation required within each drainage catchment on a pro-rata basis is shown in Table 3 below and the drainage layout drawings in Appendix I.

Table 3: Attenuation Requirements

Catchment	Area (ha)	Allowable Discharge Rate (l/s)	Required attenuation (m^3)
Whole Stag Brewery component of the Site (includes areas to discharge into sewer network only)	5.69	405.0	2655
East part of the Stag Brewery component of the Site – 1	0.30	21.3	140
East part of the Stag Brewery component of the Site – 2	0.25	17.8	117
East part of the Stag Brewery component of the Site – 3	0.18	12.8	84
West part of the Stag Brewery component of the Site – School	2.18	155.2	1017
West part of the Stag Brewery component of the Site – 4	1.07	76.2	499
West part of the Stag Brewery component of the Site – 5	0.54	38.5	252
West part of the Stag Brewery component of the Site – 6	0.38	26.9	177
West part of the Stag Brewery component of the Site – 7	0.79	56.3	369

4.28. The drainage layout drawings in Appendix I show attenuation being provided by geo-cellular tanks within each catchment. This ensures a robust drainage scheme is proposed ensuring no flooding for the design storm event including for climate change. The potential to use permeable paving to reduce the size of geo-cellular tanks required would be investigated during detailed design.

4.29. The area comprising the proposed school (Application B) has been designed as a separate catchment, with surface water flows attenuated within a geo-cellular storage tank below the proposed sports pitch to the south of the school building and two tanks in series in the north of the school site. Surface water would be discharged into the Thames Water surface water sewer system via two proposed connections, one to the north and one to the south of the school, which would serve the area comprising the school only.

4.30. Where feasible, the tanks are proposed outside of the basement extent and below the extent of the proposed tree pits. Due to the extensive basement proposed in the north-west of the Stag Brewery component of the Site, two attenuation tanks are proposed within the basement providing the required attenuation volume for catchments 5 and 6. Two rooms have been allocated within the basement for the use of providing attenuation. Surface water from these tanks would be pumped into the adjacent Thames Water sewers. This is to avoid the risks associated with the Thames Water sewers surcharging, which could back-up into the low-lying basement tanks and potentially cause over-flow into the basement rooms. The basement plan as shown on drawing

WIE10667CSA920007.A04 is indicative only and subject to the parameter plans, as this part of the Stag Brewer component of the Site is submitted as an outline application only. The exact layout of the basement tanks is therefore subject to future stages of design.

4.31. There is limited space for attenuation features to serve the proposed residential units in the north-west of the Site. This is because the road and pavements are to be offered up for adoption. A proposed surface water sewer within the road would pick up surface water from the residential units and associated hardstanding areas and discharge into the Thames Water surface water sewer to the west. Attenuation would be provided by two offline attenuation tanks; surface water would back up into these tanks from the flow control structure prior to discharge into the public sewer.

4.32. Appropriate treatment would be incorporated into the drainage system to ensure that the quality of water discharged is acceptable. This would be achieved through the incorporation of green roofs, and the potential inclusion of permeable paving/sub-base storage. A biomat filtration system, downstream defender, petrol interceptor or other hard engineered solution would also be incorporated to ensure discharge is appropriately treated. This report sets out the principles of the SuDS scheme, with details of the proposed SuDS to be provided at the detailed design stage.

4.33. The on-Site drainage networks and SuDS would be privately managed and maintained for the lifetime of the Development, ensuring they remain fit for purpose and function appropriately. The management company / operator would be appointed post-planning.

4.34. The extensive basement proposed as part of the Development includes mainly car parking. It is anticipated that any surface water within the basement would pass through a petrol interceptor prior to being pumped into the foul network; details and requirements are to be confirmed during detailed design.

4.35. The surface water connections would be made to the public sewer system through a Section 106 Agreement with Thames Water, under the Water Industry Act 1991. Where possible the existing connections would be reused. This would be confirmed following a CCTV survey.

Sustainable Drainage Systems Maintenance Plan

4.36. The PPG sets out the requirement for developers to consider the operation, management and maintenance of all SuDS.

4.37. Post construction the on-Site management company (who would be appointed post-planning) would be responsible for the SuDS included in the scheme. Table 4 outlines what maintenance is anticipated for the proposed / potentially proposed SuDS features.

Table 4: Maintenance Plan for SuDS

SuDs and Task	Frequency
Green / Brown Roofs	
Inspect system to replace dead plants as required and ensure plants are sufficiently watered (during establishment period).	As required.

SuDs and Task	Frequency
Inspect system to replace dead plants (post establishment period).	Annually (in autumn).
Remove nuisance and invasive vegetation, including weeds.	Six monthly or as required.
Inspect system to ensure substrate is not eroded and inlet / outlet drains are not blocked.	Annually or as required (after severe storms).
Rainwater Harvesting	
Inspect system for debris / blockages.	Annually or as required.
Permeable Paving	
Brushing and vacuuming.	Once a year.
Stabilise and mow contributing adjacent areas.	As required.
Removal of weeds or management using glyphosphase applied directly into the weeds.	As required.
Remediate any landscaping which, through.vegetation maintenance of soil slip, has been raised to within 50mm of the level of the paving.	As required.
Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required.
Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years as required (if infiltration performance is reduced due to significant clogging).
Initial inspection.	Monthly for three months after installation.
Inspect for evidence of poor operation and / or weed growth – if required, take remedial action.	Three-monthly, 48 hours after large storms in first six months.
Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.
Monitor inspection chambers.	Annually.
Underground Attenuation	
Inspection of silt traps, manholes and pipework, and remove any sediment / debris.	Quarterly or as required.
Jetting of main structure to remove any sediment build up.	Annually or as required.

5. Foul Drainage

5.1. The proposed foul drainage would be designed in accordance with BS EN 752 – Drain and Sewer Systems Outside Buildings[vii], BS EN 12056 – Gravity Drainage Systems Inside Buildings[viii], and Approved Document H of Building Regulations[ix].

5.2. It is understood that foul flows from the existing Stag Brewery component of the Site discharge to the Thames Water foul network in the surrounding highways. It is proposed to mimic this scenario, with new connections into the sewers on Mortlake High Street, Lower Richmond Road, Ship Lane, and Willams Lane according to the proposed building layout. The indicative connection points are shown on the drainage layout (Appendix I).

5.3. The existing and proposed foul discharge rates have been calculated using the water consumption method at 14.4 l/s and 25.5 l/s respectively (Appendix J).

5.4. A Pre-Development enquiry has been submitted to Thames Water to confirm that the existing public sewer network has the capacity to accommodate the foul flows.

5.5. If new connections are required, these would be made to the public sewer system through an S106 Agreement with Thames Water, under the Water Industry Act 1991.

6. Impact on Existing Drainage Infrastructure

6.1. Easements to existing drainage infrastructure crossing the Stag Brewery component of the Site need to be allowed for to ensure it is not impacted upon. The Development complies with all necessary easements, and where these are not possible, appropriate diversions are proposed.

6.2. The 225mm diameter Thames Water foul sewer crossing the Stag Brewery component of the Site is proposed to be diverted as shown on the drainage plan in Appendix I. The two rising mains only service the existing uses within the Stag Brewery component of the Site (now redundant and dis-used), and are proposed to be abandoned as part of the Development (Applications A and B). An easement of 4.0m is allowed for to the combined sewer along the north-eastern boundary of the Site to ensure it is not impacted upon as it conveys off-Site flows.

7. Conclusions

7.1. This Drainage Strategy has been produced to cover the Stag Brewery component of the Site (Applications A and B). Drainage associated with highways and surface water run-off from the highway drainage associated with the Chalkers Corner part of the Site (Application C) will be addressed as part of the wider highways drainage and would be discharged to the sewer as existing, will not be attenuated, and would continue to be managed by the local highways authority. It is therefore considered to be appropriate and robust to focus the Drainage Strategy on the Stag Brewery part of the Site herein.

7.2. Surface water runoff from the northeast of the Application A site (Stag Brewery component of the Site) would discharge by gravity to the River Thames (adjacent to the northern boundary of the Site) via three outfalls. As the River Thames is tidal in this location, direct discharge to the River would be unrestricted. Surface water runoff from the remainder of the Stag Brewery component of the Site would discharge via gravity to the Thames Water sewer network in the surrounding highways, at 50% (or 405.0 l/s) of the existing rate. LBRuT have confirmed this approach to be acceptable.

7.3. Based on a restriction to 405.0 l/s, approximately 2655m^3 of attenuation would be required. This has been calculated using a WinDes Quick Storage Estimate which includes for all storm durations and takes account of a 40% increase in rainfall intensity to account for climate change.

7.4. Appropriate treatment would be incorporated into the drainage system to ensure that the quality of water discharged is acceptable. This would be achieved through the incorporation of green roofs, with the inclusion of rainwater harvesting and permeable paving suggested throughout the development, with further details to be provided during detailed design. A biomat filtration system within the attenuation tanks and downstream defenders or similar hard engineered solution would also be incorporated to ensure discharge is appropriately treated.

7.5. Foul flows from the Stag Brewery component of the Site (Application A and B) would discharge by gravity the Thames Water sewer network. The existing and proposed foul discharge rates have been calculated using the water consumption method at 14.4l/s and 25.5 l/s respectively.

7.6. A Pre-Development enquiry has been submitted to Thames Water to ensure sufficient capacity is available in the foul and surface water sewer networks to accept the proposed flows.

7.7. The on-Site drainage networks and SuDS would be privately managed and maintained for the lifetime of the Stag Brewery component of the Development (Applications A and B), ensuring they remain fit for purpose and function appropriately. The management company / operator would be appointed post-planning. The school drainage system (Application B) would be delivered and maintained separately from the Application A and C sites.

7.8. This report confirms that surface water runoff from the Stag Brewery component of the Site (Applications A and B) can be managed sustainably to ensure that flood risk is not increased elsewhere. It is considered that the information provided within this report satisfies the requirements of the NPPF and the London Plan.

References

[i] Department for Communities and Local Government, March 2012. National Planning Policy Framework.

[ii] Department for Communities and Local Government, March 2014. Planning Practice Guidance [Accessed: August 2015].

[iii] Department for Environment, Food and Rural Affairs, March 2015. Non-statutory technical standards for sustainable drainage systems.

[iv] Greater London Authority, March 2016. The London Plan: Spatial Development Strategy for Greater London consolidated with Alterations since 2011.

[v] Mayor of London, April 2014. Supplementary Planning Guidance: Sustainable Design and Construction.

[vi] London Borough of Richmond Upon Thames (2011); Local Development Framework – Development Management Plan.

[vii] London Borough of Richmond Upon Thames, February 2015. Planning Guidance Document – Delivering SuDS in Richmond.

[viii] London Borough of Richmond upon Thames (2017): Local Plan, Publication version of consultation, 4 January - 15 February 2017.

[ix] British Standards Institution, April 2008. BS EN 752:2008 – Drain and Sewer Systems Outside Buildings.

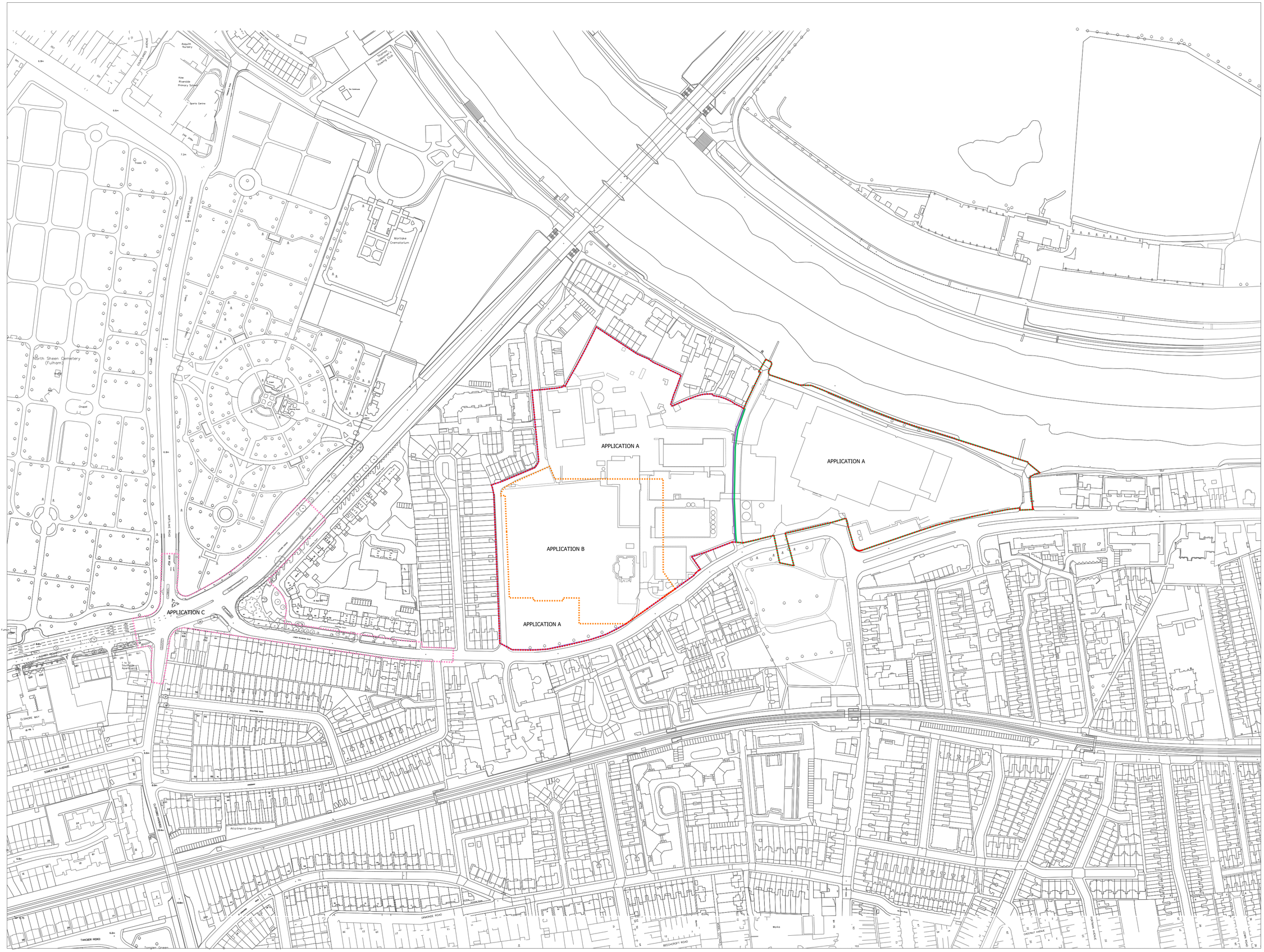
[x] British Standards Institution, September 2000. BS EN 12056-2:2000 – Gravity Drainage Systems Inside Buildings.

[xi] HM Government, 2010. The Building Regulations 2010: H, Drainage and Waste Disposal.

[xii] Waterman Infrastructure & Environment Ltd, 2018. Preliminary Environmental Risk Assessment.

APPENDICES

A. Development Proposals



NOTES:

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- Application A Boundary
- Application B Boundary
- Application C Boundary
- Development Area 1
- Development Area 2

	Date	Check	Rev
PLANNING APPLICATION	12/02/18	BJ	-

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London, SW14 7ET

Drawing
RED LINE SITE LOCATION PLAN - APPLICATIONS A, B AND C

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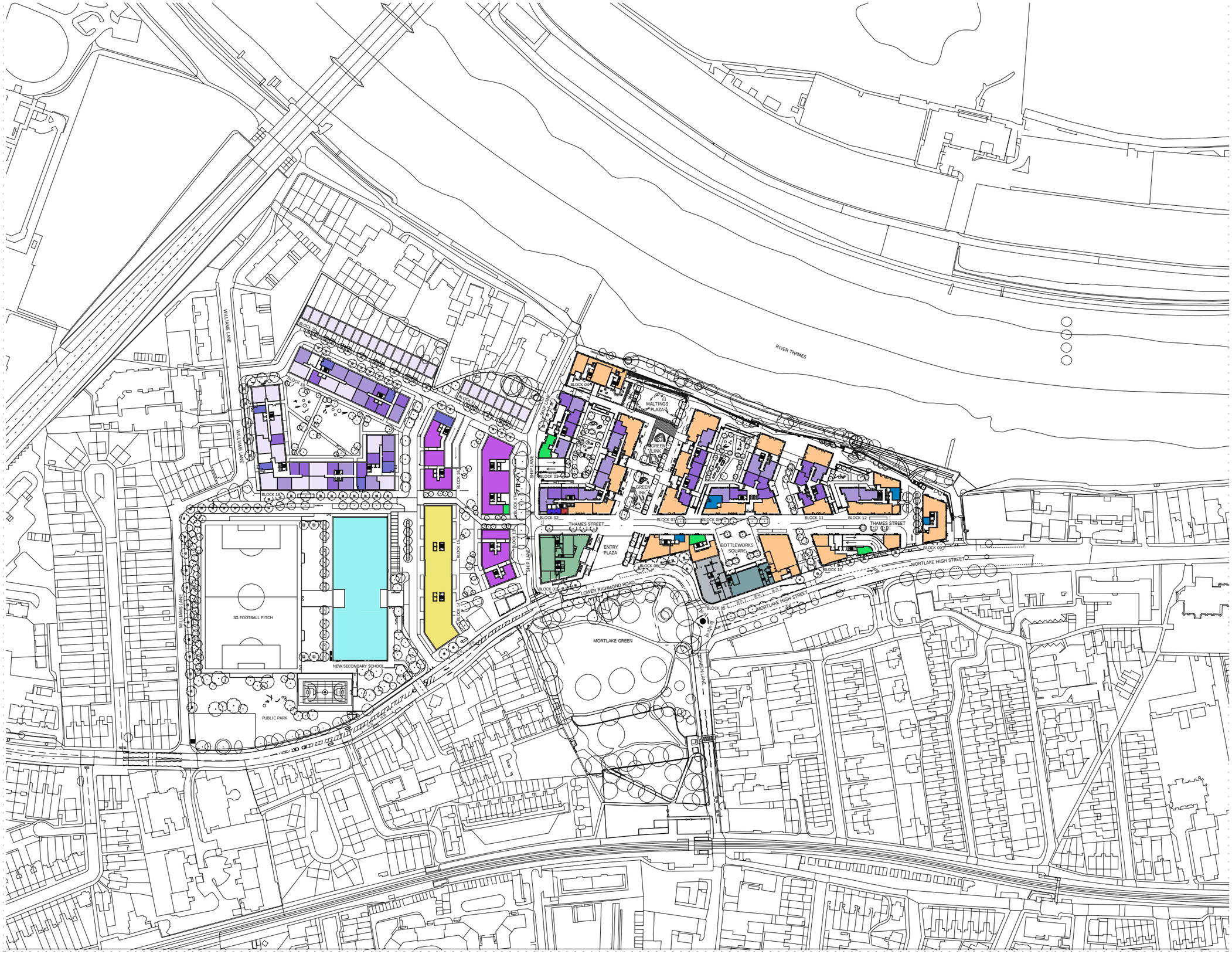

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NORTH

- 1 BED
- 1 BED (L)
- 1 BED (S)
- 2 BED
- 2 BED (L)
- 2 BED (M)
- 3 BED
- 3 BED (H)
- 4 BED
- 4 BED (H)
- ASSISTED LIVING
- CAR PARK ENTRANCE
- CARE HOME
- CINEMA
- CORE
- FLEXIBLE USE
- GAS METER ROOM
- HOTEL
- OFFICE
- PLANT
- REFUSE
- REFUSE STORE
- RESTAURANT/BAR
- SCHOOL
- SMOKE
- SUBSTATION

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PROPOSED MASTERPLAN
GROUND FLOOR LEVEL

Drawn	Date	Scale
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Job Number	Drawing number	Revision
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NOTES:

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NORTH

- 1 BED (L)
- 1 BED (S)
- 2 BED (L)
- 2 BED (M)
- ASSISTED LIVING
- CAR PARK ENTRANCE
- CINEMA
- CORE
- FLEXIBLE USE
- GAS METER ROOM
- HOTEL
- OFFICE
- PLANT
- REFUSE STORE
- RESTAURANT/BAR
- SMOKE
- SUBSTATION

Revision description	Date	Check	Rev
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Drawing

PROPOSED DEVELOPMENT AREA 01
GROUND LEVEL PLAN

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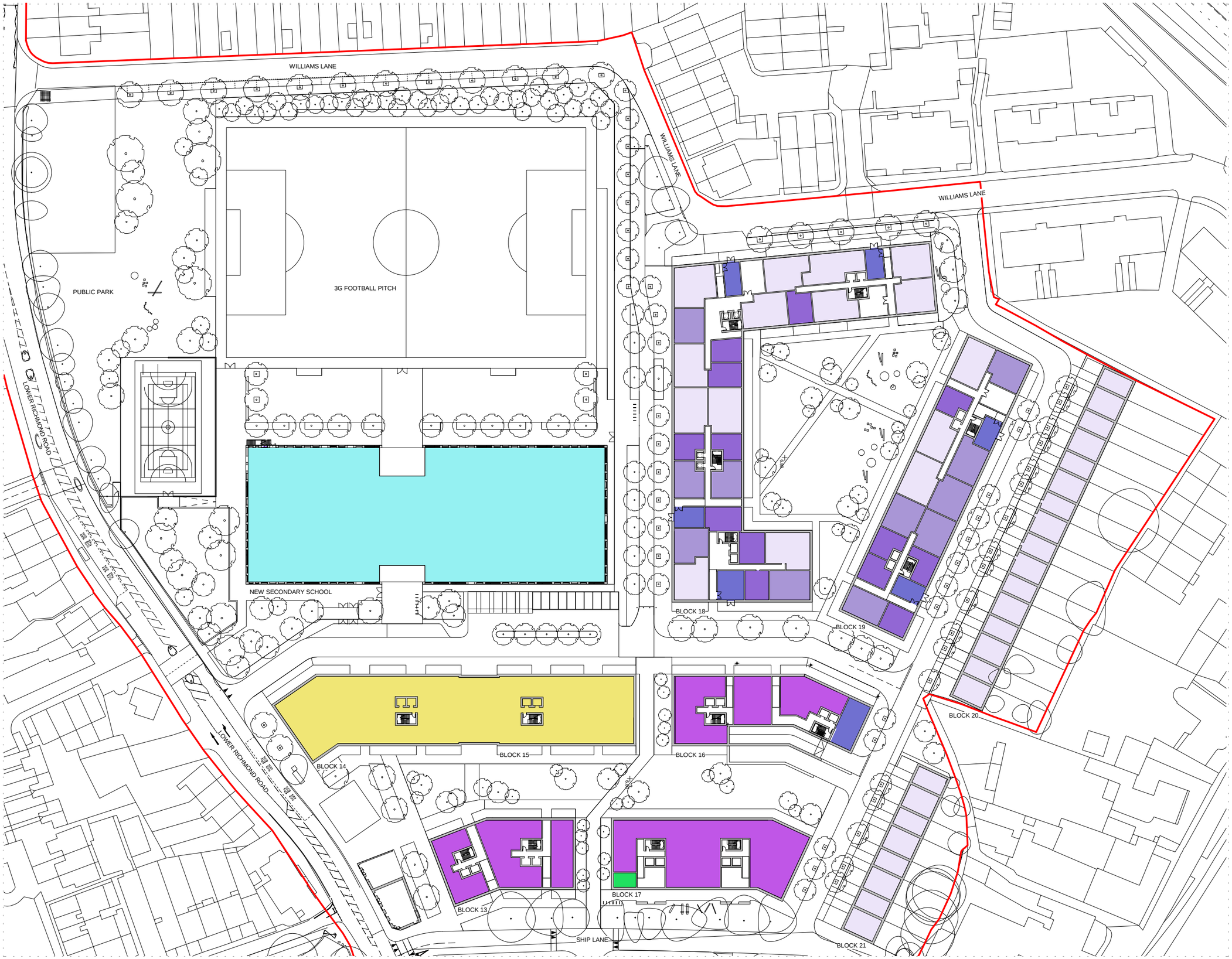

NORTH

- 1 BED
- 2 BED
- 3 BED
- 3 BED (H)
- 4 BED
- 4 BED (H)
- AC WC
- AHU EAST
- ASSISTED LIVING
- BT COMMS INTAKE
- CARE HOME
- CIRCULATION_PLANT
- CL ST
- COMMUNITY LOCKERS
- COMMUNITY OFFICE
- LV SWITCH ROOM
- MAINTENANCE ST
- OFFICE
- REFUSE
- REPROGRAPHICS
- SCHOOL
- SERVER
- SUBSTATION

Revision description	Date	Check	Rev
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PROPOSED DEVELOPMENT AREA 02
GROUND LEVEL PLAN

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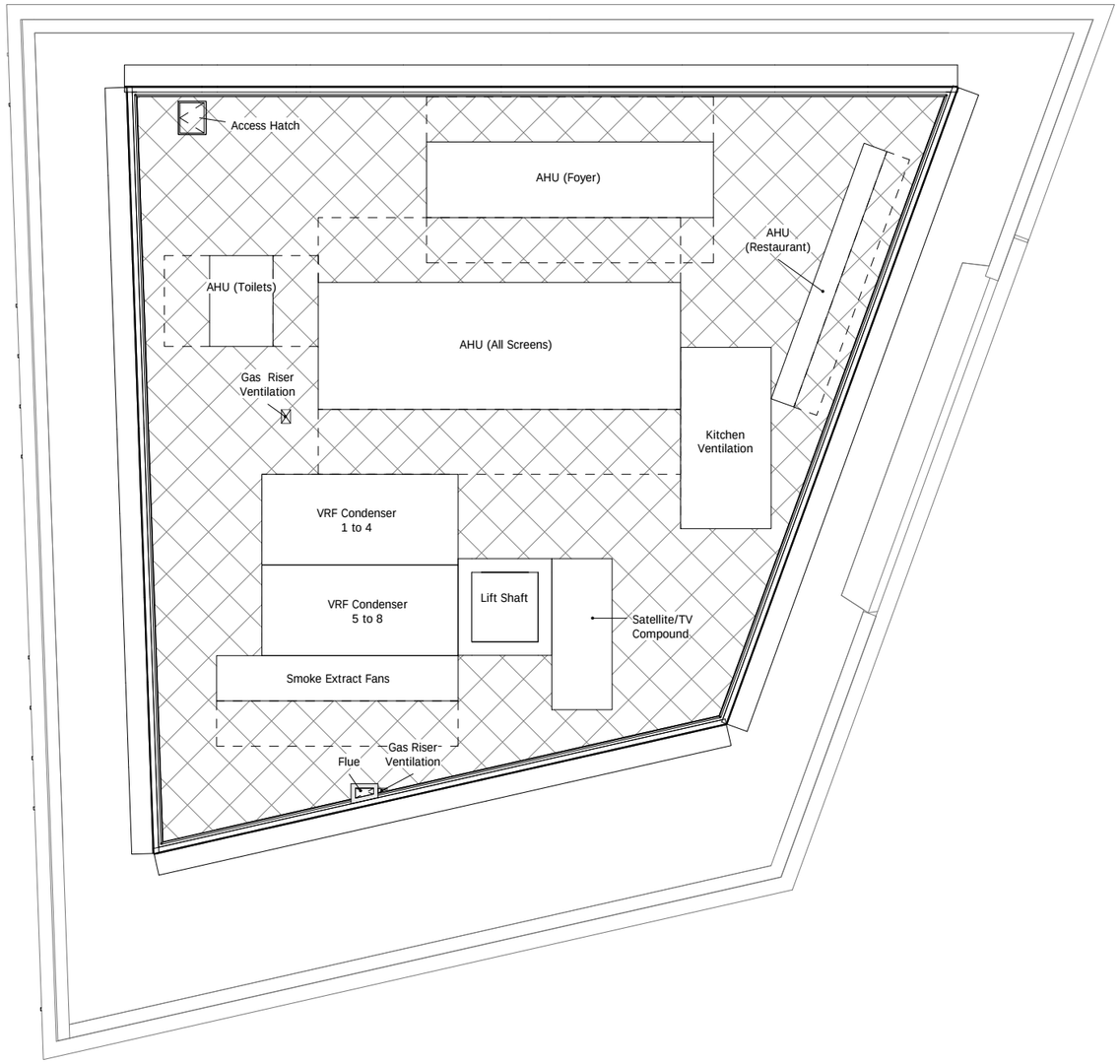

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BUILDING 01 - PROPOSED ROOF PLAN

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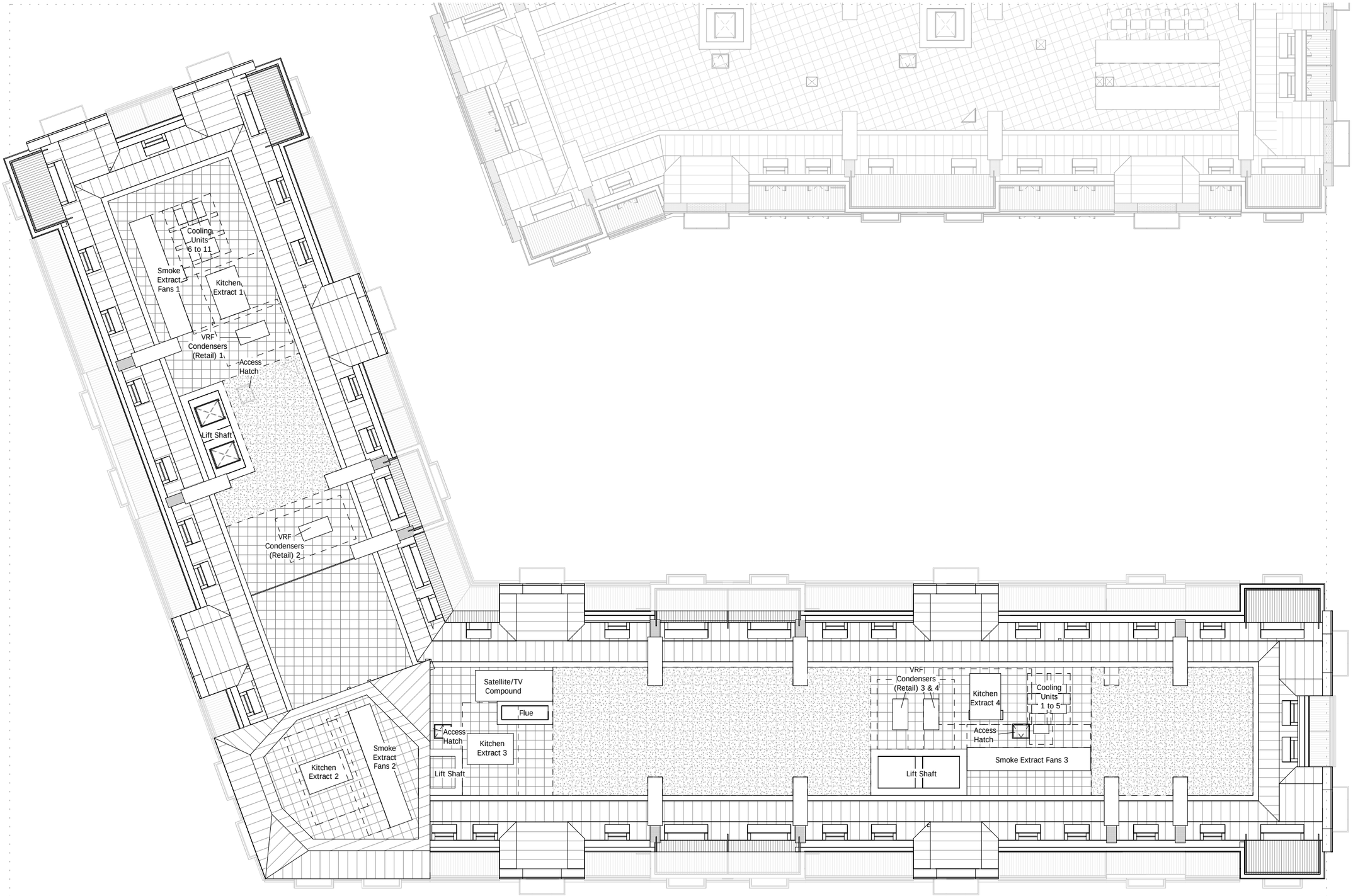

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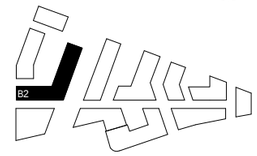

Available roof space for brown/green roof and PVs

Revision description	Date	Check	Rev
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BUILDING 02 - PROPOSED ROOF PLAN

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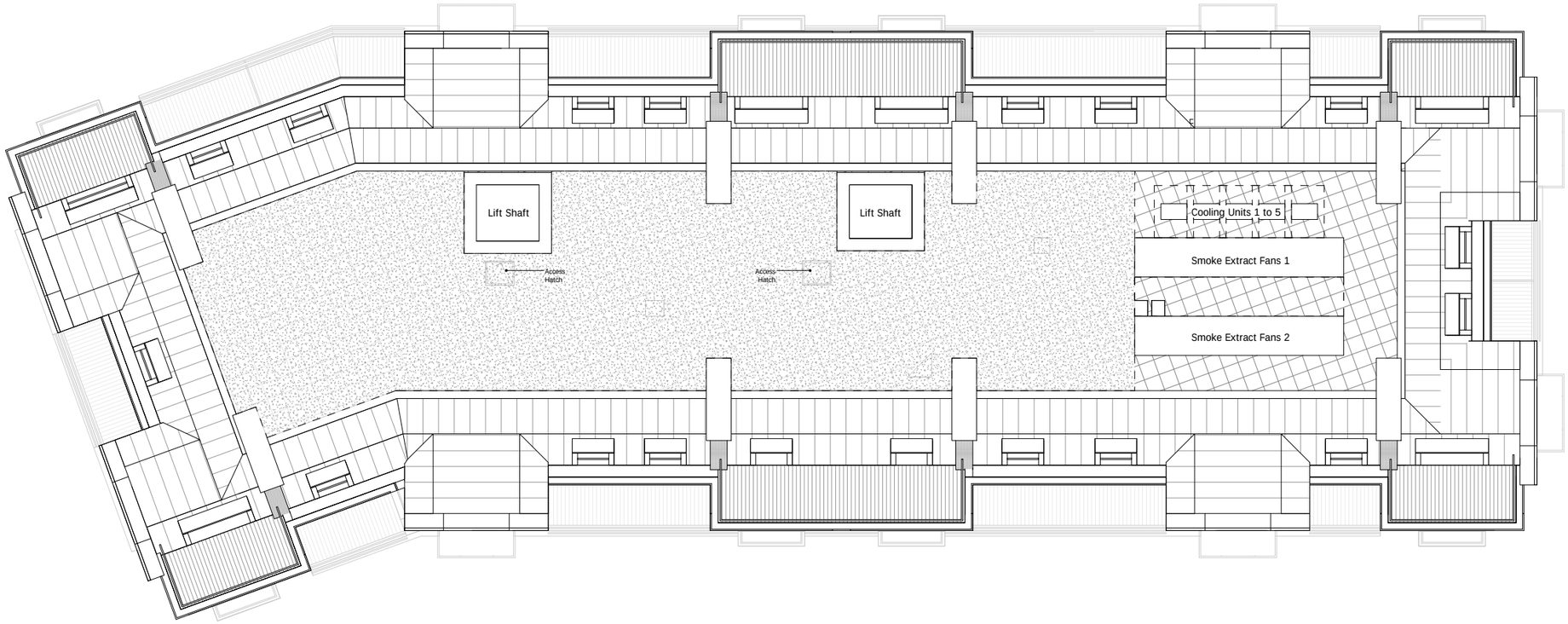

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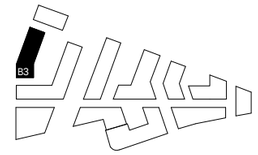

AVAILABLE ROOF SPACE FOR BROWN/GREEN ROOF AND PVs

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BUILDING 03 - PROPOSED ROOF LEVEL

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Job Number	Drawing number	Revision
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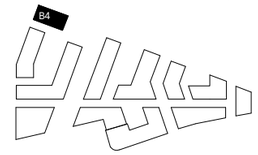

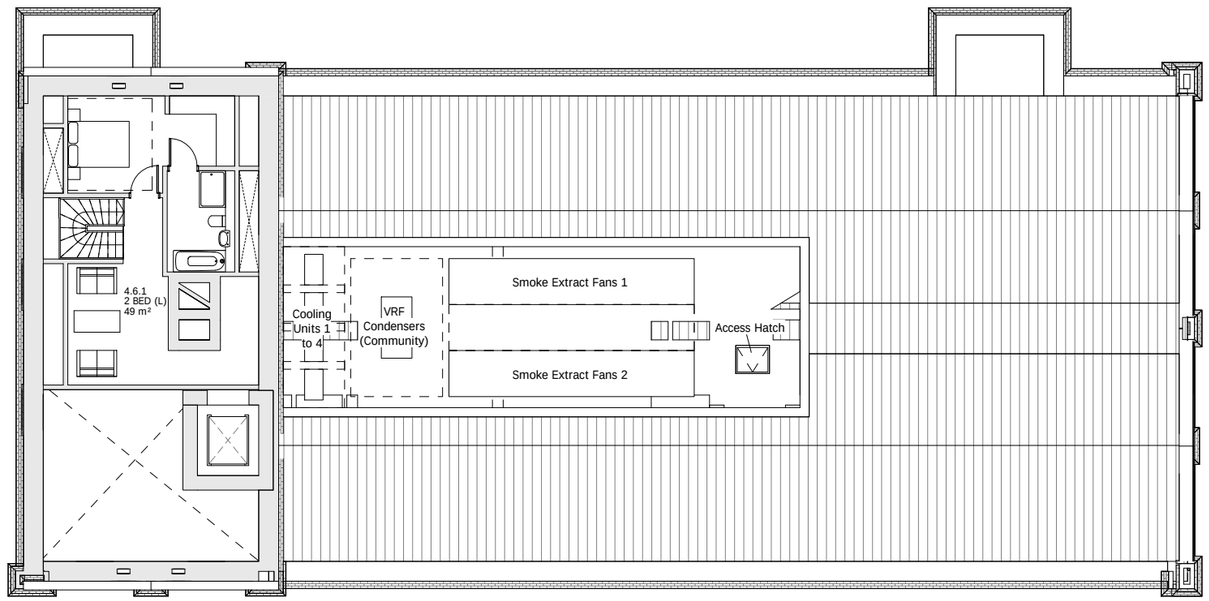

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BUILDING 04 - PROPOSED SEVENTH FLOOR PLAN

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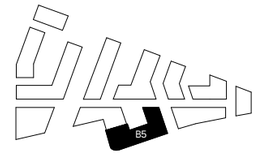

Available roof space for brown/green roof and PVs

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BUILDING 05 - PROPOSED ROOF PLAN

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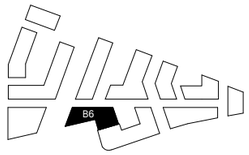

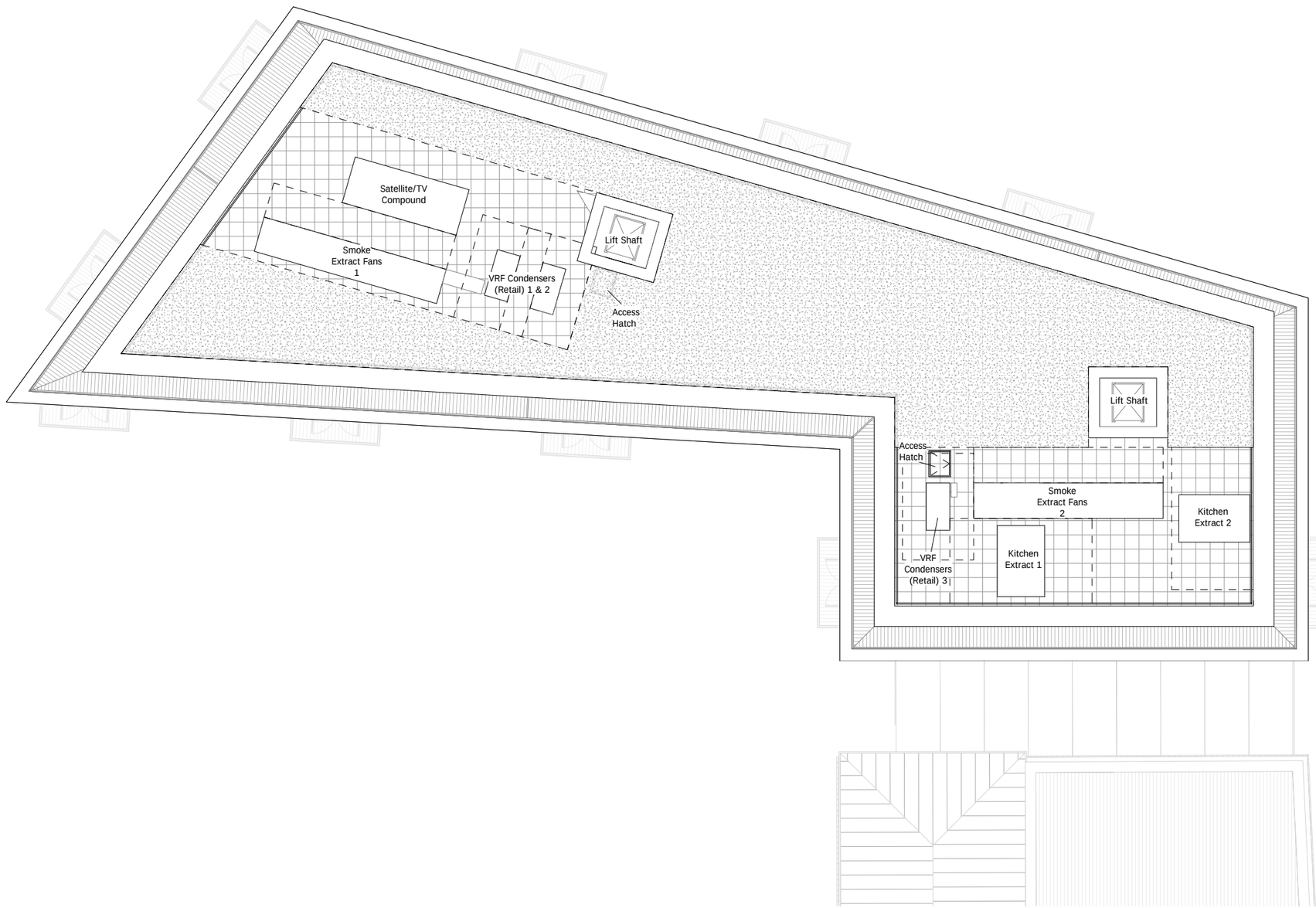

Available roof space for brown/green roof and PVs

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BUILDING 06 - PROPOSED ROOF PLAN

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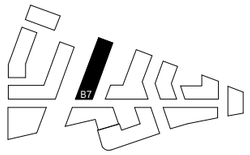
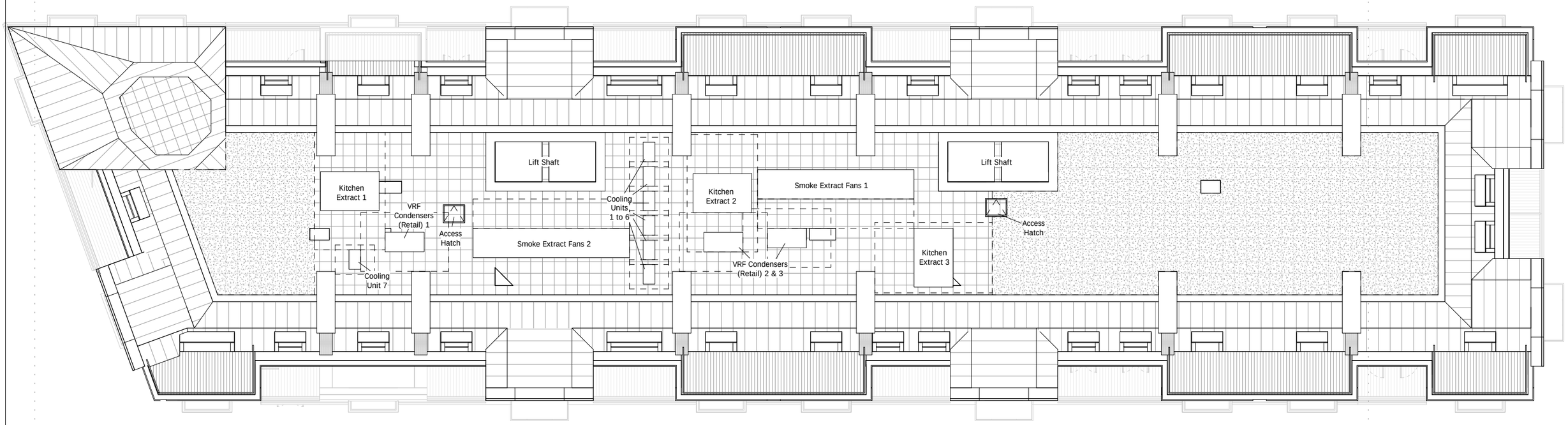


Available roof space for brown/green roof and PVs



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BUILDING 07 - PROPOSED ROOF PLAN

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Job Number	Drawing number	Revision
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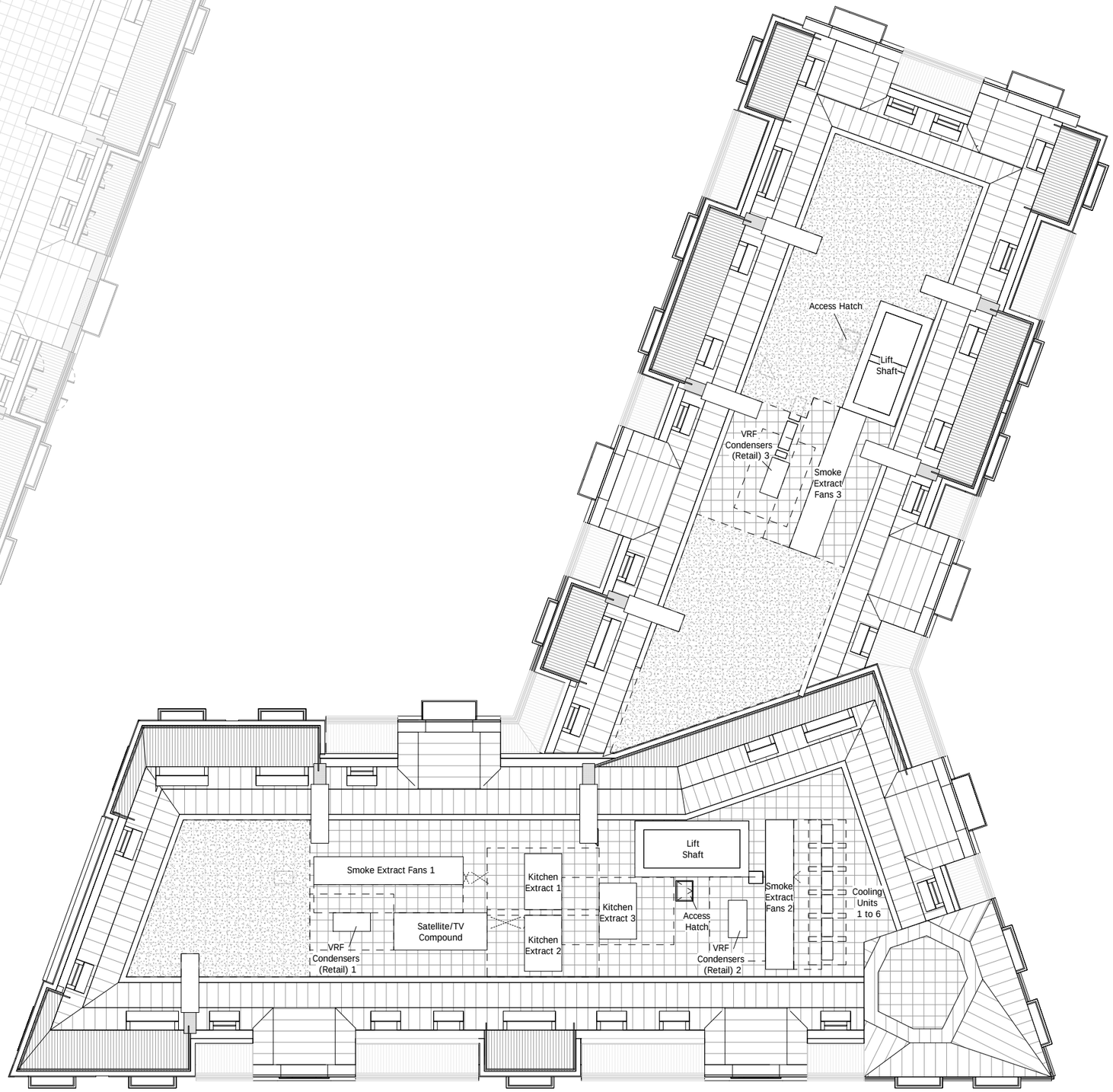

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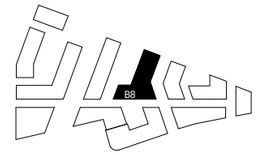

Available roof space for brown/green roof and PVs

Revision description	Date	Check	Rev
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BUILDING 08 - PROPOSED ROOF PLAN

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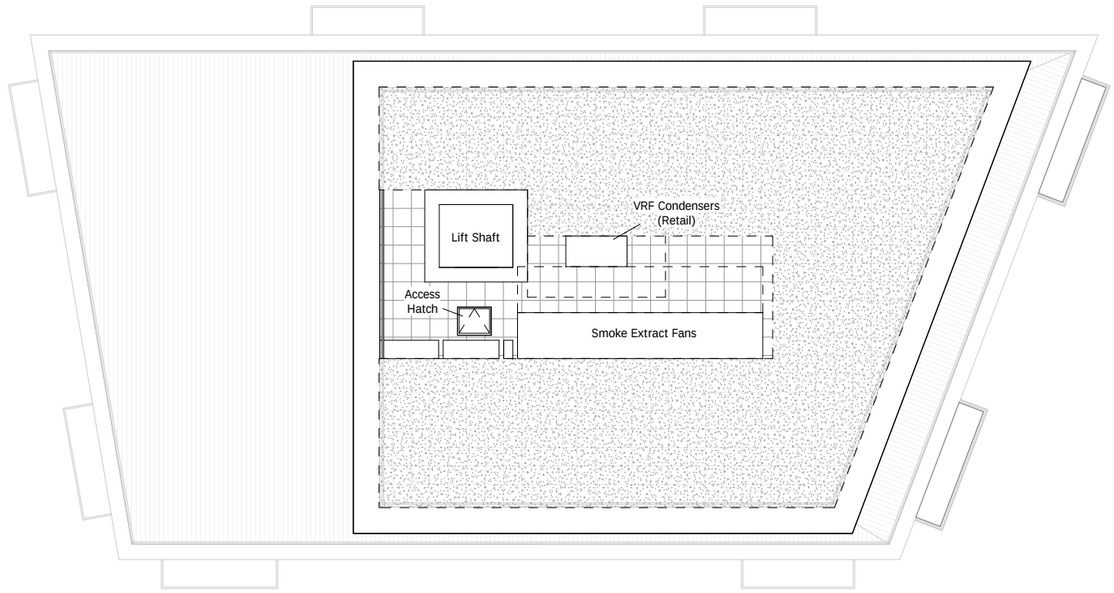

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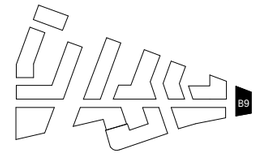

AVAILABLE ROOF SPACE FOR BROWN/GREEN ROOF AND PVs

Revision description	Date	Check	Rev
FINAL DRAFT PLANNING APPLICATION	18/01/18	BJ	-

SQUIRE & PARTNERS

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Project

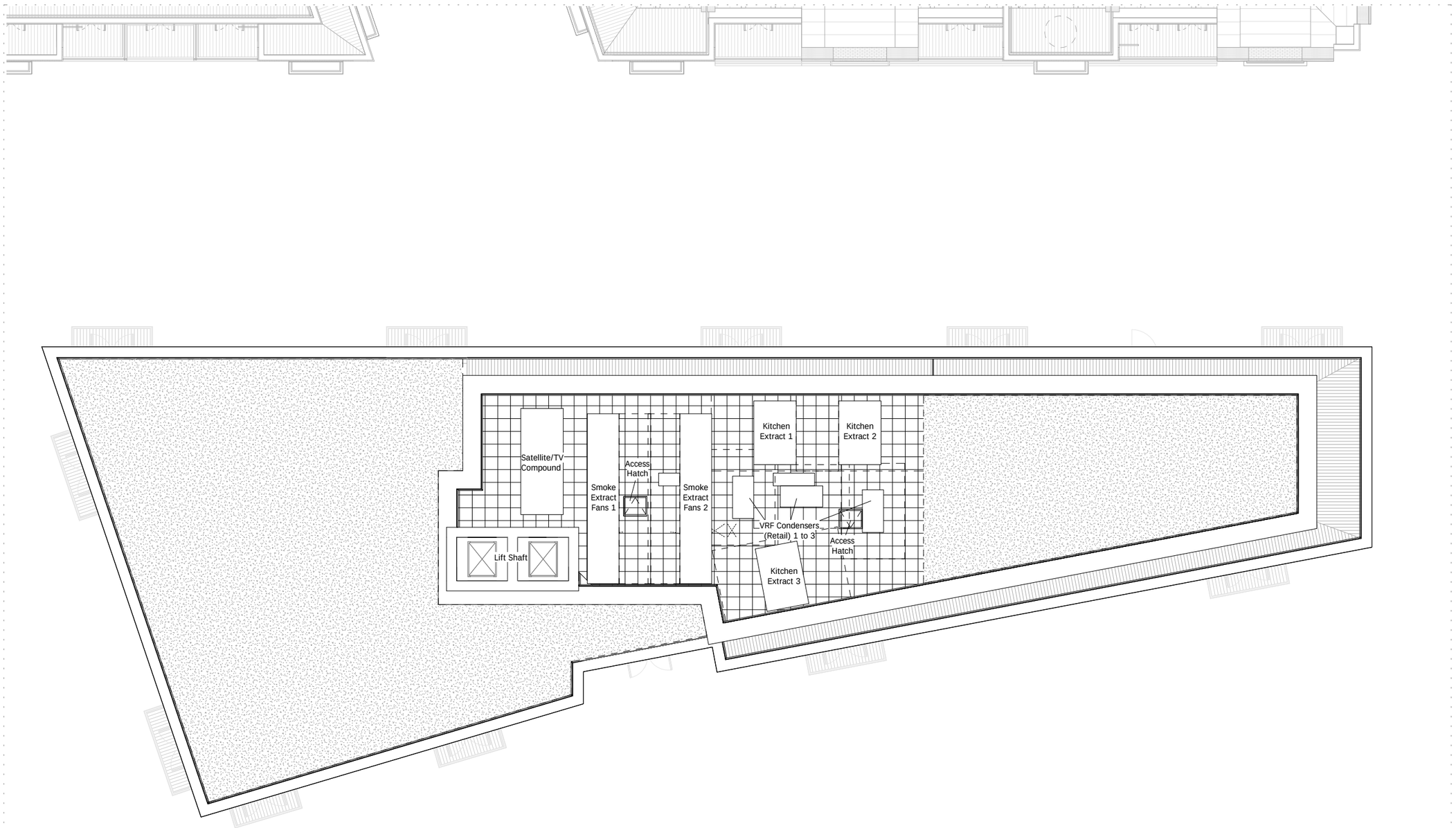
Stag Brewery
Richmond

Drawing

BLUILDING 09 - PROPOSED ROOF PLAN

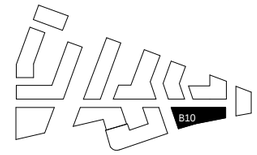
Drawn	Date	Scale
KHO	01/16/18	1 : 100 @ A1 1 : 200 @ A3

Job Number	Drawing number	Revision
16019	C645_B09_P_RF_001	-



0 1 2 5 10 m

NORTH



AVAILABLE ROOF SPACE FOR BROWN/GREEN ROOF AND PVs

Revision description	Date	Check	Rev
FINAL DRAFT PLANNING APPLICATION	18/01/18	BJ	-

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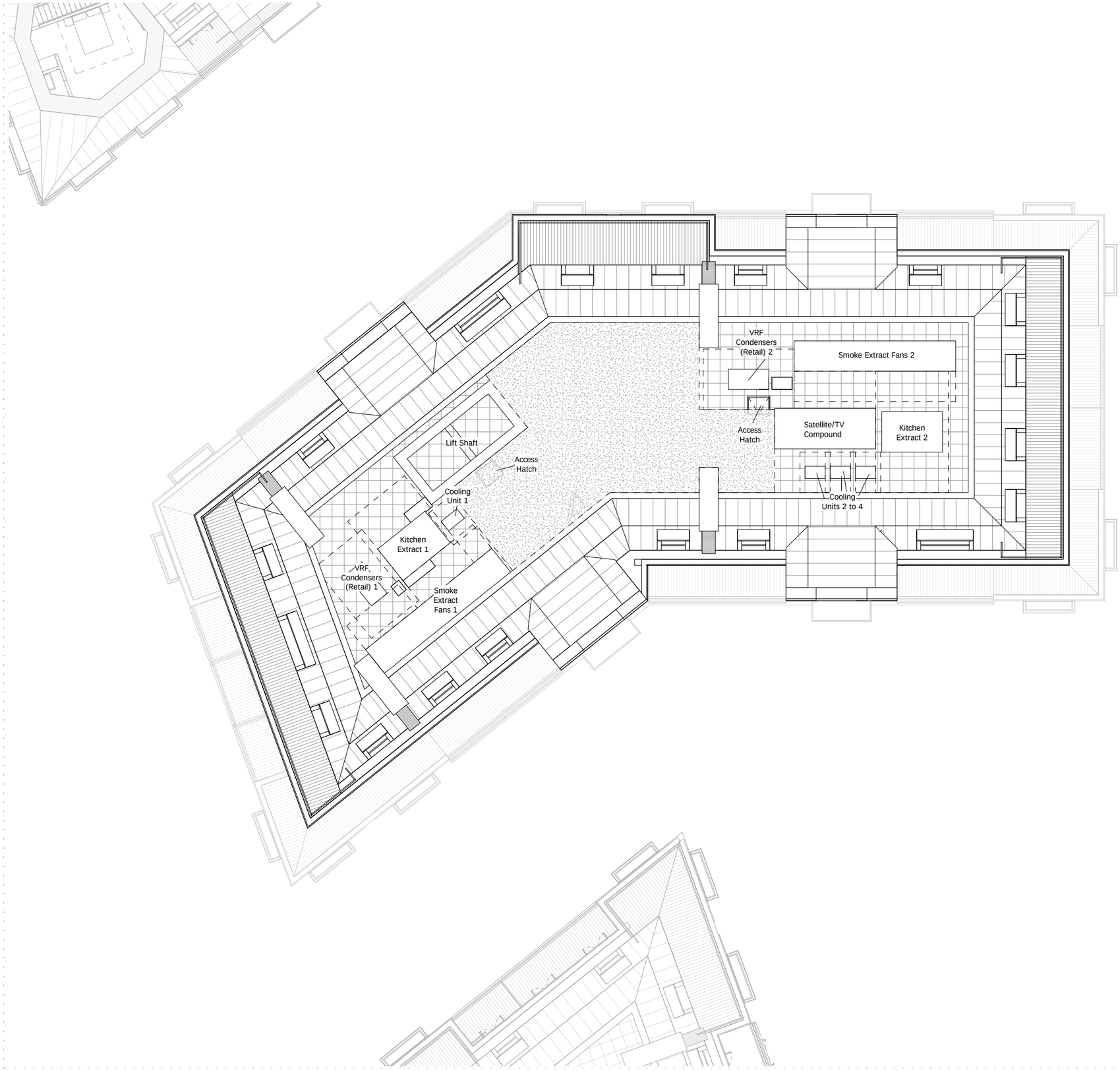
Drawing

BUILDING 10 - PROPOSED ROOF PLAN

Drawn	Date	Scale
KHO	01/16/18	1 : 100 @ A1 1 : 200 @ A3

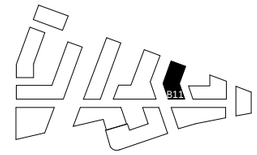
Job Number	Drawing number	Revision
16019	C645_B10_P_RF_001	-



NOTES:

DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS TO BE CHECKED ON SITE. ALL OMISSIONS AND DISCREPANCIES TO BE REPORTED TO THE ARCHITECT IMMEDIATELY.

NORTH



AVAILABLE ROOF SPACE FOR BROWN/GREEN ROOF AND PVs

Revision description	Date	Check	Rev
FINAL DRAFT PLANNING APPLICATION	18/01/18	BJ	-

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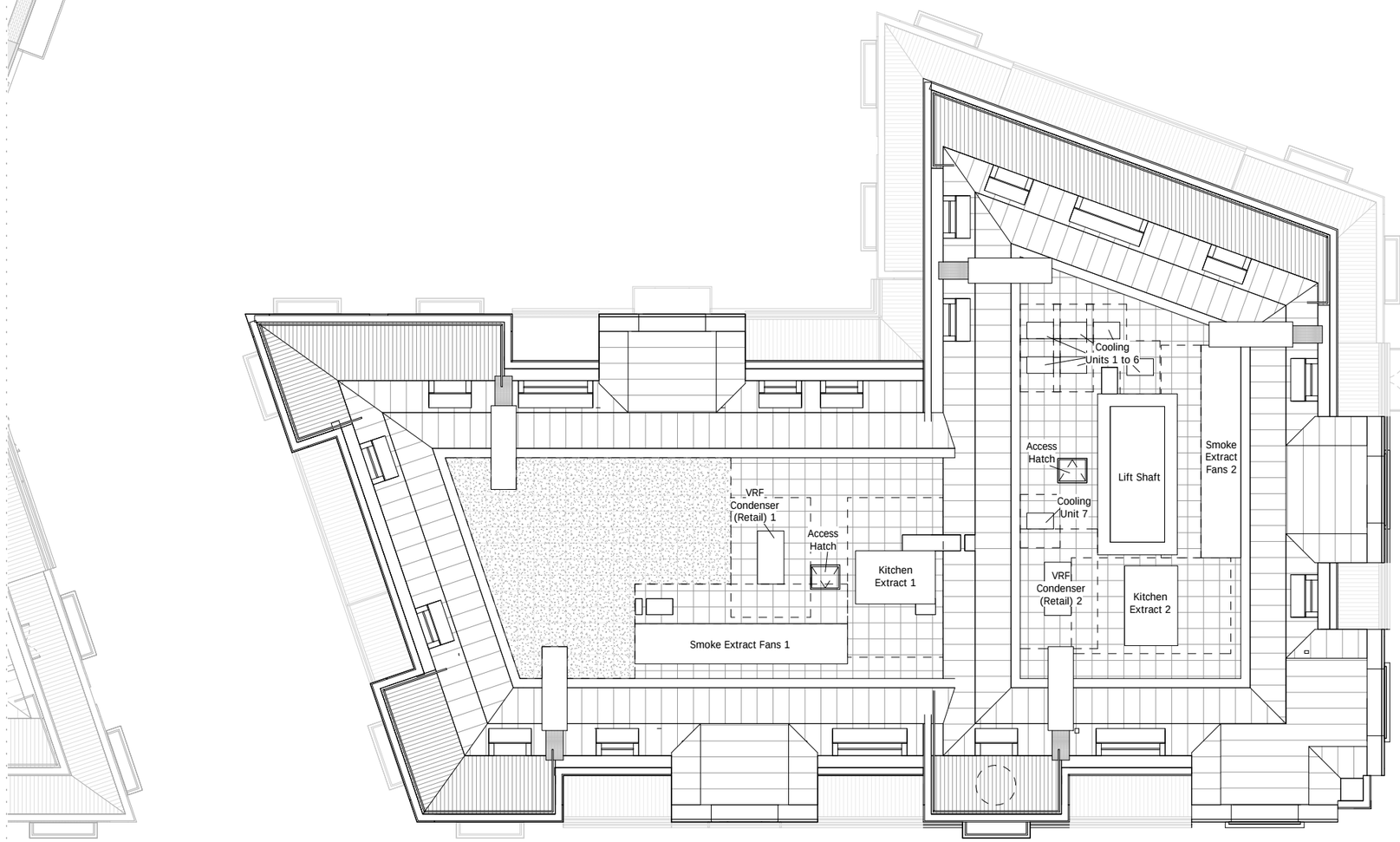
Drawing

BUILDING 11 - PROPOSED ROOF PLAN

Drawn	Date	Scale
KHO	01/16/18	1 : 100 @ A1 1 : 200 @ A3

Job Number	Drawing number	Revision
16019	C645_B11_P_RF_001	-

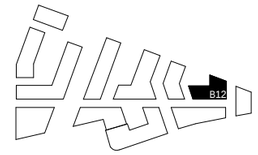


0 1 2 5 10 m

NOTES:

DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS TO BE CHECKED ON SITE. ALL OMISSIONS AND DISCREPANCIES TO BE REPORTED TO THE ARCHITECT IMMEDIATELY.

NORTH



AVAILABLE ROOF SPACE FOR BROWN/GREEN ROOF AND PVs

Revision description	Date	Check	Rev
FINAL DRAFT PLANNING APPLICATION	18/01/18	BJ	-

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Drawing

BUILDING 12 - PROPOSED ROOF PLAN

Drawn	Date	Scale
KHO	01/16/18	1 : 100 @ A1 1 : 200 @ A3

Job Number	Drawing number	Revision
16019	C645_B12_P_RF_001	-

NOTES:

DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS TO BE CHECKED ON SITE. ALL OMISSIONS AND DISCREPANCIES TO BE REPORTED TO THE ARCHITECT IMMEDIATELY.

NORTH

PROPOSED SITE LEVELS

BLOCK DATUM (GROUND LEVEL)

13-21 BLOCK NUMBER

PLANNING APPLICATION BOUNDARY

INDICATIVE

Revision description	Date	Check	Rev
FINAL DRAFT PLANNING APPLICATION	18/01/18	BJ	-

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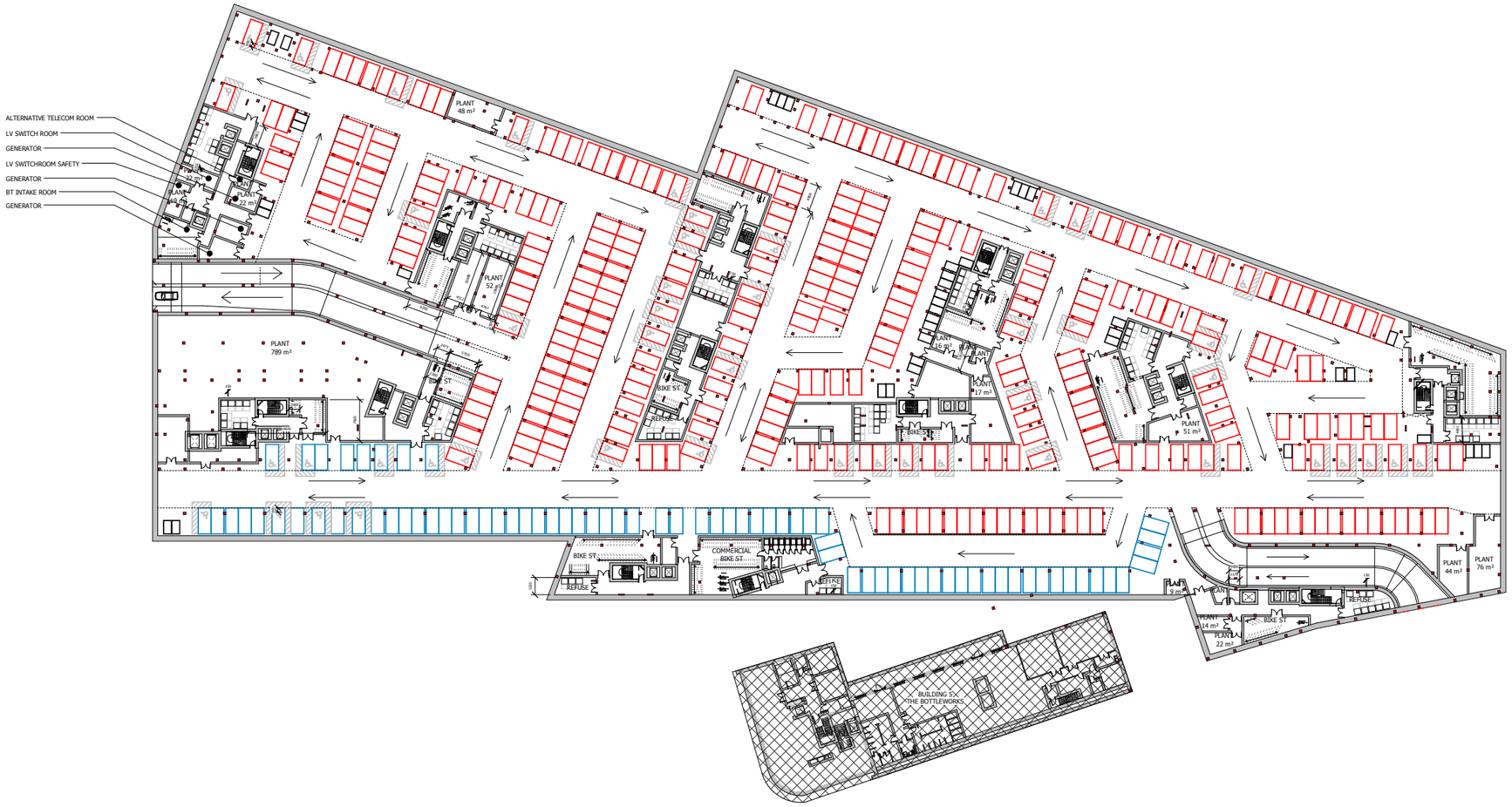
Drawing

PROPOSED BUILDING LEVELS - GROUND FLOOR

Drawn	Date	Scale
KHO	01/18/18	1 : 1000 @ A1 1 : 2000 @ A3

Job Number	Drawing number	Revision
16019	C645_Z2_P_PR_007	-

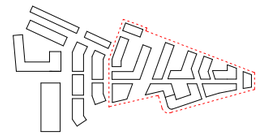


0 5 10 25 50 m

NOTES:

DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS TO BE CHECKED ON SITE. ALL OMISSIONS AND DISCREPANCIES TO BE REPORTED TO THE ARCHITECT IMMEDIATELY.

NORTH



KEY

- 331 Residential Spaces
- 77 Commercial Spaces
- 42 Motorbike Spaces
- 1014 Cycle Spaces

Revision description	Date	Check	Rev
FINAL DRAFT PLANNING APPLICATION	18/01/18	BJ	-

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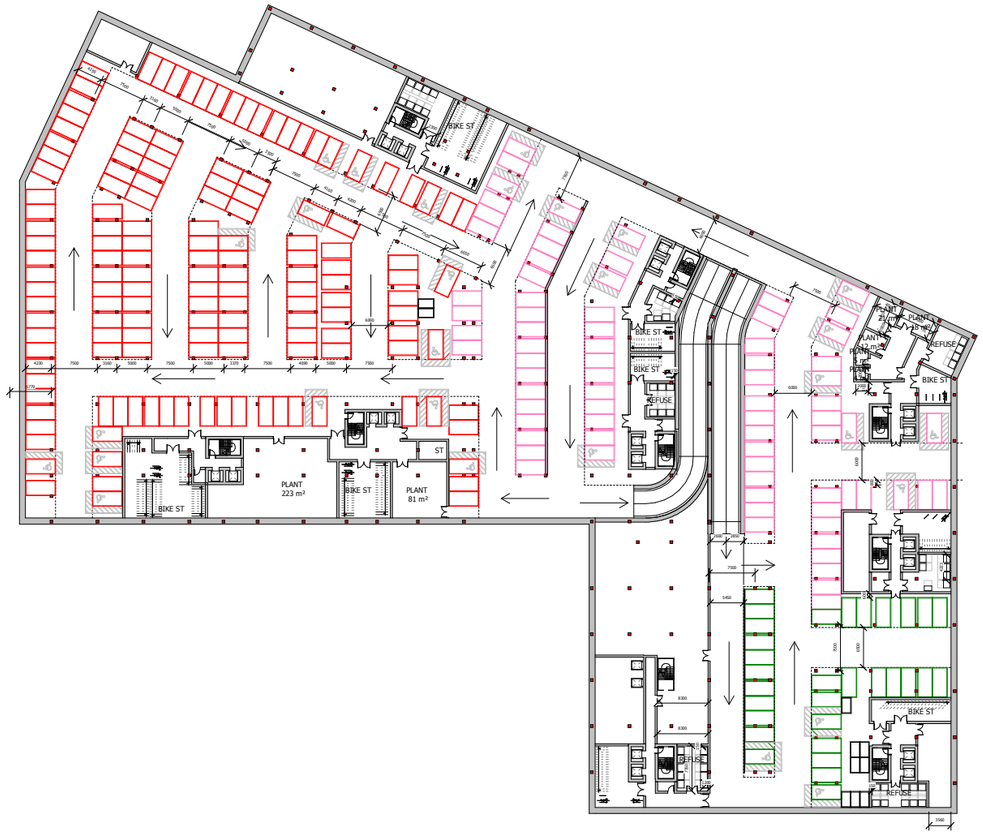
Drawing

PROPOSED DEVELOPMENT AREA 01
BASEMENT PLAN

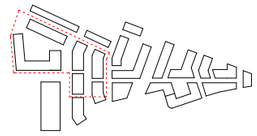
Drawn	Date	Scale
RKL	18/01/18	1 : 500 @ A1 1 : 1000 @ A3

Job Number	Drawing number	Revision
16019	C645_Z1_P_B1_001	-



0 5 10 25 50 m

NORTH



KEY

- 31 C2/Health Centre Spaces
- 77 Assisted Living Spaces
- 148 Residential Spaces
- 10 Motorbike Spaces
- 513 Cycle Spaces

INDICATIVE

Revision description	Date	Check	Rev
FINAL DRAFT PLANNING APPLICATION	18/01/18	BJ	-

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Project

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Drawing

PROPOSED DEVELOPMENT AREA 02
BASEMENT PLAN

Drawn	Date	Scale
RKL	18/01/18	1 : 500 @ A1 1 : 1000 @ A3

Job Number	Drawing number	Revision
16019	C645_Z2_P_B1_001	-

NOTES:

DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS TO BE CHECKED ON SITE. ALL OMISSIONS AND DISCREPANCIES TO BE REPORTED TO THE ARCHITECT IMMEDIATELY.

INDICATIVE

Revision description	Date	Check	Rev
ISSUE TO DESIGN TEAM	25/10/17	BJ	-

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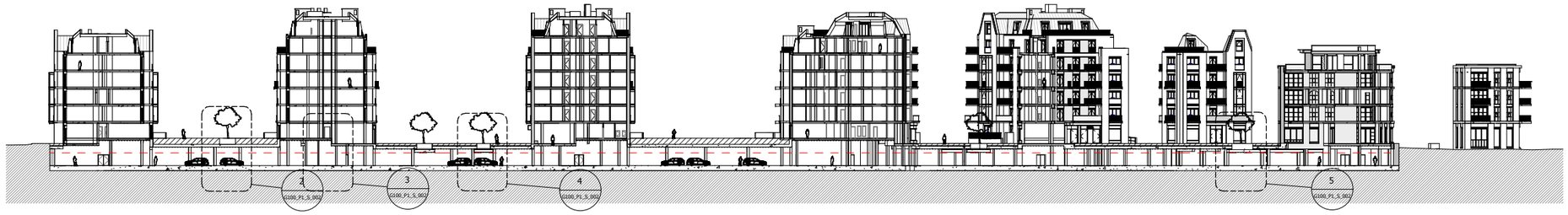
Drawing

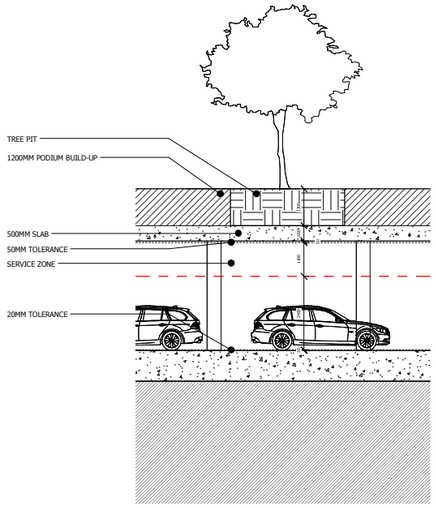
PHASE 01 - BASEMENT SECTION 01

Drawn	Date	Scale
RKL	12/01/16	1 : 200 @ A1 1 : 400 @ A3

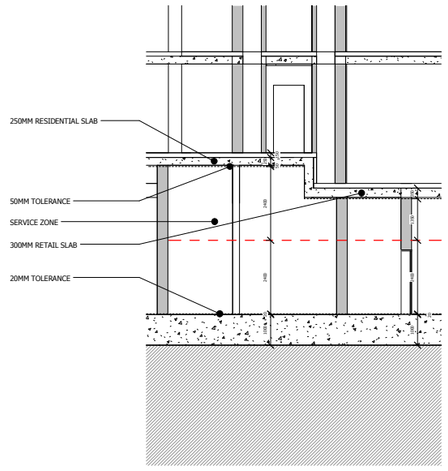
Job Number	Drawing number	Revision
16019	G100_P1_S_001	-



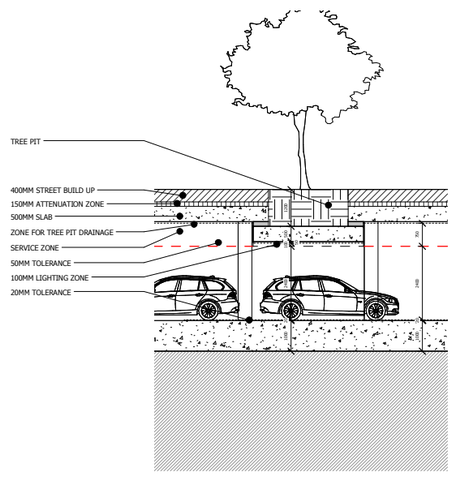
1 Basement Section_Phase 01_002
1 : 500



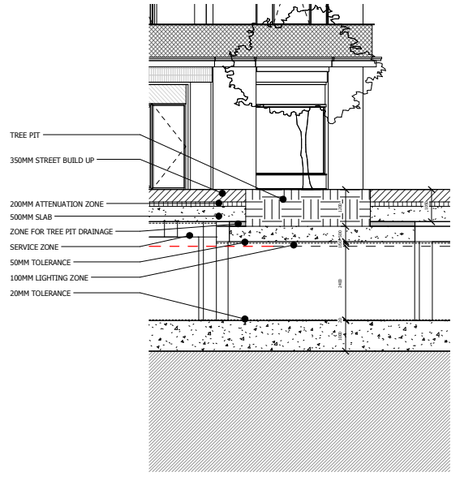
2 Basement Section_Phase 01_Podium
1 : 100



3 Basement Section_Phase 01_Slab Step
1 : 100



4 Basement Section_Phase 01_Boulevard
1 : 100



5 Basement Section_Phase 01_Main Street
1 : 100

0 5 10 25 50 m

NOTES:

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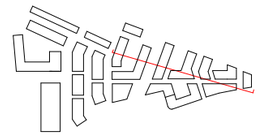
NORTH



INDICATIVE

Revision description	Date	Check	Rev
ISSUE TO DESIGN TEAM	25/10/17	BJ	A
SCENARIO 2 DESIGN FREEXE	11/08/17	BJ	-

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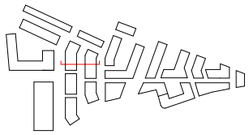
Drawing
PHASE 01 - BASEMENT SECTIONS 02

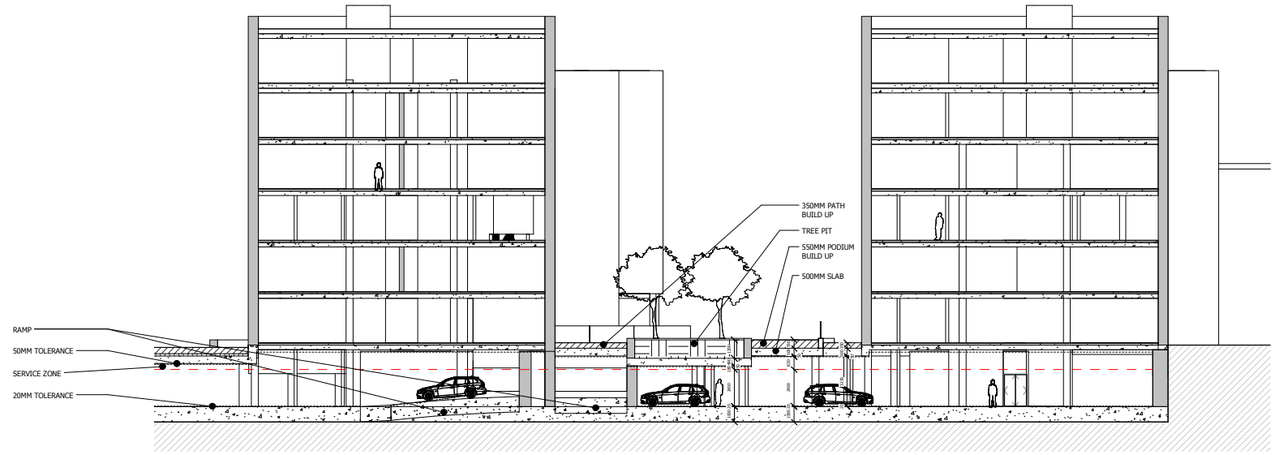
Drawn	Date	Scale
RKL	12/02/16	As indicated@ A1 @ A3

Job Number	Drawing number	Revision
16019	G100_P1_S_002	A

NORTH



INDICATIVE



0 5 10 25 50 m

ISSUE TO DESIGN TEAM	25/10/17	BJ	A
SCENARIO 2 DESIGN FREEXE	11/08/17	BJ	-
Revision description	Date	Check	Rev

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Richmond

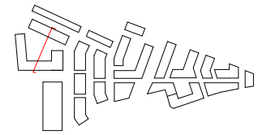
Drawing

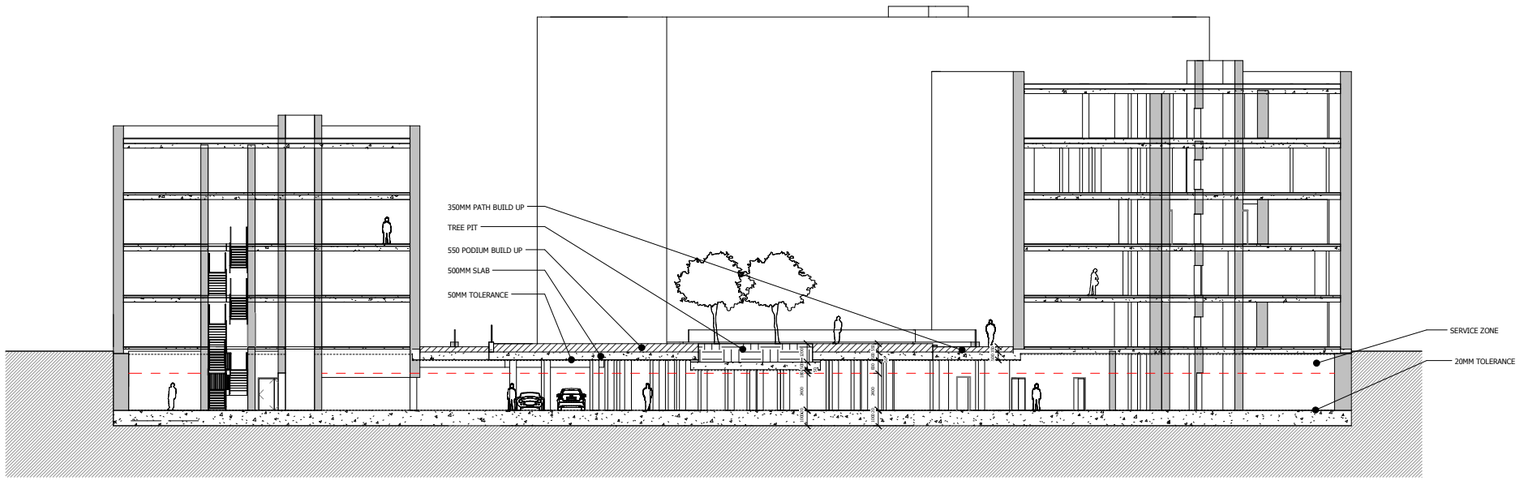
PHASE 02 - BASEMENT SECTION 01

Drawn	Date	Scale
RKL	12/01/16	1 : 200 @ A1 1 : 400 @ A3

Job Number	Drawing number	Revision
16019	G100_P2_S_001	A

NORTH





INDICATIVE

0 5 10 25 50 m

Revision description	Date	Check	Rev
ISSUE TO DESIGN TEAM	25/10/17	BJ	-

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Project
Stag Brewery
Richmond

Drawing
PHASE 02 - BASEMENT SECTION 02

Drawn	Date	Scale
RKL	12/01/16	1 : 200 @ A1 1 : 400 @ A3

Job Number	Drawing number	Revision
16019	G100_P2_S_002	-

B. Thames Water Correspondence

Sewer Flooding
History Enquiry

Waterman Infrastructure & Environment

Search address supplied

Stag Brewing Co Ltd
The Stag Brewery
Mortlake
London
SW14 7ET

Your reference WIE10667

Our reference SFH/SFH Standard/2016_3238633

Received date **22 January 2016**

Search date **23 January 2016**

Thames Water Utilities Ltd

Property Searches
PO Box 3189
Slough SL1 4WW

DX 151280 Slough 13

T 0118 925 1504
E searches@thameswater.co.uk
I www.thameswater-propertysearches.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Sewer Flooding

History Enquiry

Search address supplied: Stag Brewing Co Ltd,The Stag Brewery,Mortlake,London,SW14 7ET

This search is recommended to check for any sewer flooding in a specific address or area

TWUL, trading as Property Searches, are responsible in respect of the following:-

(i) any negligent or incorrect entry in the records searched;

(ii) any negligent or incorrect interpretation of the records searched;

(iii) and any negligent or incorrect recording of that interpretation in the search report

(iv) compensation payments

Thames Water Utilities Ltd

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Slough SL1 4WW

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E searches@thameswater.co.uk
I www.thameswater-propertysearches.co.uk

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Sewer Flooding

History Enquiry

History of Sewer Flooding

Is the requested address or area at risk of flooding due to overloaded public sewers?

The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers.

For your guidance:

- A sewer is “overloaded” when the flow from a storm is unable to pass through it due to a permanent problem (e.g. flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapses and equipment or operational failures are excluded.
- “Internal flooding” from public sewers is defined as flooding, which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- “At Risk” properties are those that the water company is required to include in the Regulatory Register that is presented annually to the Director General of Water Services. These are defined as properties that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Company’s reporting procedure.
- Flooding as a result of storm events proven to be exceptional and beyond the reference period of one in ten years are not included on the At Risk Register.
- Properties may be at risk of flooding but not included on the Register where flooding incidents have not been reported to the Company.
- Public Sewers are defined as those for which the Company holds statutory responsibility under the Water Industry Act 1991.
- It should be noted that flooding can occur from private sewers and drains which are not the responsibility of the Company. This report excludes flooding from private sewers and drains and the Company makes no comment upon this matter.
- For further information please contact Thames Water on Tel: 0800 316 9800 or website www.thameswater.co.uk

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I www.thameswater-propertysearches.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2016_3238630

TQ2075NW

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 520250,175750

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

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
4512	6.54	4.41
4601	6.78	4.11
46MK	n/a	n/a
46NE	n/a	n/a
46NL	n/a	n/a
4605	6.03	4.3
4604	5.92	2.97
4603	6.02	4.11
4602	5.92	2.18
46MN	n/a	n/a
46NH	n/a	n/a
46LN	n/a	n/a
461A	n/a	n/a
4508	6.77	5.28
4507	n/a	n/a
4506	6.76	5.22
4501	6.75	4.26
451B	n/a	n/a
451A	n/a	n/a
4502	6.44	3.91
4510	6.45	3.59
4511	6.34	3.37
4504	6.33	2.52
4503	6.45	2.92
4513	6.36	3.22
4505	n/a	2.86
4802	5.35	.8
4716	n/a	n/a
4706	6.33	4.22
4717	n/a	n/a
4707	n/a	n/a
4801	5.22	1.38
4708	n/a	n/a
4714	5.95	3.74
4718	n/a	n/a
4705	5.87	2.69
4713	5.79	1.65
4715	5.75	2.45
4711	6.05	2.52
4712	n/a	n/a
4703	5.84	1.98
4804	5.05	2.06
4803	4.95	n/a
4908	4.97	n/a
4905	5.03	2.59
4904	5.02	.89
4903	5.08	.89
4907	4.94	2.32
4902	4.86	1.96
4906	4.96	n/a
4901	4.93	2.36
35LH	n/a	n/a
35LJ	n/a	n/a
3502	6.37	5.2
3501	6.57	5.49
4509	5.71	5.46
351A	n/a	n/a
361A	n/a	n/a
3611	6.7	4.84
3610	6.8	4.74
3609	6.77	4.77
3604	6.76	4.09
46ME	n/a	n/a
3605	6.78	3.94
36LL	n/a	n/a
36LM	n/a	n/a
3603	n/a	n/a
36NC	n/a	n/a
36NL	n/a	n/a
36NK	n/a	n/a
36NH	n/a	n/a
36MM	n/a	n/a
361B	n/a	n/a
3802	5.33	3.22
39MJ	n/a	n/a
39NE	n/a	n/a
391A	n/a	n/a
38LK	n/a	n/a
38MK	n/a	n/a
38ML	n/a	n/a
39ND	n/a	n/a
39NK	n/a	n/a
3904	5.14	2.68
3907	5.99	1.99
39NJ	n/a	n/a
39NC	n/a	n/a
3902	4.98	3.64
3903	6	1.53
3906	5.17	2.03
3908	n/a	n/a
3905	5.19	2.25

Manhole Reference	Manhole Cover Level	Manhole Invert Level
3901	5.2	1.62
361C	n/a	n/a
3608	6.19	5.48
36MJ	n/a	n/a
36MH	n/a	n/a
36NF	n/a	n/a
36ML	n/a	n/a
361D	n/a	n/a
3602	5.82	3.69
3701	6.15	3.48
3702	6.16	4.58
271D	n/a	n/a
371B	n/a	n/a
2701	5.59	2.87
371A	n/a	n/a
371D	n/a	n/a
371C	n/a	n/a
1603	6.29	5.13
1506	6.76	5.16
1503	6.75	4.86
26MK	n/a	n/a
26ME	n/a	n/a
26LF	n/a	n/a
26LE	n/a	n/a
26LN	n/a	n/a
26LM	n/a	n/a
26LD	n/a	n/a
26LL	n/a	n/a
2601	6.27	4.87
2602	6.33	5.17
2510	6.72	4.76
2508	6.68	5.12
26HD	n/a	n/a
2502	6.83	5.04
2503	6.67	4.98
261A	n/a	n/a
26FN	n/a	n/a
2604	n/a	n/a
251B	n/a	n/a
251A	n/a	n/a
35MN	n/a	n/a
3607	6.32	4.48
3606	6.55	4.89
35NF	n/a	n/a
35MJ	n/a	n/a
3601	6.58	4.51
16NK	n/a	n/a
16ME	n/a	n/a
16LM	n/a	n/a
271A	n/a	n/a
271C	n/a	n/a
26MF	n/a	n/a
271B	n/a	n/a
27NM	n/a	n/a
26HM	n/a	n/a
26HL	n/a	n/a
2702	6.33	5.28
281A	n/a	n/a
261B	n/a	n/a
2703	5.61	2.87
2603	n/a	n/a
3804	4.67	4.08
3801	n/a	n/a
1809	5.06	3.86
1804	5.11	n/a
1805	5.12	2.35
1801	5.09	.25
2808	5.07	3.63
381D	n/a	n/a
2807	5.2	3.42
381C	n/a	n/a
381B	n/a	n/a
2803	5.26	2.16
2802	5.28	.38
381A	n/a	n/a
38NL	n/a	n/a
38NH	n/a	n/a
38NM	n/a	n/a
38NJ	n/a	n/a
2809	5.07	n/a
2805	5.19	2.78
2806	5.3	3.26
3803	4.87	3.65
38LM	n/a	n/a
2801	5.32	.44
38MM	n/a	n/a
2804	5.33	1.95
38LL	n/a	n/a
16JM	n/a	n/a
26KL	n/a	n/a
06NL	n/a	n/a
26KK	n/a	n/a
16LH	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
26KJ	n/a	n/a
1604	6.26	5.46
16LD	n/a	n/a
1601	6.28	4.59
26KD	n/a	n/a
16KM	n/a	n/a
26KC	n/a	n/a
16KJ	n/a	n/a
16MM	n/a	n/a
26JN	n/a	n/a
16KE	n/a	n/a
261C	n/a	n/a
1606	6.33	5.49
1602	6.34	5.24
26JJ	n/a	n/a
26JH	n/a	n/a
26JF	n/a	n/a
161A	n/a	n/a
16MN	n/a	n/a
16NG	n/a	n/a
26HN	n/a	n/a
16LN	n/a	n/a
0613	6.15	4.12
0606	n/a	n/a
0614	6.16	3.64
0506	n/a	n/a
0610	6.19	5.11
0517	n/a	n/a
0611	n/a	n/a
0604	6.15	3.68
0516	n/a	n/a
0504	6.97	4.62
0609	6.14	4.77
0515	6.78	3.96
0501	6.94	4.13
151A	n/a	n/a
151C	n/a	n/a
151B	n/a	n/a
16JJ	n/a	n/a
1508	6.71	4.9
1504	6.71	5.25
1502	6.89	5.09
16LL	n/a	n/a
1505	6.86	5.41
16MF	n/a	n/a
1605	6.3	5.42
09ND	n/a	n/a
09NM	n/a	n/a
09NJ	n/a	n/a
09NL	n/a	n/a
091A	n/a	n/a
0903	n/a	n/a
0904	5.55	3.51
0901	n/a	n/a
0902	5.59	1.67
09MN	n/a	n/a
19NE	n/a	n/a
19NL	n/a	n/a
19NM	n/a	n/a
19NF	n/a	n/a
19NH	n/a	n/a
19MK	n/a	n/a
19MJ	n/a	n/a
19MF	n/a	n/a
19MH	n/a	n/a
18ME	n/a	n/a
1901	n/a	n/a
0807	5.16	2.54
07NK	n/a	n/a
0804	5.18	1.83
0802	5.19	.09
0703	5.21	3.38
0701	5.18	2.31
0702	n/a	n/a
0605	6.1	2.99
0809	5.08	2.26
0808	5.06	2.47
07ML	n/a	n/a
07NE	n/a	n/a
0805	5.1	1.16
0801	5.15	.14
08NM	n/a	n/a
18NJ	n/a	n/a
18MN	n/a	n/a
18NK	n/a	n/a
18NC	n/a	n/a
18NL	n/a	n/a
18ND	n/a	n/a
18NM	n/a	n/a
1808	5.26	2.26
1807	5.17	2.41
1806	5	2.43
1802	5.16	.2

Manhole Reference	Manhole Cover Level	Manhole Invert Level
1803	5.03	2.03
05LD	n/a	n/a
05LE	n/a	n/a
07LK	n/a	n/a
07KN	n/a	n/a
08NE	n/a	n/a
08NC	n/a	n/a
0803	5.12	.01
07LM	n/a	n/a
07LD	n/a	n/a
071B	n/a	n/a
07NM	n/a	n/a
0806	5.16	2.62
071A	n/a	n/a
07ME	n/a	n/a
07LJ	n/a	n/a
0507	6.41	5.15
0503	6.36	4.68
0607	5.99	4.16
0608	6	4.7
25ML	n/a	n/a
25MN	n/a	n/a
35LD	n/a	n/a
35LE	n/a	n/a
35LF	n/a	n/a
2506	6.95	5.58
2501	6.76	5.28
2504	6.82	5.1
35LC	n/a	n/a
2507	6.79	5.15
2505	6.65	5.28
25MJ	n/a	n/a
35NK	n/a	n/a

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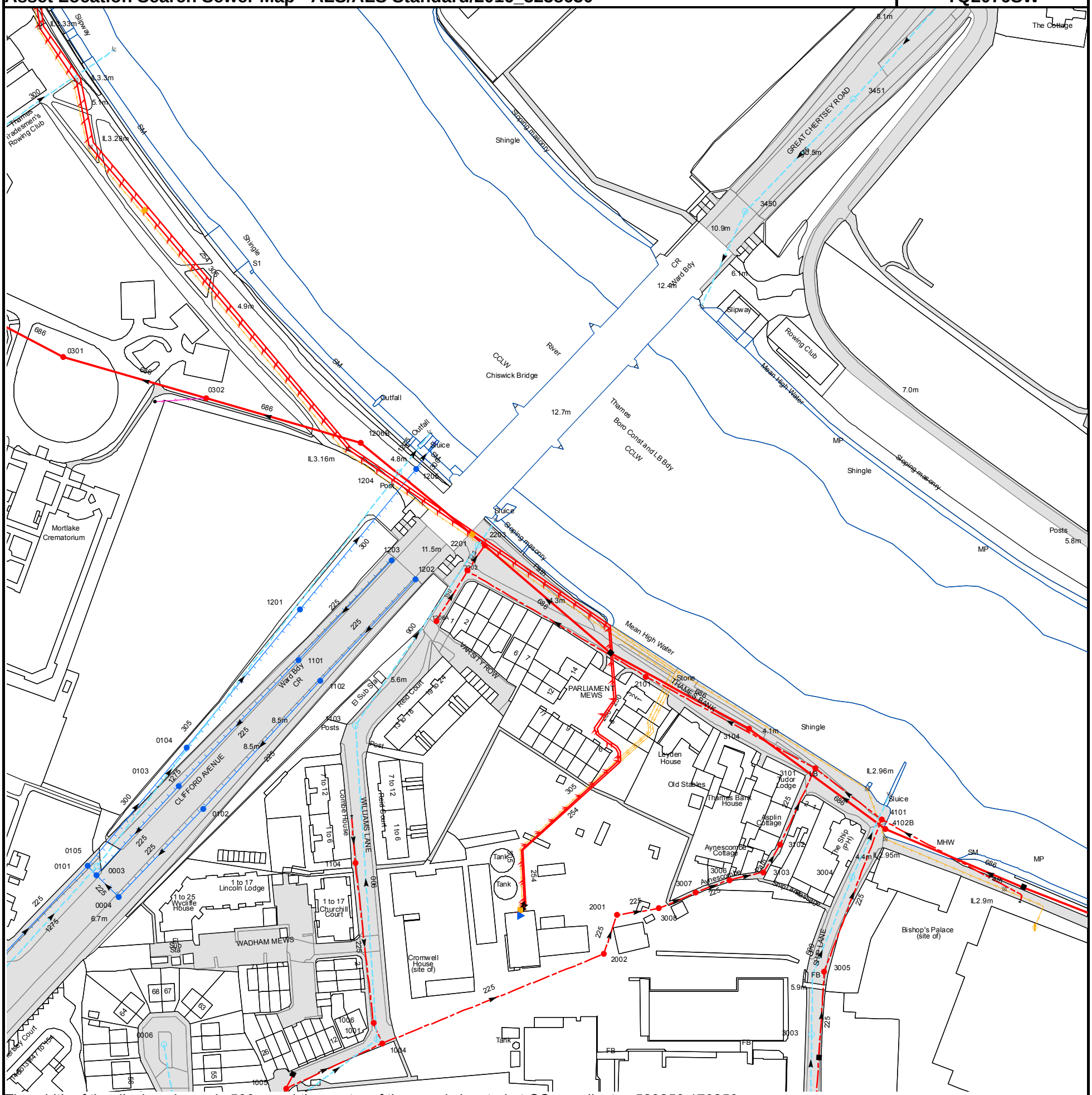
Asset Location Search Sewer Map - ALS/ALS Standard/2016_3238630

TQ2076SW



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 520250,176250

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
3103	6.12	1.37
1104	5.93	4.19
3102	5.77	1.35
4102B	n/a	-4.73
4101	3.47	1.08
0102	n/a	n/a
0103	n/a	n/a
3101	4.14	.92
0104	n/a	n/a
3104	n/a	-4.82
1103	5.88	1.73
1102	n/a	n/a
2101	n/a	n/a
1101	n/a	n/a
1206A	5.06	4
1201	n/a	n/a
1202	n/a	n/a
2202	4.53	.29
1203	n/a	n/a
2201	n/a	n/a
2203	n/a	-4.99
1204	n/a	n/a
1205	4.62	2.02
1206B	n/a	-5.07
0302	n/a	-5.16
3450	10.79	1.9
3451	9.23	2.01
0003	n/a	n/a
0105	n/a	n/a
0101	n/a	n/a
0301	n/a	-5.24
2002	n/a	n/a
2001	n/a	n/a
3008	n/a	n/a
3007	6.65	1.7
3006	6.59	1.59
3003	6.06	2.01
3005	5.56	1.22
3004	4.81	1.77
0004	n/a	n/a
0006	5.52	4.54
1005	6.3	3.66
1006	6.3	1.96
1001	6.3	1.96
1004	6.26	2.79

Asset Location Search Sewer Map - ALS/ALS Standard/2016_3238630

TQ2075NE

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 520750,175750

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

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
96MD	n/a	n/a
971E	n/a	n/a
96LF	n/a	n/a
96LE	n/a	n/a
96LL	n/a	n/a
96LM	n/a	n/a
96LN	n/a	n/a
96MC	n/a	n/a
96ME	n/a	n/a
9710	6.67	4.13
971F	n/a	n/a
9707	6.64	2.63
96LK	n/a	n/a
9601	6.12	2.72
97MJ	n/a	n/a
9609	6.31	4.48
9602	6.33	2.85
96KN	n/a	n/a
97MK	n/a	n/a
96KF	n/a	n/a
97MN	n/a	n/a
96LD	n/a	n/a
96LC	n/a	n/a
971G	n/a	n/a
851C	n/a	n/a
851D	n/a	n/a
851A	n/a	n/a
8503	6.32	4.8
8513	6.29	5.27
951D	n/a	n/a
951B	n/a	n/a
951C	n/a	n/a
961B	n/a	n/a
95NC	n/a	n/a
9603	6.17	4.47
9608	6.18	4.65
9604	6.14	4.4
9507	5.96	4.66
9510	5.92	4.84
95HH	n/a	n/a
951A	n/a	n/a
96NM	n/a	n/a
95HJ	n/a	n/a
9511	5.91	4.65
9501	6.01	2.93
95JC	n/a	n/a
8804	5.61	4.52
88MF	n/a	n/a
8801	5.95	2.33
88LM	n/a	n/a
88MK	n/a	n/a
88MM	n/a	n/a
88MN	n/a	n/a
8709	6.12	3.86
88MH	n/a	n/a
8705	6.09	2.51
88LN	n/a	n/a
9806	5.91	4.13
9805	5.91	3.33
9708	6.06	3.86
9702	6.14	2.54
9703	6.11	n/a
9709	5.94	4.62
9804	5.62	4.66
98KJ	n/a	n/a
98KE	n/a	n/a
98KC	n/a	n/a
9802	5.7	3.13
9801	5.44	2.75
8802	5.62	2.12
8910	5.9	4.51
8903	5.91	3.91
99MM	n/a	n/a
99MN	n/a	n/a
9905	5.4	4.49
891B	n/a	n/a
9902	5.43	n/a
9901	5.71	2.13
89ND	n/a	n/a
89NE	n/a	n/a
861A	n/a	n/a
871A	n/a	n/a
861C	n/a	n/a
861D	n/a	n/a
8711	6.83	4.51
8704	6.85	4.1
8701	6.37	4.24
87NH	n/a	n/a
8601	6.19	4.92
8611	6.14	4.94
97MM	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
96MJ	n/a	n/a
96MK	n/a	n/a
961C	n/a	n/a
96ML	n/a	n/a
96MM	n/a	n/a
961A	n/a	n/a
971A	n/a	n/a
97MF	n/a	n/a
9605	6.24	5
971B	n/a	n/a
96KL	n/a	n/a
971C	n/a	n/a
971D	n/a	n/a
97MD	n/a	n/a
96KJ	n/a	n/a
96LH	n/a	n/a
7709	6.39	3.48
7706	6.29	3.83
77MK	n/a	n/a
77NF	n/a	n/a
77NC	n/a	n/a
77NH	n/a	n/a
7602	6.24	4.7
7601	6.39	4.58
7704	6.45	4.56
77MN	n/a	n/a
7703	6.89	4.35
7713	6.37	4.63
77KN	n/a	n/a
7621	n/a	n/a
7610	n/a	n/a
77MC	n/a	n/a
7708	6.18	3.64
7701	6.1	3.73
761A	n/a	n/a
761B	n/a	n/a
771A	n/a	n/a
8707	6.77	4.33
8706	6.16	1.91
8708	6.38	4.35
8602	6.35	4.39
8710	6.83	4.66
861B	n/a	n/a
7917	5.32	2.72
7916	5.32	2.75
7915	5.31	2.8
7910	n/a	2.98
7914	5.41	2.87
7913	5.07	3.02
7901	4.94	1.5
7904	5.06	2.39
7919	n/a	n/a
7805	n/a	n/a
7911	5.13	3.41
7918	5.14	2.67
791B	n/a	n/a
791A	n/a	n/a
7905	5.32	2.96
7912	5.21	3.71
781A	n/a	n/a
791C	n/a	n/a
781B	n/a	n/a
7902	5.37	1.76
7906	5.76	3.88
8911	n/a	n/a
8909	5.67	4.34
8904	5.68	2.08
8908	5.52	3.96
8905	5.55	1.97
891C	n/a	n/a
8901	5.61	1.86
7613	6.53	4.74
7614	6.39	5.01
8606	6.3	4.55
861E	n/a	n/a
7615	n/a	n/a
7604	n/a	n/a
66NH	n/a	n/a
66NL	n/a	n/a
8605	6.32	2.1
7605	n/a	n/a
8604	6.3	4.52
7606	n/a	n/a
7616	n/a	n/a
8610	6.29	4.09
7617	n/a	n/a
7618	6.11	5.01
76JF	n/a	n/a
76HC	n/a	n/a
7607	6.16	5.12
76MJ	n/a	n/a
7619	6.37	4.27
7608	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
8603	6.25	4.44
8609	6.27	4.84
7622	n/a	n/a
7609	n/a	n/a
7620	6.3	4.27
6520	6.28	4.78
6506	6.31	5.29
65LM	n/a	n/a
65MK	n/a	n/a
65MM	n/a	n/a
65NE	n/a	n/a
65NC	n/a	n/a
6511	n/a	n/a
6512	n/a	n/a
7612	6.38	4.92
75NG	n/a	n/a
75NF	n/a	n/a
751B	n/a	n/a
75NH	n/a	n/a
7511	6.4	4.85
7510	6.39	4.86
7508	6.1	5.05
75NM	n/a	n/a
7507	6.51	5.34
75NL	n/a	n/a
77LF	n/a	n/a
6808	5.94	4.75
68LJ	n/a	n/a
78KN	n/a	n/a
6809	5.95	3.03
78LH	n/a	n/a
68JM	n/a	n/a
68JC	n/a	n/a
68LL	n/a	n/a
68MD	n/a	n/a
68JF	n/a	n/a
68JD	n/a	n/a
7804	n/a	n/a
7802	5.84	3.2
68MF	n/a	n/a
78NM	n/a	n/a
78ML	n/a	n/a
7801	5.67	3.09
7803	5.69	3.92
68LC	n/a	n/a
68KH	n/a	n/a
78ME	n/a	n/a
78NF	n/a	n/a
68ND	n/a	n/a
7806	n/a	n/a
6807	5.66	4.37
68MN	n/a	n/a
6907	5.38	2.03
69NK	n/a	n/a
68NH	n/a	n/a
6912	4.72	2.17
68MM	n/a	n/a
681B	n/a	n/a
68ML	n/a	n/a
6914	5.5	1.63
6915	5.27	1.67
6913	4.82	1.52
6917	4.57	1.51
69NC	n/a	n/a
6806	5.34	2.58
6918	4.6	1.82
6919	4.82	2.06
6805	5.36	3.72
6903	4.71	1.07
6803	5.3	3.44
6920	4.9	2.26
6921	4.91	3.31
6804	5.26	2.5
6908	4.96	2.33
68NM	n/a	n/a
78LM	n/a	n/a
7909	4.94	2.63
6707	6.05	4.43
6704	6.04	4.24
67KL	n/a	n/a
67LF	n/a	n/a
67LD	n/a	n/a
6703	5.93	4.58
67MJ	n/a	n/a
67ML	n/a	n/a
6708	5.92	4.26
6706	6.73	3.34
67MH	n/a	n/a
67MK	n/a	n/a
7712	6.05	3.64
77LH	n/a	n/a
77LK	n/a	n/a
7705	6.46	1.76

Manhole Reference	Manhole Cover Level	Manhole Invert Level
77LE	n/a	n/a
7710	6.73	3.44
7702	6.75	4.27
7711	6.78	4.67
76HK	n/a	n/a
76FF	n/a	n/a
7611	5.99	4.16
76FH	n/a	n/a
76NL	n/a	n/a
76NM	n/a	n/a
7603	6.02	4.9
65NM	n/a	n/a
55JL	n/a	n/a
6501	n/a	n/a
55JK	n/a	n/a
65KE	n/a	n/a
66LD	n/a	n/a
66LF	n/a	n/a
6604	6.22	5.14
6605	6.21	5.01
66LE	n/a	n/a
6606	6.26	4.81
6601	n/a	n/a
66LK	n/a	n/a
66LN	n/a	n/a
6608	n/a	n/a
66LJ	n/a	n/a
66LM	n/a	n/a
6602	n/a	n/a
6609	6.09	4.68
6603	6.08	4.75
6607	6.03	3.82
66ND	n/a	n/a
66LH	n/a	n/a
66LL	n/a	n/a
66MM	n/a	n/a
661B	n/a	n/a
661A	n/a	n/a
5514	6.58	5.12
55MN	n/a	n/a
65NL	n/a	n/a
65JJ	n/a	n/a
65JE	n/a	n/a
65HN	n/a	n/a
65HK	n/a	n/a
651B	n/a	n/a
6514	n/a	n/a
65HF	n/a	n/a
65KC	n/a	n/a
65JD	n/a	n/a
65HM	n/a	n/a
6516	6.27	5.28
65HJ	n/a	n/a
651A	n/a	n/a
6503	6.31	4.79
65HE	n/a	n/a
6515	6.33	5.14
6504	n/a	n/a
6521	6.31	4.13
6518	6.37	5.51
6505	6.36	4.54
6519	6.32	4.23
65KK	n/a	n/a
65LC	n/a	n/a
65LF	n/a	n/a
65MD	n/a	n/a
57NH	n/a	n/a
5803	n/a	1.33
5705	n/a	n/a
58LK	n/a	n/a
5704	6.83	3.79
581A	n/a	n/a
5718	6.57	5.16
5804	6.28	1.37
5717	6.88	4.38
57ML	n/a	n/a
5808	6.27	5.43
5806	6.21	4.15
5710	6.2	1.5
5712	6.26	5.22
5713	6.04	4.5
5706	6.04	3.81
67NM	n/a	n/a

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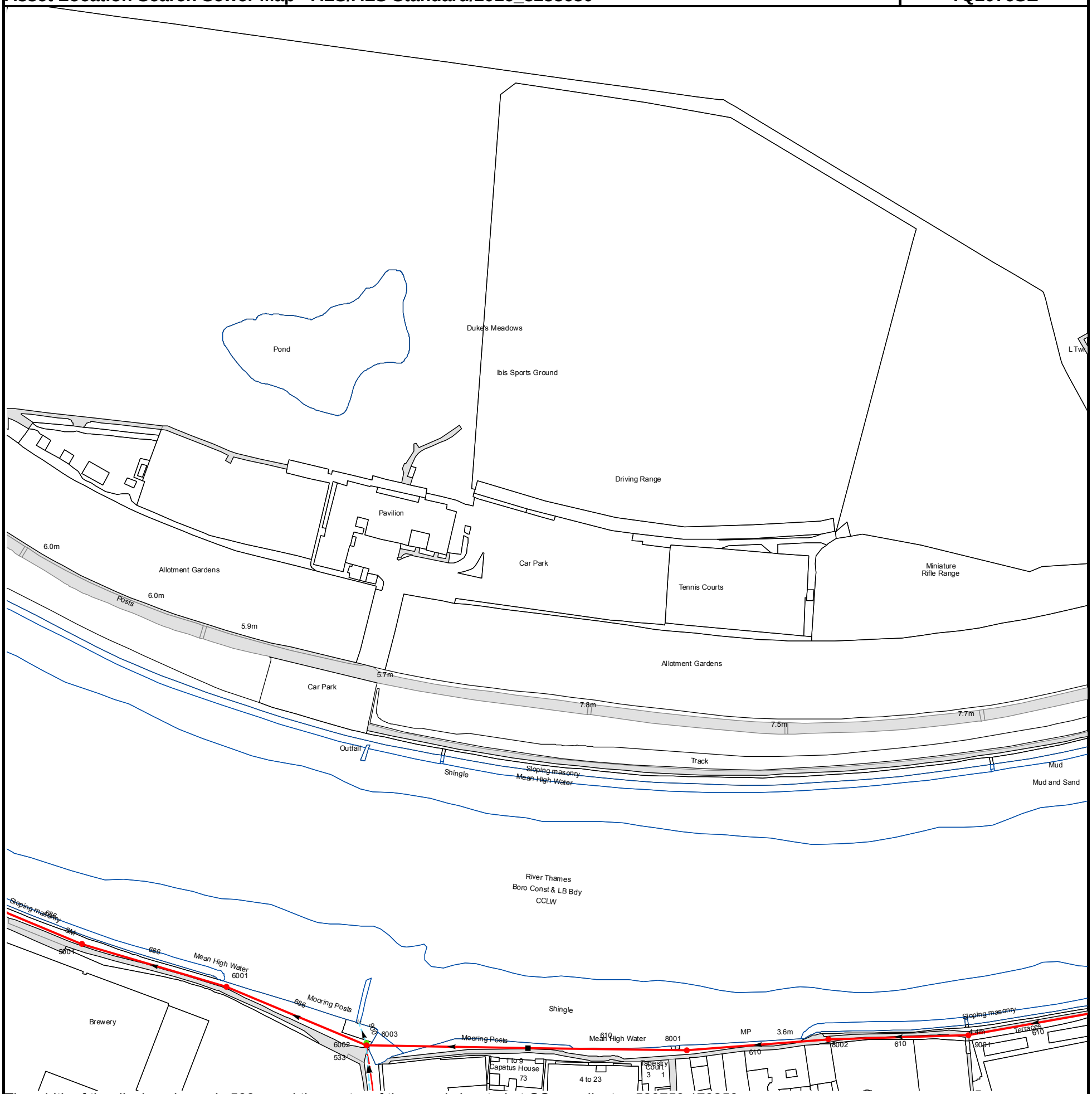
Asset Location Search Sewer Map - ALS/ALS Standard/2016_3238630	TQ2076SE



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 520750,176250

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
8002	n/a	-4.15
9001	n/a	-4.06
8001	n/a	-4.23
6003	3.64	.92
6002	n/a	-4.41
6001	n/a	-4.49
5001	n/a	-4.57

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ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

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

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

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

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

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

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

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

Control Valve

Drop Pipe

Ancillary

Weir

End Items

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

Outfall

Undefined End

Inlet

Other Symbols

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

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.

2) All measurements on the plans are metric.

3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

5) 'na' or '0' on a manhole level indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

Asset Location Search Water Map - ALS/ALS Standard/2016_3238630

TQ2075NW

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 520250,175750

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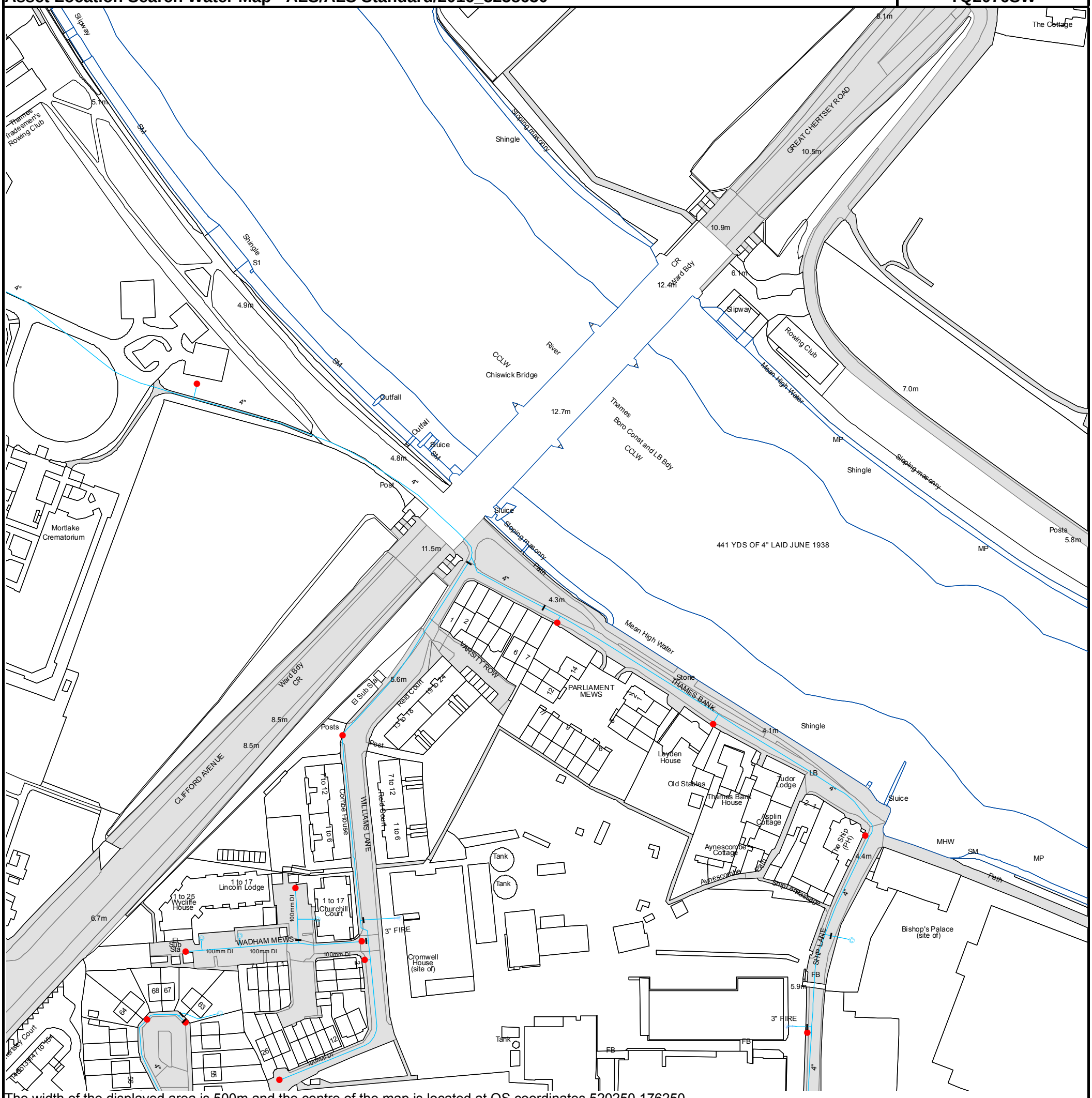
Asset Location Search Water Map - ALS/ALS Standard/2016_3238630

TQ2076SW



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 520250,176250

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Asset Location Search Water Map - ALS/ALS Standard/2016_3238630

TQ2075NE

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 520750,175750

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Asset Location Search Water Map - ALS/ALS Standard/2016_3238630	TQ2076SE

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 520750,176250

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

ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

4"

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

16"

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

3" SUPPLY

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

3" FIRE

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

3" METERED

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger

Other Water Pipes (Not Operated or Maintained by Thames Water)

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indiates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

C. Onsite Drainage Records