

1 VINYL SQUARE

THE OLD VINYL FACTORY

Joseph
Homes.

THE OLD
VINYL FACTORY

 PATRICK PARSONS

DRAINAGE STATEMENT

OCTOBER 2019



Flood Risk and Drainage Statement
1 Vinyl Square, The Old Vinyl Factory
for
Joseph Homes

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Executive Summary

This report demonstrates that the drainage strategy for the 1 Vinyl Square site complies with the requirements stipulated within the National Planning Policy Framework 2019, London Plan, Draft London Plan and London Borough of Hillingdon Local Plan.

The site, known as 1 Vinyl Square, is 0.45 ha and is on previously developed brownfield land located off Blyth Road, Hayes. The proposed development is a mixed use development which will consist of 134 residential homes, 395 sqm of commercial floor space, car parking, cycle parking and landscaping.

Although the site is within The Old Vinyl Factory (TOVF) masterplan, which has an approved drainage strategy, it is recognised that the ability to submit a reserved matters application has lapsed and full planning permission must now be sought for the proposed development. This drainage strategy will therefore consider this as a separate site and aim to apply the current drainage policies mentioned above.

The risk of fluvial and tidal flooding can be considered as low as the entire site is located within Flood Zone 1 and the area is not at risk of flooding from tidal river or ocean sources. The site is located within a high groundwater flood risk zone with a probability of between 50 and 75%. However, as there have been no historical flooding events and the groundwater is at least 2.5m below ground level, the risk of groundwater flooding can be considered as low. The risk of surface water flooding can be considered as low as although flooding is likely to occur within a 1 in 100 year storm event, it will all be contained within the neighbouring roads. There is no evidence of historical sewer flooding so therefore the sewer flooding risk can be considered as low. The risk of flooding from artificial sources can also be considered as low as no hazards have been identified for the site.

The greenfield runoff rate for the site shows the Qbar rural and the Qbar urban (based on 70% impermeable area) to be 0.4 l/s and 1.2 l/s respectively. The greenfield runoff volume from the site is 48 m³. As this is a full planning application, this drainage strategy disregards the existing TOVF infrastructure (which was designed based on guidance that has now been updated and provides the necessary attenuation on site to discharge at 3 times the greenfield runoff rate in accordance with London Plan Sustainable Design and Construction SPG section 3.4.10 for brownfield sites. Three times the greenfield runoff rate for the site is 1.2 l/s. This flow will be controlled with a Hydrobrake.

Remediation of the top layers of the soil has been carried out due to contamination caused by previous land uses. Although the top layers of the soil have been remediated, deeper soil is likely to still be contaminated which rules out any possibility of ground soakage.

A 25 m³ attenuation tank is required on site to prevent the surface water system from flooding during a 1 in 100 year plus 40% climate change worst case storm. This tank will be located under the cycle store within the proposed building and will be an offline tank.

Following the SuDS hierarchy set out in the London Plan, rainwater harvesting will be incorporated into the design which will provide irrigation for the green roofs. Roof spaces will be a combination of amenity spaces and soft landscaping spaces which will remove pollutants at the source, attenuate runoff rates and reduce runoff volumes. This report contains a SuDS management and maintenance plan to ensure the system remains fully functional for the lifetime of the development.

A private gravity foul water network was also constructed within the TOVF development which connects into a Thames Water foul sewer in Blyth Road. The location of the gravity foul sewer within the site clashes with the proposed building footprint and therefore, is required to be relocated. The TOVF foul network was designed with the anticipated loads from the 1 Vinyl Square site in mind. Therefore, there is sufficient capacity within the network to receive the predicted flow rate of 6.54 l/s.

The report has demonstrated that the proposed drainage measures ensure that no property or land (on or off-site) will be at risk of flooding if the development proceeds and that suitable means of surface water and foul drainage can be achieved for the proposed development.

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1.0 Introduction

- 1.1.1 Patrick Parsons have been instructed by the applicant, JH Veneer Limited, to produce a drainage strategy report to support the planning application for a development at 1 Vinyl Square, Hayes, London which was previously known as 'The Old Veneer Building'.
- 1.1.2 The following national, regional and local drainage policies apply to proposed developments being submitted for planning approval:

National Planning Policy Framework 2019.

Paragraph 165 states that:

Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:

- take account of advice from the lead local flood authority;
- have appropriate proposed minimum operational standards;
- have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
- where possible, provide multifunctional benefits.

All land in England and Wales is classified into four main Flood Zones which refer to the probability of river or sea flooding. The four Flood Zones are:

- Flood Zone 1 (Low Probability) – less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%);
- Flood Zone 2 (Medium Probability) – having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) in any year or having between a 1 in 200 and 1 in 1000 annual probability of sea flooding in any year (0.5% - 0.1%);
- Flood Zone 3a (High Probability) – having a 1 in 100 or greater annual probability of river flooding ($\geq 1\%$) or having a 1 in 200 or greater annual probability of sea flooding ($\geq 0.5\%$); and
- Flood Zone 3b (the Functional Floodplain) – having a 1 in 20 or greater annual probability of river flooding. The zone comprises land where water has to flow or be stored in times of flood.

London Plan March 2016 Policy 5.13 Sustainable Drainage

Developments should utilise sustainable urban drainage systems (SuDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy: -

1. Store rainwater for later use
2. Use infiltration techniques, such as porous surface in non-clay areas
3. Attenuate rainwater in ponds or open water features for gradual release

4. Attenuate rainwater by storing in tanks or sealed water features for gradual release
5. Discharge rainwater direct to a watercourse
6. Discharge rainwater to a surface water sewer/drain
7. Discharge rainwater to the combined sewer.

Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation.

London Plan Sustainable Design and Construction Supplementary Planning Guidance (April 2014) Paragraph 3.4.10

All developments on greenfield sites must maintain greenfield runoff rates. On previously developed sites, runoff rates should not be more than three times the calculated greenfield rate. The only exceptions to this; where greater discharge rates may be acceptable; are where a pumped discharge would be required to meet the standards or where surface water drainage is to tidal waters and therefore would be able to discharge at unrestricted rates provided unacceptable scour would not result.

Draft London Plan July 2019 Policy SI 13 Sustainable Drainage

Development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible. There should also be a preference for green over grey features, in line with the following drainage hierarchy:

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

Development proposals for impermeable surfacing should be refused unless they can be shown to be unavoidable, including on small surfaces such as front gardens and driveways.

Drainage should be designed and implemented in ways that promote multiple benefits including increased water use efficiency, improve water quality, and enhance biodiversity, urban greening, amenity and recreation.

Development proposals should aim to get as close to greenfield run-off rates as possible depending on site conditions. The well-established drainage hierarchy set out in this policy helps to reduce the rate and volume of surface water run-off. Rainwater should be managed

as close to the top of the hierarchy as possible. There should be a preference for green over grey features, and drainage by gravity over pumped systems. A blue roof is an attenuation tank at roof or podium level; the combination of a blue and green roof is particularly beneficial as the attenuated water is used to irrigate the green roof.

For many sites, it may be appropriate to use more than one form of drainage, for example a proportion of rainwater can be managed by more sustainable methods, with residual rainwater managed lower down the hierarchy. In some cases, direct discharge into the watercourse is an appropriate approach, for example rainwater discharge into the tidal Thames or a dock. This should include suitable pollution prevention filtering measures, ideally by using soft engineering or green infrastructure. In addition, if direct discharge is to a watercourse where the outfall is likely to be affected by tide-locking, suitable storage should be designed into the system. However, in other cases direct discharge will not be appropriate, for example discharge into a small stream at the headwaters of a catchment, which may cause flooding. This will need to be assessed on a case-by-case basis, taking into account the location, scale and quality of the discharge and the receiving watercourse. The maintenance of identified drainage measures should also be considered in development proposals

London Borough of Hillingdon Local Plan, Part 2: Development Management Policies, October 2015, (with modifications March 2019) Policy DME110 – Water Management, Efficiency and Quality

- Applications for all new build developments are required to include a drainage assessment demonstrating that appropriate sustainable drainage systems (SuDS) have been incorporated in accordance with the London Plan Hierarchy (Policy 5.13: Sustainable drainage).
- All major new build developments, as well as minor developments in Critical Drainage Areas or an area identified at risk from surface water flooding, must be designed to reduce surface water run-off rates to no higher than the pre development greenfield runoff rate in a 1:100 year storm scenario, plus an appropriate allowance for climate change for the worst storm duration. The assessment is required regardless of the changes of impermeable areas and the fact that a site has an existing high runoff rate will not constitute justification.
- Rain Gardens and non-householder developments should be designed to reduce surface water run-off rates to greenfield run-off rates.
- Schemes for the use of SuDS must be accompanied by adequate arrangements for the management and maintenance of the measures used, with appropriate contributions made to the Council where necessary.
- Proposals that would fail to make adequate provision for the control and reduction of surface water runoff rates will be refused.
- Developments should be drained by a SuDS system and must include appropriate methods to avoid pollution of the water environment. Preference should be given to utilising the drainage options in the SuDS hierarchy which remove the key pollutants that hinder improving water quality in Hillingdon. Major development should adopt a 'treatment train' approach where water flows through different SuDS to ensure resilience in the system.

1 Vinyl Square forms part of a larger development known as The Old Vinyl Factory that has received outline planning permission. The site is being developed in phases with Reserved Matters Applications or separate full planning applications being submitted for each phase. Most of the buildings, roads and infrastructure have either already been constructed or currently under construction, for the masterplan site.

A Surface Water Drainage Strategy (Alan Baxter and Associates LLP, December 2013) was produced for The Old Vinyl Factory site and was approved. The strategy proposed a peak discharge rate of 35% of the pre-development discharge rate (65% attenuation) and storage provision to prevent flooding during a 1 in 100 year plus 30% climate change. The approved strategy complied with the climate change and drainage policies in place at that time.

West London Strategic Flood Risk Assessment: Part 3 - Sources and Assessment of Flood Risk

All sources of flooding must be assessed for the site. These consist of:

- Fluvial flooding
- Tidal flooding
- Surface Water and Ordinary Watercourse flooding
- Groundwater flooding
- Sewer flooding
- Artificial sources flooding

The flood risk assessment for each of the flooding sources must consist of:

- The flood risk that the source poses
- Mitigation measures incorporated into the proposed site design which address these risks
- The overall risk posed to the site

2.0 Description of Site and Planning

- 2.1.1 The site address is 1 Vinyl Square, The Old Vinyl Factory, Blyth Road, Hayes, London, UB3 1SY, within the London Borough of Hillingdon. The site is a vacant brownfield site formerly occupied by the Veneer Building. Within the site boundary, a car park and roads also exist however, they are drained independently of the 1 Vinyl Square site, so these areas are disregarded in this report. The wider site, 'The Old Vinyl Factory' (TOVF) has outline planning permission, however the ability to submit a reserved matters application for 1 Vinyl Square has lapsed.
- 2.1.2 The proposed site plan is within **Appendix A**. The site is bordered by Blyth Road to the North, internal roads constructed as part of the masterplan to the west and south and a public square (known as Vinyl Square) which is yet to be constructed to the east of the site but has resolution for approval of planning permission. The red-line boundary shown on the proposed site plan within **Appendix A** covers an area of 0.45ha and includes the site access road off Blyth Road, and the continuation of this road to the south and west of the proposed Veneer Store. This road and associated parking, however, already has detailed planning permission under the Veneer Store development and has been constructed. The remaining 1 Vinyl Square site within the red-line boundary occupies an area of 0.224ha. The 1 Vinyl Square site layout can be found with **Appendix B**.

- 2.1.3 The maximum height of the building will be 11 storeys (ground plus 10 floors) plus lift overruns. The description of the proposed development is:

“Full planning permission for the redevelopment of the site to provide a mixed-use development comprising 134 residential dwellings (C3 Use Class) and 395sqm (GIA) commercial floorspace (flexible A1/A2/A3/A5/B1 Use Class), car parking, cycle parking and associated landscaping.”

3.0 Existing Geology and Hydrology

3.1 Existing Geology

- 3.1.1 A site investigation was carried out by RPS (Geotechnical & Environmental Investigation, 2011). Boreholes BH101 and BH08 are located closest to the 1 Vinyl Square site. The borehole logs can be viewed in **Appendix C**.
- 3.1.2 Made ground was encountered from the surface to a depth of 0.1m and consists of both granular and cohesive material with varying proportions of brick, concrete, ash and clinker.
- 3.1.3 The Taplow Gravel Formation was encountered beneath the surfacing layer for depths up to 5.8m below ground level. The deposit typically consisted of sandy gravel with SPT values varying between N = 17 and N > 50 which indicates a range from medium dense to very dense compaction.
- 3.1.4 London Clay was encountered beneath the Taplow Gravel at a depth of 5.8m. It was found to comprise of typically stiff, brown and blue/grey clay with variable silty and sandy layers. The base of the deposit was not encountered during the site investigation. SPT values varied between N = 18 to N = 50 which equates to a range from stiff to very stiff consistency.

3.2 Hydrology

- 3.2.1 Groundwater beneath the site rests within the Taplow Gravel stratum. According to the bore hole results, the groundwater rests between 2.5m and 4.5m below ground level underneath the site. The general ground water flow direction is towards the south-east, controlled by the topography of the underlying London Clay. The Taplow Gravel is classed as a Principal Aquifer in the vicinity of the site however the site is not located within a groundwater source protection zone.
- 3.2.2 The surface water courses in the vicinity of the site are the Grand Union Canal which is situated approximately 200m to the north of the site and the River Crane which is located approximately 900m to the southeast of the site. TOVF development does not discharge directly to either water courses.

3.3 Ground Soakage Potential

- 3.3.1 The geotechnical information provided states that soakaways are a suitable solution due to the presence of the aquifer in the Taplow Gravels.

3.3.2 As stated in the contamination information provided, the presence of shallow contamination would result in limitations in the use of infiltration solutions.

3.3.3 Therefore, although soil types mean infiltration is possible, the presence of ground contamination poses too high a risk to the aquifer so infiltration to ground is not considered to be a viable solution.

4.0 Flood Risk

4.1 Fluvial Flooding

4.1.1 Fluvial sources include rivers, streams and ditches. Fluvial flooding occurs when the receiving catchment inflow in the river exceeds the flow capacity of the river channel. Rainfall intensity and duration, groundwater levels and overland flow directly contribute to the overwhelming of river channel capacity which forces waters to spill into the adjacent floodplain. This effect has been analysed UK wide by the EA to identify existing development within the floodplain and inform the design of new development in the floodplain.

4.1.2 The West London Strategic Flood Risk Assessment (WLSFRA) Policy Map shows that the entire site is located within Flood Zone 1 which means that the site will have a 0.1% annual probability or less of fluvial flooding. Refer to **Appendix D** for the WLSFRA Policy Map for fluvial flooding. Therefore, the risk of fluvial flooding is considered to be low.

4.2 Tidal Flooding

4.2.1 As shown in the WLSFRA Policy Map for tidal flooding within **Appendix D**, the site is not in an area at risk of tidal flooding. The risk of tidal flooding is therefore low.

4.3 Groundwater Flooding

4.3.1 Groundwater flooding most commonly occurs during wet winter months after long periods of rainfall, where groundwater levels are seasonally high and exceed the capacity of the aquifers, rising above the surface topsoil.

4.3.2 Groundwater flooding is likely to occur in low-lying areas underlain by regional aquifers of commonly chalk or sandstone. The EA groundwater online mapping shows the site to lie within a Primary Aquifer for the superficial deposits. Refer to **Appendix D** for the EA Groundwater Map.

4.3.3 The EA Groundwater Map confirms that the bedrock deposits are not classified as an aquifer.

4.3.4 The WLSFRA Susceptibility to Groundwater Flooding Map shows that the site has a high groundwater flooding risk with a percentage chance of 50 to 75%. Refer to **Appendix D** for the WLSFRA Groundwater Flooding Map.

4.3.5 As previously mentioned in Chapter 3, groundwater levels within the trial pits surrounding the site ranged between 2.5m and 4.5m below ground level.

- 4.3.6 There are no reported historical incidences of flooding from ground water on site or in the neighboring areas.
- 4.3.7 The proposed development does not have any basements and site levels are designed such that no point within the site will be lower than the existing ground level. The levels are also designed to ensure surface flow paths direct surface runoff away from the building in the unlikely case of groundwater flooding.
- 4.3.8 The groundwater level is approximately 3m below ground level and there are no historical records of groundwater flooding. With the proposed site levels and higher than the existing levels, it can be considered that the overall groundwater flooding risk is low.

4.4 Surface Water and Ordinary Watercourse Flooding

- 4.4.1 Surface water flooding (pluvial flooding) occurs when intense rainfall is unable to infiltrate into the ground or enter drainage systems resulting in localised flooding in low spots that provide no means of outfall.
- 4.4.2 The WLSFRA Surface Water Flood Risk Map shows a part of the site to be flooded in a 1 in 100 storm event which is shown in **Appendix D**. However, the surface water flooding is localised around the roads which previously ran through the site which have since been demolished, and to the north of the site in Blyth Road. The maximum depth of the pluvial flooding in these areas for a 1 in 100 and 1 in 1000 year storm events are 0.3 and 0.6m respectively. Flooding for both events is localised in the roadways mentioned above.
- 4.4.3 The risk of the site being flooded from pluvial sources will be mitigated by the fact that the site levels are raised and that all overland flow paths direct away from the proposed building.
- 4.4.4 The lowest Finished Floor Level (FFL) within the proposed building is 31.730m. The highest elevation in the existing roadway which experiences the most significant pluvial flooding is 31.410m. The difference between existing levels and proposed levels is 0.32m, which is greater than the maximum possible flood depth from a 1 in 100 storm event.
- 4.4.5 Due to the proposed finished floor levels being greater than the existing site levels and the proposed overland flow paths, the pluvial flood risk to the site is considered to be low.

4.5 Sewer Flooding

- 4.5.1 In order to control and convey surface water runoff from impermeable surfaces in urban areas, underground surface water sewers or combined sewers (foul and surface water) are often utilised in urban areas. Pipes, culverts etc have a finite capacity and therefore pose a risk of flooding due to the risk of siltation, blockage or collapse.
- 4.5.2 As shown in **Appendix D**, no historical sewer flooding has occurred in the surrounding area according to the WLSFRA Sewer, Groundwater & Artificial Flood Risk Web Map. Therefore, the sewer flood risk is considered to be low.

4.6 Artificial Sources Flooding

- 4.6.1 Infrastructure can be designed to store, carry and protect the flow of water. For example, reservoirs store water, a canal stores/transfers water and a flood defence protects land from flood water. Failure of these water related infrastructure forms can cause flooding.
- 4.6.2 The WLSFRA Sewer, Groundwater & Artificial Flood Risk Map shows that the site is not exposed to any reservoir flood risk which is shown in **Appendix D**.
- 4.6.3 There are no existing watermains running through the proposed site. The nearest watermain is located within the newly constructed road as part of TOVF development directly east, west and south of the site. Should this water main fail, the proposed levels of the site will prevent the water from flowing towards the proposed building and any flooding arising from a failure will be localised.
- 4.6.4 The location of water mains within Blyth Road are unknown. However, it is recognised that due to the difference in levels and the direction of the overland flow paths, flooding will be contained within Blyth Road itself not have an impact on the site.
- 4.6.5 The flood risk from artificial sources can be considered to be low.

5.0 Existing Site Runoff Rates and Drainage Strategy

5.1 Existing Surface Water Runoff Rates and Volumes

- 5.1.1 Whilst the 1 Vinyl Square is within TOVF masterplan site, for which an approved drainage strategy exists, it is recognised that the ability to submit a reserved matters application has lapsed and full planning permission must now be sought for the proposed development albeit the masterplan is a material consideration in planning terms. This Drainage Strategy will therefore consider it as a separate site and aims to apply the current drainage policies.
- 5.1.2 The site is on previously developed brownfield land and has a total area of 0.45 ha. The car park and roads within the site boundary are being drained by the wider TOVF surface water drainage network. As these areas have already been designed for, they do not need to be included in this drainage strategy. The area that is being included in this drainage strategy is 0.224 ha.
- 5.1.3 The greenfield runoff rate for the 0.224 ha area, using the interim code of practice for the sustainable drainage systems, shows the Qbar rural and the Qbar urban (based on 70% impermeable area) to be 0.4 l/s and 1.2 l/s respectively. The Greenfield Calculations are contained within **Appendix E**.
- 5.1.4 As per the London Plan Sustainable Design and Construction SPG section 3.4.10:
On previously developed sites, runoff rates should not be more than three times the calculated Greenfield rate.

The maximum flow allowable from site is 3 times the greenfield rate (Qbar rural), equal to 1.2 l/s.
- 5.1.5 The greenfield runoff from the site is 48 m³ (refer to calculations within **Appendix E**).

5.2 Existing Surface Water Infrastructure

- 5.2.1 A surface water drainage network has already been constructed within and around the 1 Vinyl Square site. It was constructed as part of the wider TOVF development works in 2017 (under outline permission ref. 2012/1833 and subsequent detailed submissions). This drainage network was designed to receive unattenuated flow rates from the new building based on the approved site wide drainage strategy.
- 5.2.2 This network consists of below ground surface water sewers and large online below ground cellular storage attenuation tanks. Hydro-brake flow controls limit the discharge from these tanks into an existing Thames Water surface water sewer under Blyth Road to the north. The Hydro-brake flow controls and associated attenuation volumes are designed to accommodate the whole of TOVF development in accordance with the Surface Water Drainage Strategy approved by the London Borough of Hillingdon i.e. including 1 Vinyl Square and associated landscaping. It has been designed to accommodate runoff from rainfall events up to a 1:100 + 30% climate change without flooding and provides the surface water attenuation storage required for 1 Vinyl Square for this climate change event.
- 5.2.3 As stated in the introduction, the main drainage infrastructure has been constructed around the site based on the masterplan drainage strategy. Drawing L19091-C-0205 with **Appendix E** shows the as built drainage infrastructure.
- 5.2.4 This drainage strategy (and already constructed network) proposed that all roof run-off from the 1 Vinyl Square building connects into three lateral connections located to the south of the building that drain into Attenuation Tank 2 (AT2).
- 5.2.5 As this is a full planning application, this drainage strategy disregards the existing TOVF infrastructure and provides the necessary attenuation on site to discharge at 3 times the greenfield runoff rate.

5.3 Existing Foul Water Infrastructure

- 5.3.1 A private gravity foul water network was also constructed within and around the 1 Vinyl Square site.
- 5.3.2 The private foul network connects into a Thames Water foul sewer in Blyth Road via an existing sewer connection located in Vinyl Square.
- 5.3.3 The foul drainage strategy, and already constructed network, for the building proposed that all foul drainage connects to the two laterals located to the south of the building.
- 5.3.4 The two laterals are not sufficient to serve the new building and the already constructed system on-site is located below the proposed building (refer to drawing L19091-C-0220 in **Appendix I**).
- 5.3.5 The pipework below the new building will need to be removed prior to commencing works. Drawing L19091-C-0205 and L19091-C-0220 in **Appendix F** and **Appendix I** respectively show how the foul drainage needs to be relocated.

6.0 Sustainable Drainage Assessment

6.1 SuDS Assessment

6.1.1 To maximize the potential use of SuDS at the site, a review has been undertaken in accordance with the SuDS Hierarchy (refer to SuDS: A Practical Guide prepared by the Environment Agency).

6.1.2 The following table indicates the potential setting for SuDS elements:

	Description	Setting	Required Area
Green Roof	A planted soil layer is constructed on the roof of a building to create a living surface. Water is stored in the soil layer and absorbed by vegetation.	Building	Building integrated
Rainwater Harvesting	Rainwater is collected from the roof of a building or from other paved surfaces and stored in an overground or underground tank for treatment and reuse locally. Water could be used for toilet flushing and irrigation.	Building	Water storage
Soakaway	A soakaway is designed to allow water to quickly soak into permeable layers of soil. Constructed like a dry well, an underground pit is dug filled with gravel or rubble. Water can be piped to a soakaway where it will be stored and allowed to gradually seep into the ground.	Open Space	Dependant on Run-off volumes and soils
Filter Strip	Filter strips are grassed or planted areas that runoff can run across to promote infiltration and cleansing.	Open Space	Maximum length 5 metres
Permeable Paving	Paving which allows water to soak through. Can be in the form of paving blocks with gaps between solid blocks or porous paving where water filters through the block itself. Water can be stored in the sub-base beneath or allowed to infiltrate into ground below.	Street / Open Space	Can typically drain double its area
Bioretention Area	A vegetated area with gravel and sand layers below designed to channel, filter and cleanse water vertically. Water can infiltrate into the ground below or drain to a perforated pipe and be conveyed elsewhere. Bioretention systems can be integrated with tree-pits or gardens.	Street / Open Space	Typically, surface area is 5-10% of drained area with storage below.
Swale	Swales are vegetated shallow depressions designed to convey and filter water. These can be 'wet' where water gathers above the surface, or 'dry' where water gathers in a gravel layer beneath. Can be lined or unlined to allow infiltration.	Street / Open Space	Account for width to allow safe maintenance typically 2-3 metres wide.
Hardscape Storage	Hardscape water features can be used to store run-off above ground within a constructed container. Storage features can be integrated into public realm areas with a more urban character.	Open Space	Could be above or below ground and sized to storage need.
Pond / Basin	Ponds can be used to store and treat water. 'Wet' ponds have a constant body of water and run-off is additional, while 'dry' ponds are empty during periods without rainfall. Ponds can be designed to allow infiltration into the ground or to store water for a period of time before discharge.	Open Space	Dependant on runoff volumes and soils.
Wetland	Wetlands are shallow vegetated water bodies with a varying water level. Specially selected plant species are used to filter water. Water flows horizontally and is gradually treated before being discharged. Wetlands can be integrated with a natural or hardscape environment.	Open Space	Typically, 5-15% of drainage area to provide good treatment.
Underground Storage	Water can be stored in tanks, gravel or plastic crates beneath the ground to provide attenuation.	Open Space	Dependant on runoff volumes and soils.

Table 1: SuDS Elements

6.2 SuDS Hierarchy and Surface Water Discharge Assessment

6.2.1 Options for the destination for the run-off generated on site have been assessed in line with the prioritisation set out in the Building Regulations Part H document and DEFRA's Draft National Standards for SuDS as follows:

Discharge to Ground	Not viable due to ground contamination
Discharge to Watercourse	No watercourses in area
Discharge to Surface Water Sewer	Selected Option
Discharge to Other Sewer	N/A

Table 2: Surface Water Discharge Assessment

6.2.2 The London Borough of Hillingdon SuDS Proforma can be seen in **Appendix J**.

6.2.3 The indicative potential for different SuDS devices has been assessed and can be seen in the table below:

SuDS Feature	Environmental benefits	Water quality improvement	Suitability for low permeability soils ($k < 10^{-6}$)	Ground-water recharge	Suitable for small / confined sites?	Site specific restrictions	Appropriate for subject site?
Wetlands	✓	✓	✓	X	X	Site Constraints	No
Retention ponds	✓	✓	✓	X	X	Site Constraints	No
Detention basins	✓	✓	✓	X	X	Site Constraints	No
Infiltration basins	✓	✓	X	✓	X	Site Constraints	No
Soakaways	X	✓	X	✓	✓	Ground Contamination	No
Underground storage	X	X	✓	X	✓	None	Yes
Swales	✓	✓	✓	✓	X	Site Constraints	No
Filter strips	✓	✓	✓	✓	X	Site Constraints	No
Rainwater harvesting	X	✓	✓	✓	✓	Limited room available	Yes
Permeable paving	X	✓	✓	✓	✓	None	Tanked only
Green roofs	✓	✓	✓	X	✓	None	Yes
Rain Garden (external)	✓	✓	✓	X	X	None	Yes, lined
Rain Garden (planter)	✓	✓	✓	X	X	None	Yes, lined

Table 3: Suitability Assessment of SuDS on-site

6.2.4 Following the SuDS hierarchy under the London Plan, the following design aspects have been incorporated into the drainage strategy:

- Store rainwater for later use
 - A rainwater harvesting pump is to be installed within the final manhole. This final manhole will be oversized with a deep sump to retain rainwater for re-use. A rising main will convey water to a tap on the first floor podium that will be used for irrigation.
- Use infiltration techniques, such as porous surface in non-clay areas
 - No soakaways or infiltration based SuDS are incorporated into the drainage network due to the presence of contamination within the soil.
- Attenuate rainwater in ponds or open water features for gradual release
 - Rain Gardens are incorporated on the podium deck and roofs of the proposed building. Refer to **Appendix G** for these plans.
- Attenuate rainwater by storing in tanks or sealed water features for gradual release
 - A cellular storage tank will provide below ground storage upstream of the Hydrobrake and water harvesting chamber.
- Discharge rainwater direct to a watercourse
 - No watercourses are in close proximity to the site.
- Discharge rainwater to a surface water sewer/drain
 - The site will indirectly discharge to a Thames Water surface water sewer via the TOVF sewer network.
- Discharge rainwater to the combined sewer.
 - Not applicable (no combined sewers).

6.2.5 The proposed drainage system incorporates sustainable drainage features in accordance with the SuDS hierarchy, current legislation and best practice as much as practicable on site.

7.0 Drainage Proposal

7.1 Surface Water Drainage

- 7.1.1 The proposed building in 1 Vinyl Square will connect into TOVF surface water drainage network. As stated in TOVF drainage strategy, the site is required to connect into TOVF surface water drainage network upstream of Attenuation Tank 2 (AT2). An existing surface water sewer is present on site which provides this connection point. However, this pipe will partially need to be relocated due to the proposed footprint of the building.
- 7.1.2 As stated in paragraph 2.1.1, the ability to submit a reserved matters application for 1 Vinyl Square has lapsed. A full planning application is therefore being submitted for the 1 Vinyl Square development and this drainage strategy applies the current drainage regulations and policies. As stated in paragraph 2.2.1, the peak surface water discharge rate from the site will be restricted to 3 times the greenfield runoff rate (1.2 l/s) in accordance with London Plan SPG section 3.4.10.
- 7.1.3 Refer to **Appendix H** for the proposed surface water design calculations.
- 7.1.4 Refer to **Appendix I** for the proposed drainage layout.
- 7.1.5 Refer to Chapter 5 for the SuDS measures being incorporated.
- 7.1.6 New climate change allowances have been in force since February 19th, 2016. The new allowances take into consideration the design life of the development, flood zone, development type and geographical location. Based on these parameters, the central value for rainfall intensity should be used. Based on Table 4 (shown below), this is a range between 20% and 40% for the central and upper end values. Therefore, it is appropriate to use 40% on this development for design.

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

Table 4: Climate Change Allowances

- 7.1.7 The footways surrounding the proposed building fall toward the adjacent, already constructed, carriageway. Surface water falling on the footways will therefore drain to the existing road gullies.
- 7.1.8 As the allowable discharge rate from the site is lower than the anticipated runoff rate, a 25m³ attenuation tank is required on site. This tank will be located under the cycle store of the building and will be connected as an offline tank.

7.1.9 The proposed drainage network on the site meets the performance requirements set out in BSEN 752 which are summarised below:

- No pipes should surcharge during a 1 in 2 year storm event
- No flooding should occur during a 1 in 30 year storm event
- Minor flooding during a 1 in 100 year + 40% climate change storm event is acceptable as long as there is no flooding to properties on site, or land off-site.

7.1.10 The combination of the storage provided by the attenuation tank and within the pipes and manholes means that there is no flooding during any 1 in 100 + 40% climate change rainfall event and the design therefore exceeds the minimum requirement of BS EN 752 (calculations found in **Appendix H**).

7.1.11 The surface water from the roofs will discharge through controlled outlets within the green roofs and will connect into external gravity sewers on site.

7.1.12 A rainwater harvesting pump will be incorporated into the final manhole which will provide irrigation for the soft landscaping areas on the roofs. This benefits the design as it re-uses the surface water which is at the top of the SuDS hierarchy.

7.2 Water Quality

7.2.1 A key requirement of any SuDS system is that it protects the receiving water body from the risk of pollution. This can be effectively managed by an appropriate “train” or sequence of SuDS components that are connected in series.

7.2.2 The frequent and short duration rainfall events are those that are most loaded with potential contaminants (silts, fines, heavy metals and various organic and inorganic contaminants). Therefore, the first 5-10 mm of rainfall (first flush) should be adequately treated with SuDS.

7.2.3 The minimum number of treatment stages will depend on the sensitivity of the receiving water body and the potential hazard associated with the proposed development SuDS Manual (CIRIA, 2015).

7.2.4 The extent of treatment depends on land use, level of pollution prevention in the catchment and the natural protection afforded by underlying soil layers. A high hazard site will require more treatment than low hazard.

7.2.5 The treatment processes provided by different SuDS components will have varying capabilities for removal of different types of contaminants as per the table below:

Hazard	Requirements for discharge to surface water and groundwater	Present
Very Low	Removal of gross solids and sediments only.	YES
Low	Simple index approach	YES
Medium	Surface water: Simple index approach Ground water: Simple index approach and risk screening	NO
High	Guidance and risk assessment process in HA (2009). Discharge may require environmental permit or licence. Obtain pre-permitting advice from environmental regulator. Risk assessment likely to be required.	NO

Table 5: Pollution Treatment

- 7.2.6 Treatment has been provided in the form of permeable (tanked) pavements, catchpit manholes and attenuation tanks to remove sediment and contaminated particles, and geotextiles where appropriate as a filter medium. Treatment will also be provided by the Green roofs. Rainwater will be treated as it infiltrates through the soil media before entering the surface water network.

7.3 Foul Water Drainage

- 7.3.1 The foul water from the development will be collected from downpipes to a gravity sewer within the site which will connect into the existing foul sewer in Blyth Road.

- 7.3.2 The peak flow rate for the foul water from the proposed development has been calculated using the methodology set out in Sewers for Adoption, 7th Edition and BS EN 752:

$$134 \text{ homes} \times 4000 \text{ l/day} = 536,000 \text{ l/day}$$

$$536,000 \text{ l/day} \div (24 \text{ hrs} \times 60 \text{ minutes} \times 60 \text{ seconds})$$

$$= 6.204 \text{ l/s}$$

Assuming the commercial space operates for 8 hours a day:

$$395 \text{ sqm floor space} \times 7.5 \text{ l/sqm}$$

$$2962.50 \text{ l of commercial floor space} \div (8 \text{ hrs} \times 60 \text{ minutes} \times 60 \text{ seconds})$$

$$= 0.103 \text{ l/s}$$

$$\text{Total Peak flow} = 6.307 \text{ l/s}$$

- 7.3.3 As part of TOVF development, foul water sewers were constructed with and around the 1 Vinyl Square site for the proposed building to be connected to. However, as stated in paragraph 4.3.5, the foul sewer that was constructed is partially below the proposed building. Refer to **Appendix I** for drawing L19091-C-0220 illustrating the proposed sewer network and the necessary changes.

8.0 Maintenance

8.1.1 Maintenance of SuDS drainage should be in accordance with the guidance presented in CIRIA Factsheet “Maintenance of SuDS” May 2017. A detailed maintenance plan for the development will be generated by the appointed owner/maintainer of the site or a selected maintenance company and this section is for guidance only.

8.1.2 Maintenance operations can be divided into the following categories:

- Regular (or routine frequent) – this covers items that are carried out typically with a frequency from monthly to annually. It includes item such as inspection and monitoring, litter removal, grass cutting or other vegetation management, sweeping permeable pavements.
- Infrequent (or routine infrequent) – this covers items that are required typically with a frequency from annually up to 25 years (or possibly greater). It includes items such as wetland vegetation management, silt removal from swales, ponds or wetlands, scarifying and spiking infiltration basins and gravel replacement to filter drains.
- Remedial (or reactive) – this covers maintenance that is not usually required, but may be necessary as a result of vandalism, accidental damage, rainfall that exceeds the design capacity or similar events. Examples include repair of erosion in a swale or repair of permeable surfaces blocked for example by mixing concrete on them.

8.2 Allowing for Replacement

8.2.1 The design life of some SuDS elements and drainage elements of the proposed system is shorter than the predicted design life of the development. Therefore, the design and maintenance regime consider any potential replacement works (such as replacing permeable paving).

8.2.2 Regular inspection of the drainage system should be as per the tables below.

Operation and maintenance requirements for Surface Water Systems		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect for sediment and debris in catchpit manholes and gullies. Clean out as required	Twice Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris from catchpits, gullies, attenuation devices and inside of concrete manhole rings	As required, based on inspections
Remedial Actions	Reconstruct and/or replace components, if performance deteriorates or failure/blockage occurs	As required
	Replacement of clogged components (flow restriction)	As required
Monitoring	Inspect silt traps/gullies/catchpits and note rate of sediment accumulation	Monthly in the first year and then annually
	Check flow control chamber and attenuation devices	Annually

Table 6: Operation and Maintenance Requirements for Surface Water Systems

Operation and maintenance requirements for Attenuation Storage Tanks		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays	Annually, or as required
Remedial Actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

Table 7: Operation and Maintenance Requirements for Attenuation Storage Tanks

Operation and maintenance requirements for Green Roofs		
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 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 manufacturer)
	Post establishment, replace dead plants as required (where > 5% 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
	Move 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 8: Operation and Maintenance Requirements for Attenuation Storage Tanks

9.0 Conclusion

9.1 This drainage strategy has been developed to comply with the following policies;

- National Planning Policy Framework 2019,
- London Plan March 2016 Policy 5.13 Sustainable Drainage,
- London Plan Sustainable Design and Construction Supplementary Planning Guidance (April 2014) Paragraph 3.4.10,
- Draft London Plan July 2019 Policy SI 13 Sustainable Drainage, and,
- London Borough of Hillingdon Local Plan, Part 2: Development Management Policies, October 2015, (with modifications March 2019) Policy DME110 – Water Management, Efficiency and Quality.

9.2 The red-line boundary covers an area of 0.45ha and includes the site access road off Blyth Road, and the continuation of this road to the south and west of the proposed Veneer Store (approved but not yet constructed). This road and associated parking, however, already has detailed planning permission under the Veneer Store development and has been constructed. The remaining 1 Vinyl Square site within the red-line boundary occupies an area of 0.224ha.

9.3 The proposed building will have a maximum height of 11 storeys (ground plus 10 floors) plus lift overruns. The description of the proposed development is:

“Full planning permission for the redevelopment of the site to provide a mixed-use development comprising 134 residential dwellings (C3 Use Class) and 395sqm (GIA) commercial floorspace (flexible A1/A2/A3/A5/B1 Use Class), car parking, cycle parking and associated landscaping.”

9.4 Although the geology of the site indicates otherwise, contamination of the in-situ soil and the presence of a high water table means infiltration to ground is not a viable option.

9.5 Whilst the 1 Vinyl Square is within TOVF masterplan site for which an approved drainage strategy exists it is recognised that the ability to submit a reserved matters application has lapsed and full planning permission must now be sought for the proposed development. This drainage strategy will therefore consider this as a separate site and aim to apply the current drainage policies.

9.6 The site is on previously developed brownfield land and has a total area of 0.224 ha.

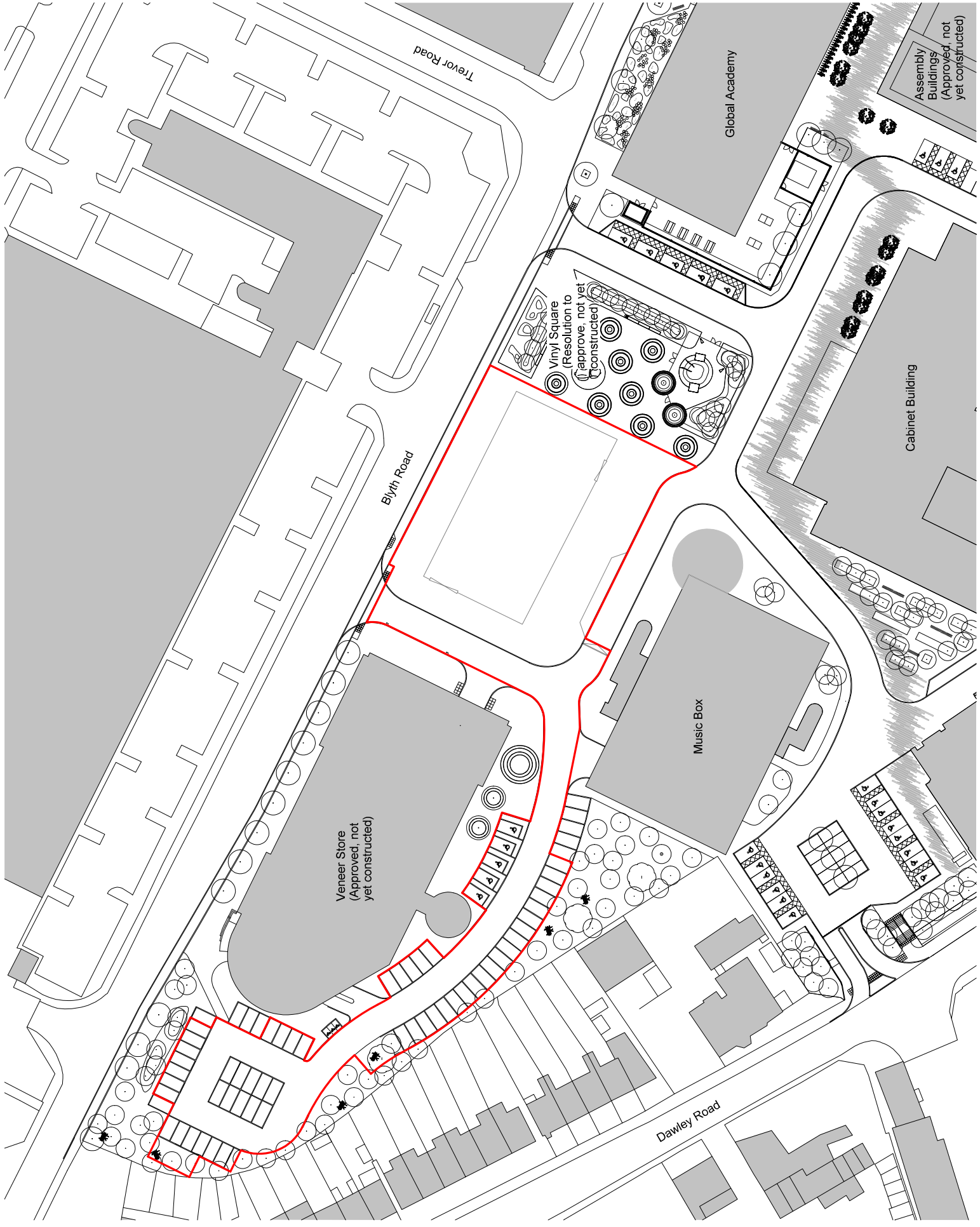
9.7 The risk of fluvial and tidal flooding can be considered as low as the entire site is located within Flood Zone 1 and the area is not at risk of flooding from tidal river or ocean sources. The site is located within a high groundwater flood risk zone with a probability of between 50 and 75%. However, as there have been no historical flooding events and the groundwater is at least 2.5m below ground level, the risk of groundwater flooding can be considered as low. The risk of surface water flooding can be considered as low as although flooding is likely to occur within a 1 in 100 year storm event, it will all be contained within the neighbouring roads. There is no evidence of historical sewer flooding so therefore the sewer flooding risk can be considered

as low. The risk of flooding from artificial sources can also be considered as low as no hazards have been identified for the site.

- 9.8 The greenfield runoff rate for the whole site, using the interim code of practice for the sustainable drainage systems, shows the Qbar rural and the Qbar urban (based on 70% impermeable area) to be 0.4 l/s and 1.2 l/s respectively. The greenfield runoff volume from the site is 48 m³.
- 9.9 A surface water drainage network has already been constructed on and around the 1 the Vinyl Square site as part of the wider TOVF development works in 2017. This private network was designed to accommodate runoff from rainfall events up to a 1:100 + 30% climate change (in accordance with the relevant climate change requirements at that time).
- 9.10 As this is a full planning application, this drainage strategy disregards the existing TOVF infrastructure and provides the necessary attenuation on site to discharge at 3 times the Greenfield Runoff rate in accordance with London Plan Sustainable Design and Construction SPG section 3.4.10. Three times the greenfield runoff rate for the site is 1.2 l/s. This flow will be controlled with a Hydrobrake.
- 9.11 A 25m³ attenuation tank is required on site to prevent the system from flooding during a 1 in 100 year plus 40% climate change worst case storm event. It is proposed to locate the tank under the cycle store in the proposed building.
- 9.12 A private gravity foul water network was also constructed within the TOVF development which connects into a Thames Water foul sewer in Blyth Road.
- 9.13 The location of the gravity foul sewer within the site clashes with the proposed building footprint and therefore will be relocated.
- 9.14 Following the SuDS hierarchy set out in the London Plan, rainwater harvesting will be incorporated into the design which will provide irrigation for the first floor podium deck planters. All roofs will contain soft landscaping areas. Rainwater falling onto these areas will be treated by infiltration through the soil. Some treatment will also be provided by settlement from the small attenuation tank which will be placed on site.
- 9.15 The TOVF foul network was designed to receive the peak foul flows from the 1 Vinyl Square site. Therefore, there is sufficient capacity within the network to receive the predicted flow rate of 6.307 l/s.
- 9.16 This report has demonstrated that the proposed drainage measures ensure that no property, on or off site, will be at risk of flooding if the development proceeds and that suitable means of surface water and foul drainage can be achieved for the proposed development.
- 9.17 This report contains a SuDS management and maintenance plan to ensure the system remains fully functional for the lifetime of the development.

Appendix A

Location Plan



Notes

1. All drawings are subject to change without notice.

2. The client is responsible for providing all necessary information and data for the design and construction of the project.

3. Any information provided by the client should be taken from the project's data and not from the drawings.

4. The drawings are the property of the client and should not be reproduced without written permission.

5. This drawing is prepared for the specific project stage in the design process. Any changes to the design should be made in consultation with the design team.

6. All dimensions are in meters unless otherwise stated.

7. The drawings are prepared for the specific project stage in the design process. Any changes to the design should be made in consultation with the design team.

8. All dimensions are in meters unless otherwise stated.

9. The drawings are prepared for the specific project stage in the design process. Any changes to the design should be made in consultation with the design team.

10. All dimensions are in meters unless otherwise stated.

Application Boundary

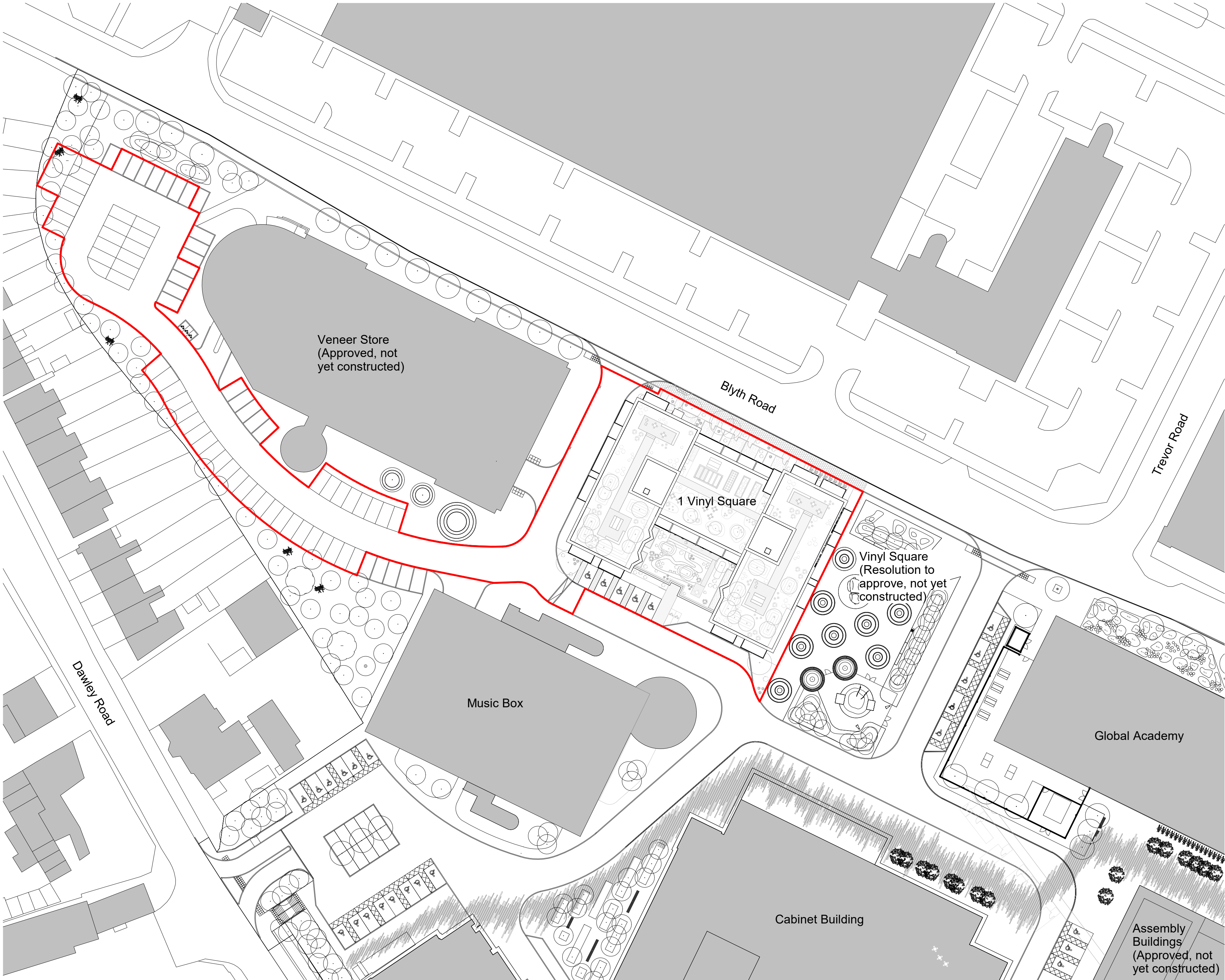
Rev	Date	Description	Drawn	Check
01	20/01/2020	Initial Design	J. Smith	M. Jones
02	25/01/2020	Final Design	J. Smith	M. Jones

Joseph
Homes.



Project
1 Vinyl Square, Old Vinyl
Factory

Existing Site Plan
Scale: 1:500
Drawing No: 01/056-177-003
Revision: 01
Scale bar: 0 5 10 15 m



Notes

Drawings to be scaled for planning purposes only. All contractors must visit the site and be responsible for taking and checking dimensions. All construction information should be taken from figured dimensions only. Any discrepancies between drawings, specifications and site conditions must be brought to the attention of the supervising officer. This drawing & the works depicted are the copyright of JTP.

This drawing is prepared for the specific project stage in the Drawing Status section below and it is not intended to be used for any other purpose. Whilst all reasonable efforts are used to ensure drawings are accurate, JTP accept no liability for any reliance placed on, or use made of, this plan by anyone for purposes other than those stated in the Drawing Status below.

Application Boundary

P1	24.10.19	Issued For Planning.	BM	DCS
Rev	Date	Description	Drawn	Chkd
Drawing Status				
For Planning				

Client

Joseph Homes.

itp JTP Studios, Unit 5
The Rum Warehouse
Pennington Street
London, E1W 2AP
+44 (0) 20 7017 1780
www.itp.co.uk

Project
1 Vinyl Square, Old Vinyl Factory

Drawing Title

Proposed Site Plan

Scale @A2 1 : 500 Job Ref 01659
Drawing No 01659-JTP-SL-002 Revision P1

Scale Bar 0 5 10 15 m



Notes

1. All drawings are subject to change without notice.

2. All dimensions are given in feet and inches.

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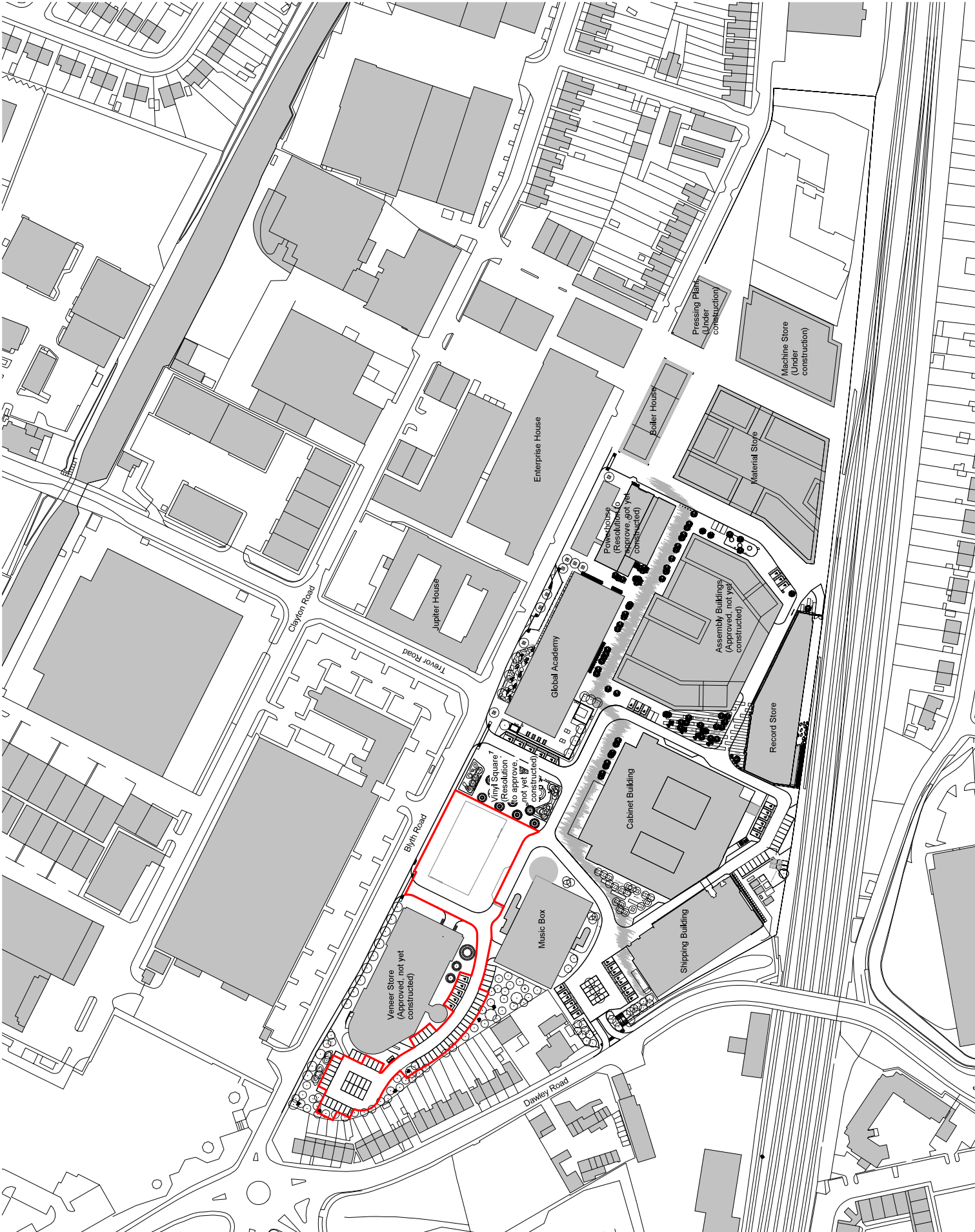
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Application Boundary



For Planning

Joseph
Homes.

jtp

Project
1 Vinyl Square, Old Vinyl
Factory

Site Location Plan

Scale 1:1250

Job Ref: 01659

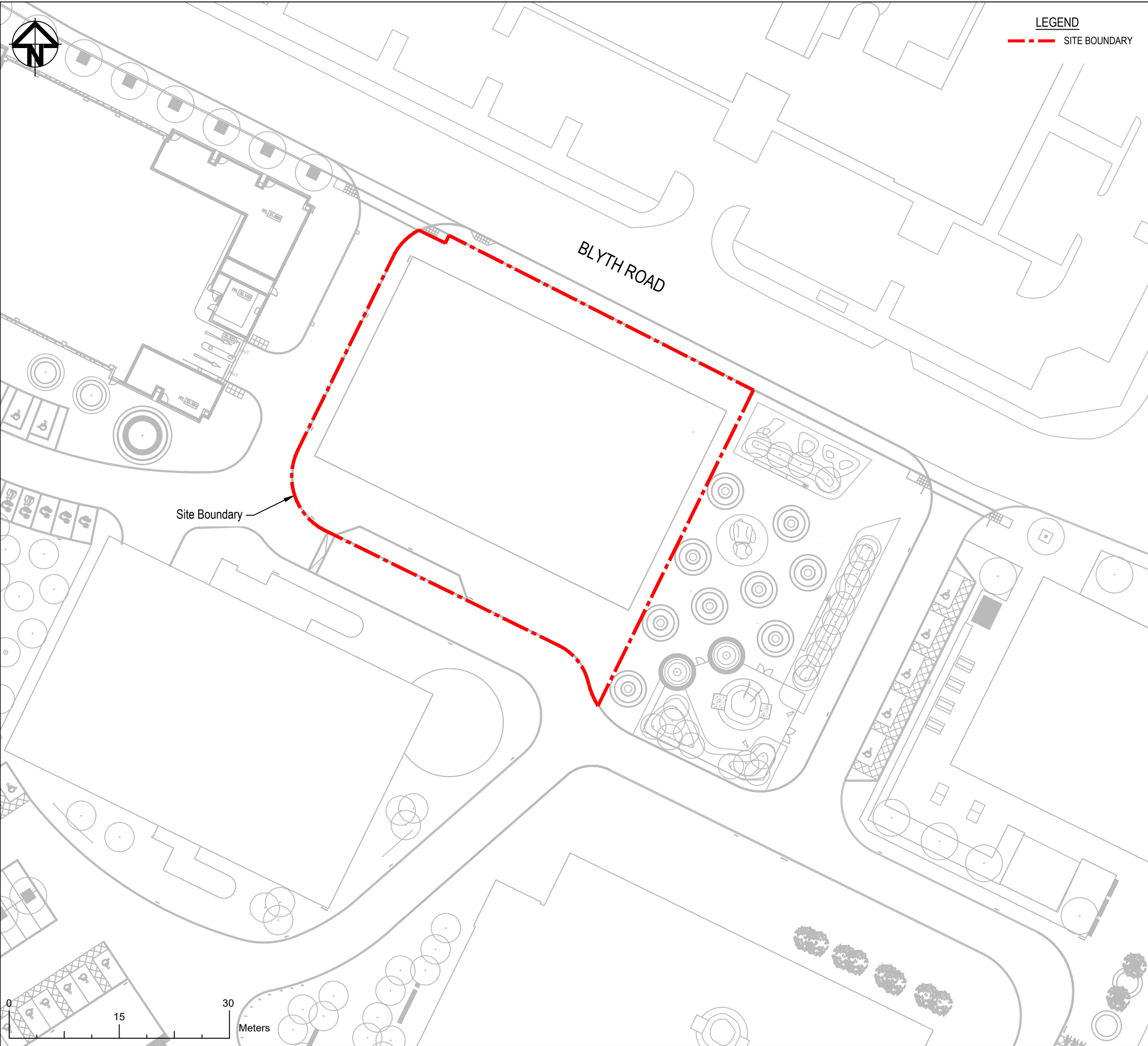
Drawing No: 01659-TP-01

Revision: P1

Scale bar 0 10 20 30 m

Appendix B

1 Vinyl Square Site Boundary



LEGEND

--- SITE BOUNDARY

- GENERAL NOTES
- 1.1. THIS DRAWING IS COPYRIGHT AND SHOULD NOT BE REPRODUCED IN WHOLE OR PART WITHOUT THE WRITTEN CONSENT OF PATRICK PARSONS LTD.
 - 1.2. DO NOT SCALE FROM THIS DRAWING.
 - 1.3. LOCATIONS OF ALL EXISTING SERVICES ON-SITE TO BE CONFIRMED & PROVIDED TO THE ENGINEER PRIOR TO COMMENCEMENT OF WORKS.
 - 1.4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT PATRICK PARSONS LTD DRAWINGS & SPECIFICATIONS.

P1	INITIAL ISSUE.	15.10.19	JA
Rev.	Amendments	Date	By

Revisions



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Client
JOSEPH HOMES

Project
VENEER BUILDING, THE OLD VINYL FACTORY

Drawing
1 VINYL SQUARE SITE LOCATION

Scales 1:500 At original size A3

Drawn	JA	Checked	AD
Date	OCT 19		

Status **PRELIMINARY**

Drg. No. **L19091-C-0200** Rev. **P1**

Appendix C

Bore Log Results

Trial Pit



Window Sample



Borehole 2010



Borehole 2011



Unit 12, Watersedge Business Park, Mowden Road, Salford Quays, M5 3EZ
T 0161 2373315 F 0161 2373315 W www.rpsgroup.com

Client: Cathedral Group

Project: Purple Hayes

Title: Borehole Location Plan

Date: March 2011

Scale: NTS

Drawn: JR Checked: AC Job Ref: RCEI15708

Figure Number: 3

Rev: 2

www.rpsgroup.com



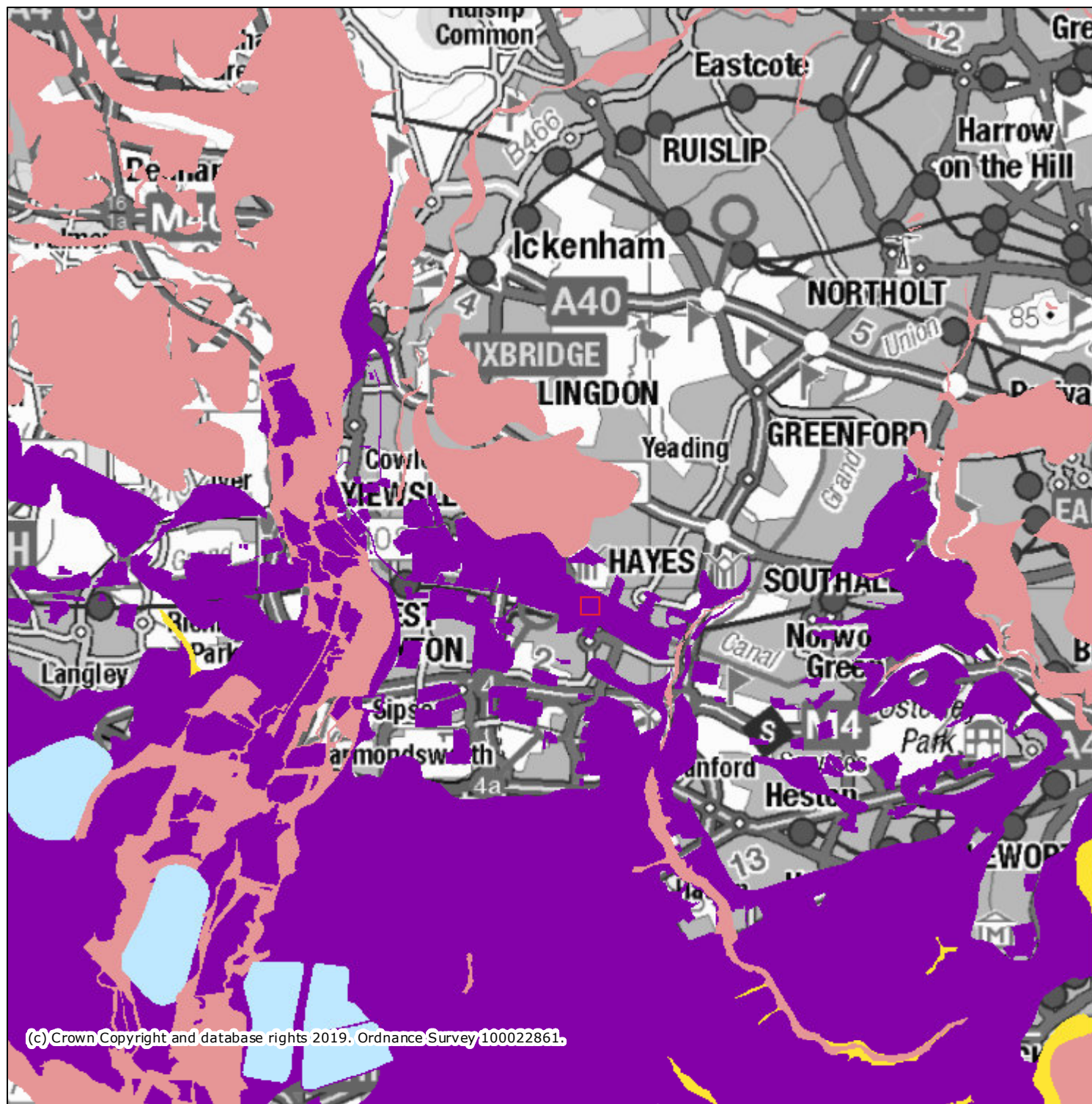
RPS				RPS Health, Safety and Environment 52 Princess Street Manchester, M1 6JX Tel: 0161 2379858 Fax: 0161 2373315			Site London Gate, Blyth Road, Hayes		Borehole Number BH101	
Boring Method Cable Percussion		Casing Diameter 150mm cased to 6.10m			Ground Level (mOD)		Client J E R Partners		Job Number 13784	
		Location							Dates 22/02/2011	
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.30	B1					(0.10) 0.10	Bitumen bonded aggregate. [Made Ground]			
0.80	B2						Dark Brown ashy sandy GRAVEL of flint with fragments of brick, concrete and clinker. [Made Ground]			
1.20-1.65 1.20-1.70	CPT N=9 B3			2,4/2,2,3,2		(2.50)				
2.20-2.65 2.20-2.70	CPT N=20 D4			1,3/2,2,4,12		2.60	Orange brown sandy fine to coarse subangular to subrounded flint GRAVEL. [Taplow Gravel Formation]			
3.20-3.65 3.20-3.70	CPT N=50 B5			5,8/13,14,15,8						
4.20-4.65 4.20-4.70	CPT N=50 D6			8,14/17,20,13 Water strike(1) at 4.50m.		(3.25)				
5.50-5.95 5.50-5.85	CPT N=17 B7			5,7/6,5,3,3		5.85	Stiff to very stiff dark grey CLAY. [London Clay Formation]			
5.85-6.00 6.00-6.45	B8 U9									
6.50	D10									
7.00-7.50	B11									
7.50-7.95 7.50	SPT N=18 D12			1,2/4,4,4,6						
9.00-9.45 9.00	SPT N=20 D13			2,3/4,4,6,6						
Remarks Hand excavated to 1.2 m.bgl. No monitoring well installed. Water added from 2.60m to 5.00m.								Scale (approx) 1:50	Logged By AC	
								Figure No. 13784.BH101		

			RPS Health, Safety and Environment 52 Princess Street Manchester, M1 6JX Tel: 0161 2379858 Fax: 0161 2373315					Site London Gate, Blyth Road, Hayes			Borehole Number BH08	
Machine : Flush : Core Dia : Method :			Casing Diameter			Ground Level (mOD)		Client J E R Partners			Job Number 13784	
			Location			Dates 08/09/2010		Engineer Aaron Cousins			Sheet 1/1	
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr	
0.20-1.00					S1 0 ppm		(0.10) (0.10) (0.20) 0.30	Bitumen bonded aggregate. [Made Ground] Concrete. [Made Ground] Pale brown fine to coarse sandy GRAVEL of flint brick, concrete and clinker. [Made Ground]	  			
1.00-1.20					S2 0 ppm		1.20 (0.60)	Soft to firm orange brown sandy gravelly CLAY. Gravel is fine to coarse subangular flint. [Brickearth]				
1.80-2.00					S3 0 ppm		1.80	Orange brown sandy fine to coarse subangular to subrounded flint GRAVEL. [Taplow Gravel Formation]		Σ1		
					Water strike(1) at 2.50m.		(4.00)					
							5.80 (0.20) 6.00	Stiff to very stiff dark grey CLAY. [London Clay Formation]				
								Complete at 6.00m				
Remarks Advanced using sonic drilling techniques. Damp from 2.5 m.bgl.									Scale (approx) 1:50		Logged By AC	
									Figure No. 13784.BH08			

Appendix D

Flood Risk Maps

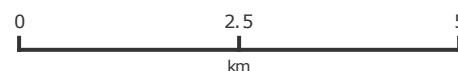
MAGiC 1 Vinyl Square Aquifer Map



Legend

Aquifer Designation Map (Superficial Drift) (England)

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unknown (lakes+landslip)
- Unproductive



Projection = OSGB36

xmin = 487600

ymin = 169500

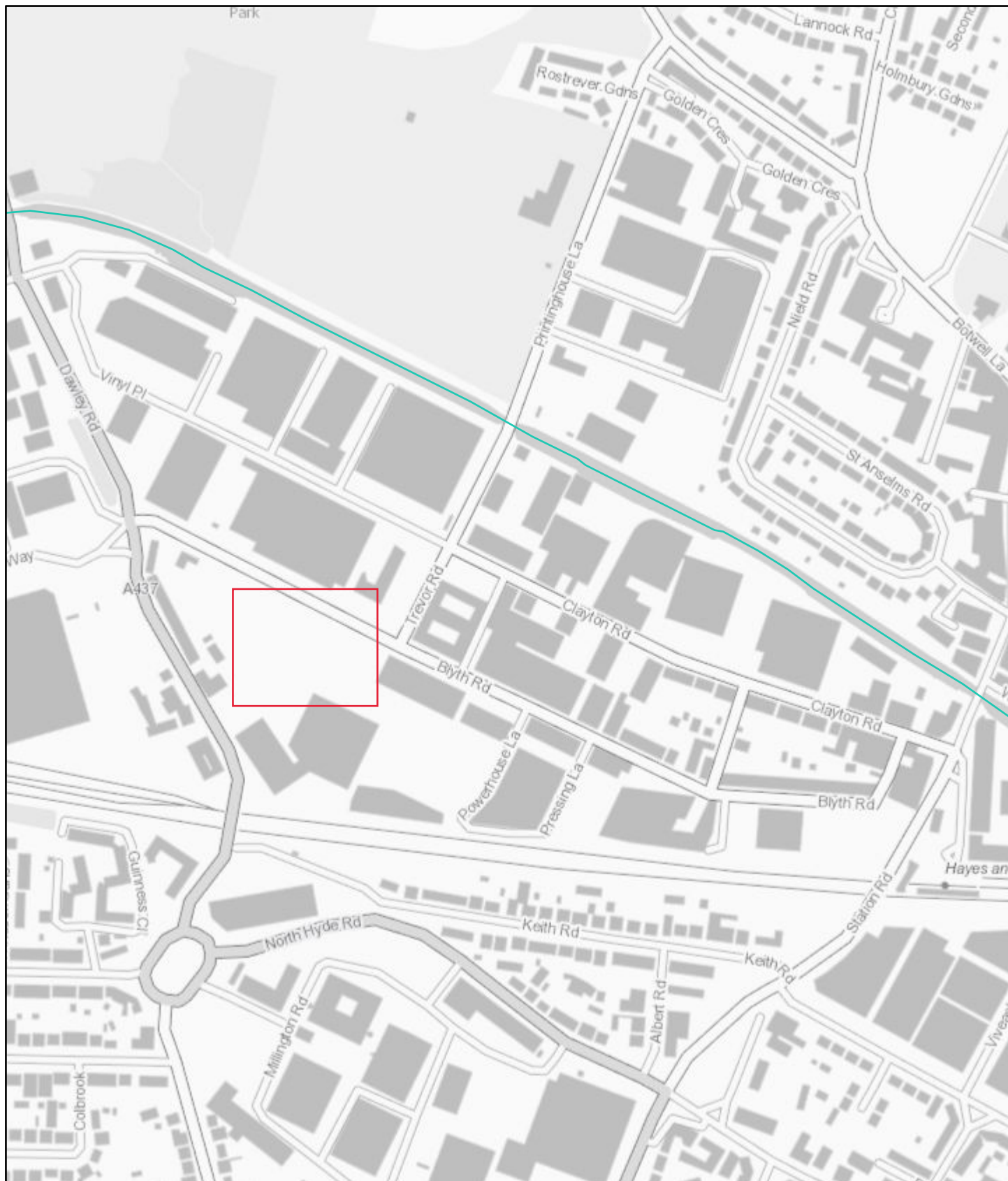
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ymax = 191400

Map produced by MAGiC on 6 November, 2019.

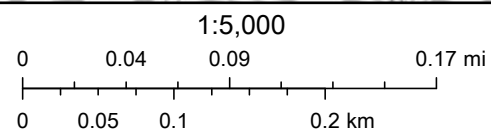
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1 Vinyl Square Fluvial Flood Risk



06/11/2019, 10:42:51

-  Borough Boundary
-  Study Area Boundary
-  Ordinary Watercourse
-  Flood_Map_for_Planning_Rivers_and_Sea_Flood_Zone_3
-  Flood_Map_for_Planning_Rivers_and_Sea_Flood_Zone_2

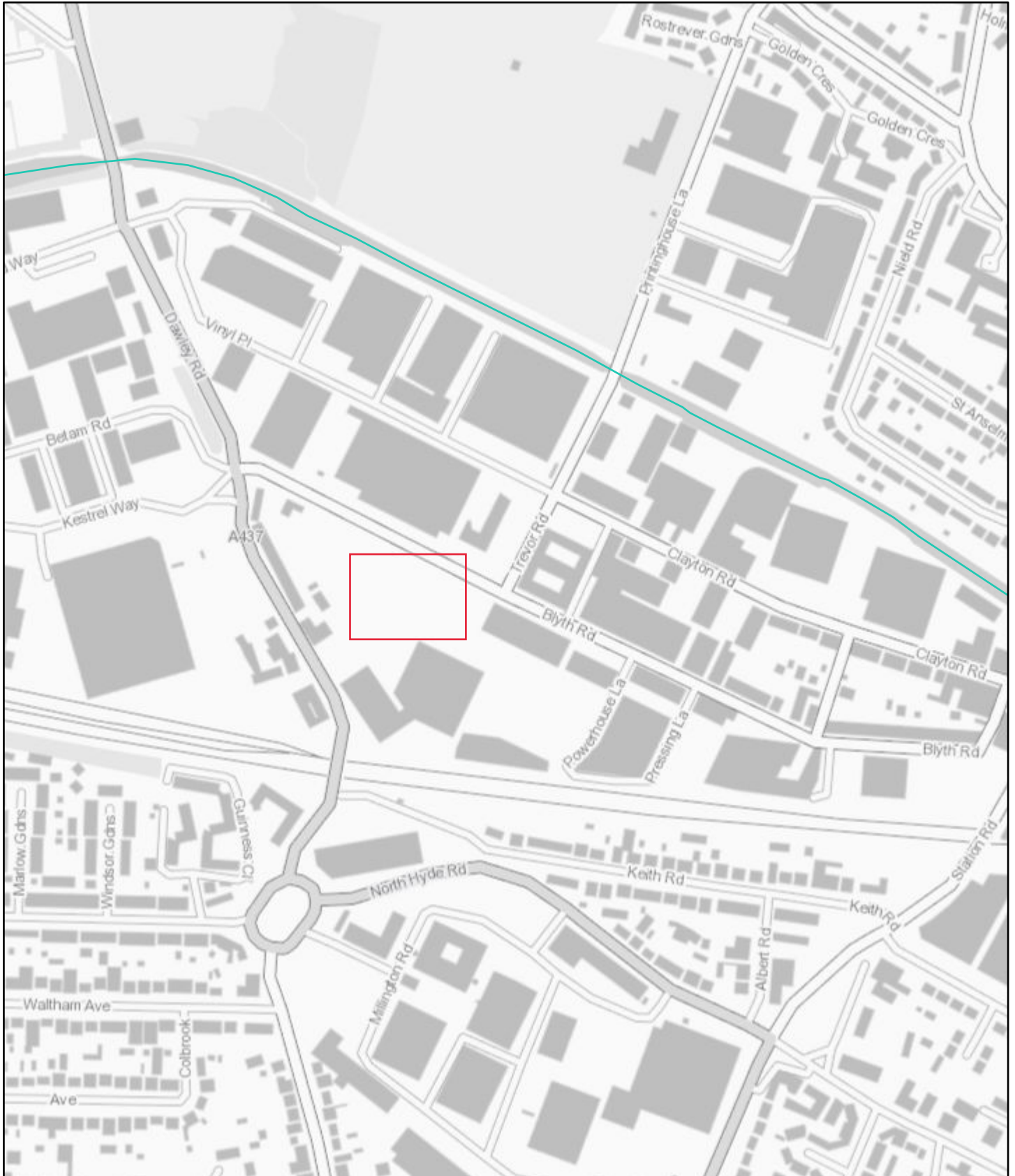


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London Boroughs of Brent, Barnet, Harrow, Hillingdon, Hounslow and Ealing

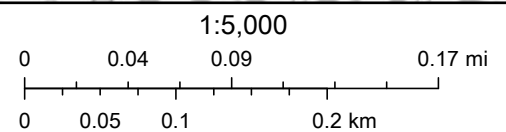
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1 Vinyl Square Tidal Flooding



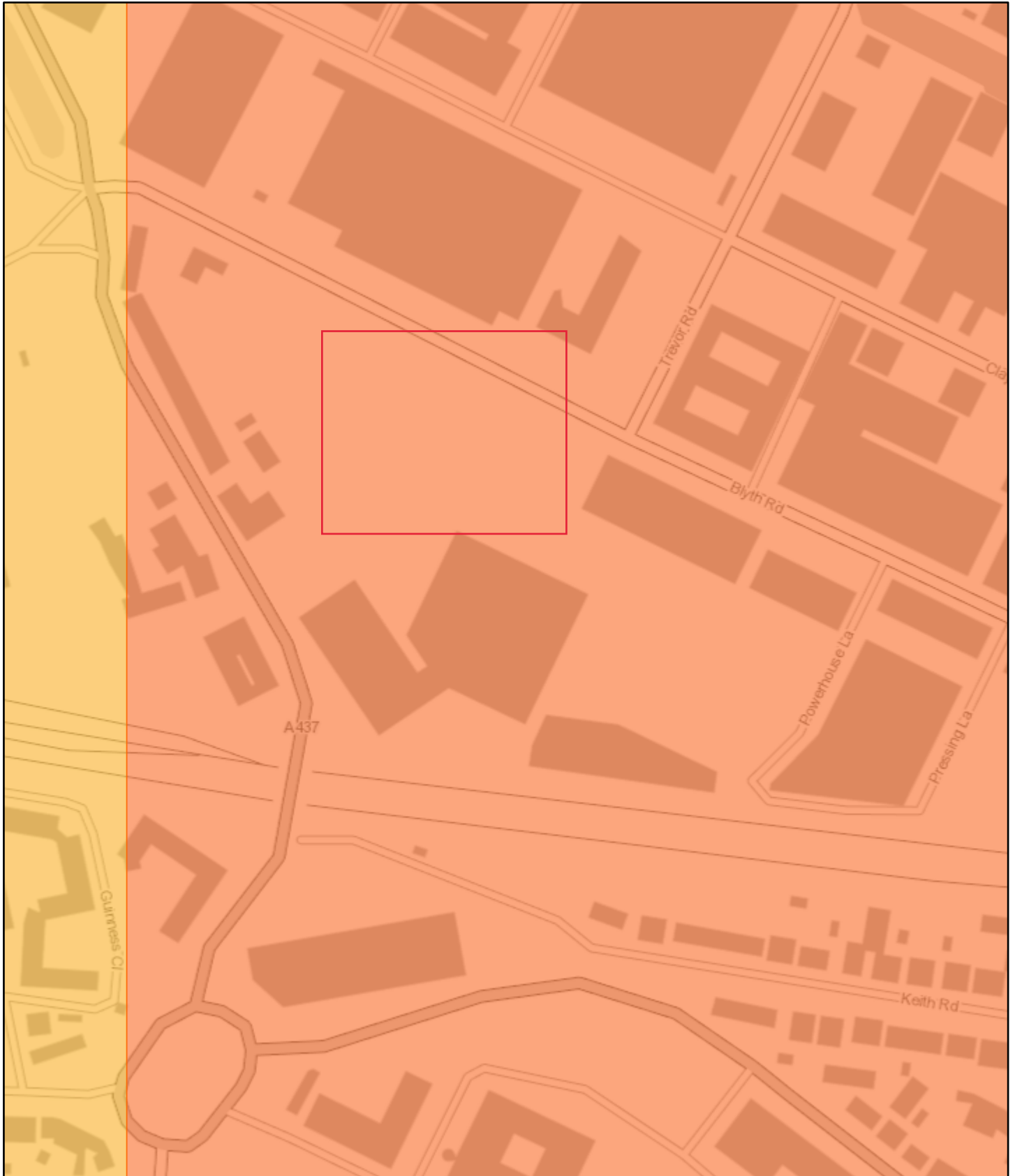
06/11/2019, 10:42:04

-  Borough Boundary
-  Study Area Boundary
-  Ordinary Watercourse



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1 Vinyl Square Groundwater Flood Risk



06/11/2019, 10:41:20

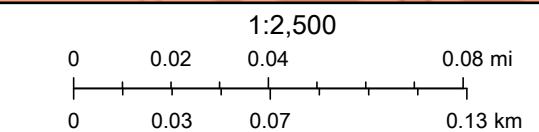
 Borough Boundary

 Study Area Boundary

EA 2017 - Susceptibility to Groundwater Flooding

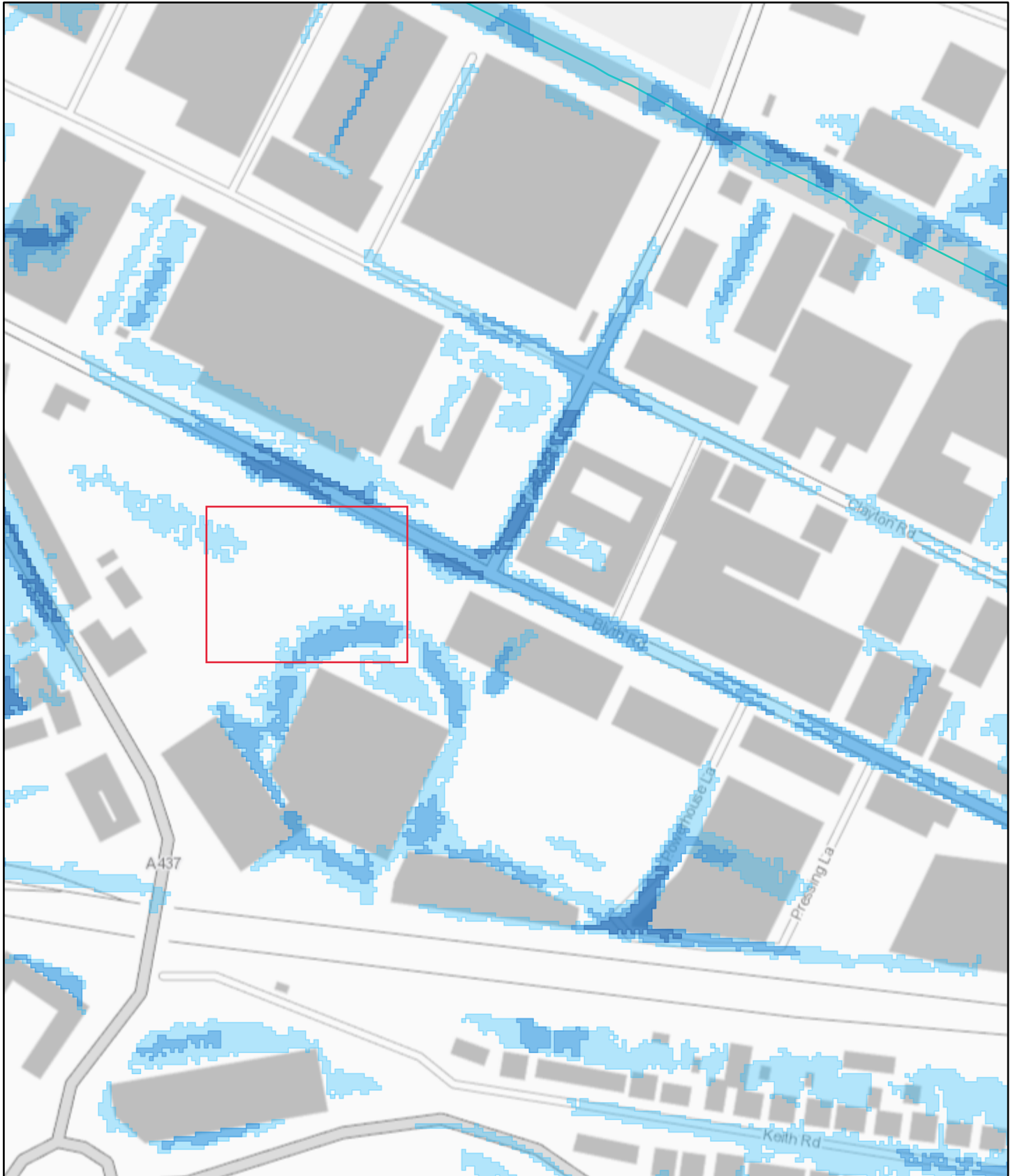
 $\geq 25\% < 50\%$

 $\geq 50\% < 75\%$



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1 Vinyl Square Pluvial Flood Risk



06/11/2019, 10:40:37

Borough Boundary

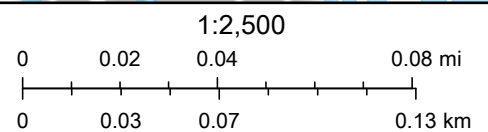
Study Area Boundary

EA 2017 - Risk of Flooding from Surface Water Extent: 3.3 percent annual chance

EA 2017 - Risk of Flooding from Surface Water Extent: 1 percent annual chance

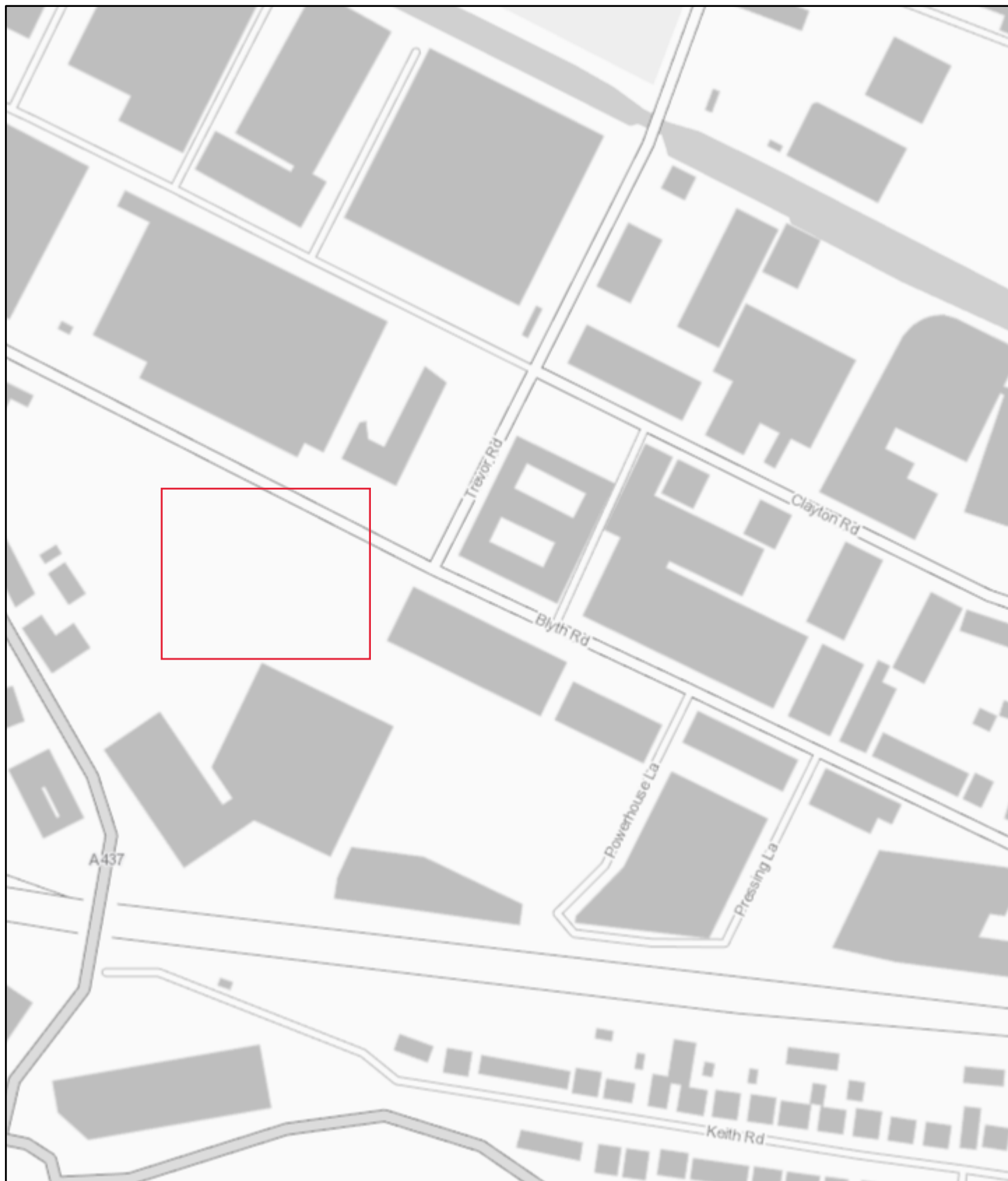
EA 2017 - Risk of Flooding from Surface Water Extent: 0.1 percent annual chance

Ordinary Watercourse



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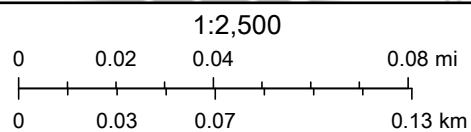
1 Vinyl Square Sewer Flood Risk



06/11/2019, 10:44:29

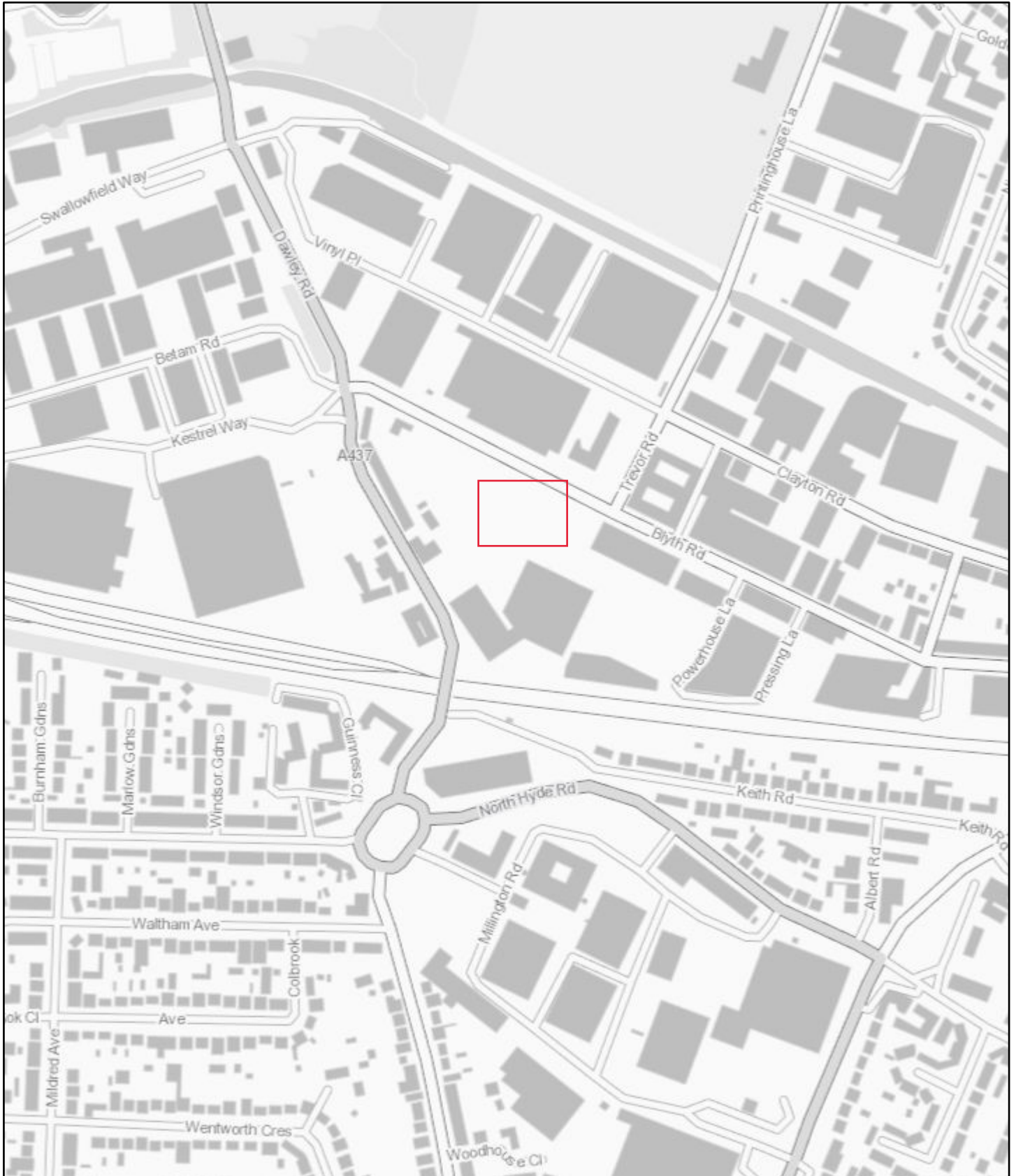
 Borough Boundary

 Study Area Boundary



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1 Vinyl Square Artificial Source Flood Risk



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Appendix E

Greenfield Runoff Calculations

Patrick Parsons Limited		Page 1
Waterloo House Thornton Street Newcastle Upon Tyne, NE1 4AP	1 Vinyl Square The Vinyl Factory Hayes	
Date 17/10/2019 File	Designed by AJD Checked by JA	
Innovyze	Source Control 2018.1.1	
ICP SUDS Mean Annual Flood Input Return Period (years) 2 Area (ha) 0.224 SAAR (mm) 616 Soil 0.300 Urban 0.700 Region Number Region 6 Results 1/s QBAR Rural 0.4 QBAR Urban 1.2 Q2 years 1.2 Q1 year 1.0 Q30 years 2.1 Q100 years 2.5		
©1982-2018 Innovyze		

Patrick Parsons Limited		Page 1
Waterloo House Thornton Street Newcastle Upon Tyne, NE1 4AP	1 Vinyl Square The Vinyl Factory Hayes	
Date 17/10/2019 File	Designed by AJD Checked by JA	
Innovyze Source Control 2018.1.1		

Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	20.000
Ratio R	0.403
Areal Reduction Factor	1.00
Area (ha)	0.224
SAAR (mm)	616
CWI	89.880
Urban	0.700
SPR	30.000

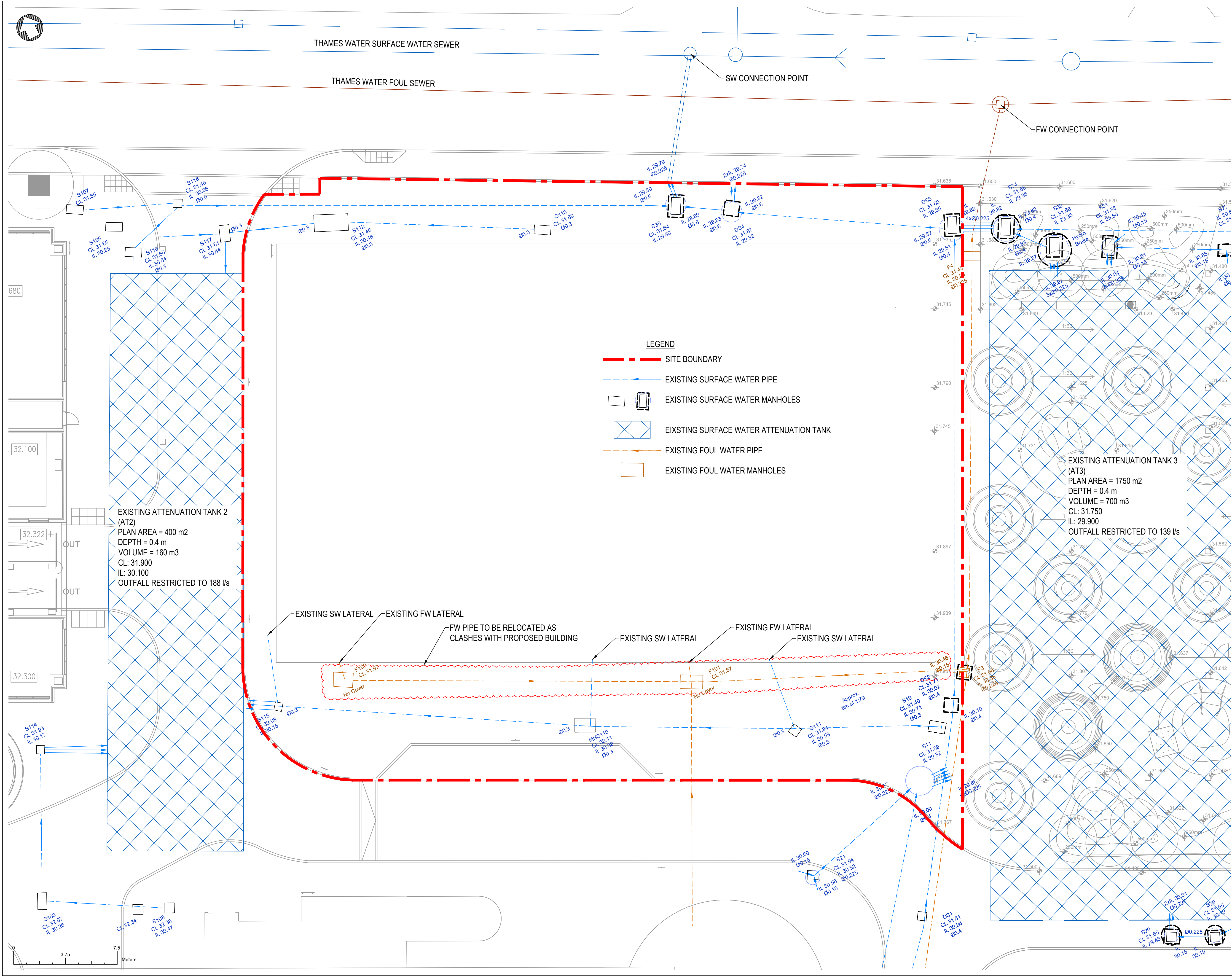
Results

Percentage Runoff (%)	34.59
Greenfield Runoff Volume (m³)	48.289

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Appendix F

Existing Drainage Infrastructure



Appendix G

Proposed Landscaping Plans



- General Notes**
- For further details, please refer to the relevant sections of the planning application. All dimensions are to be confirmed by the contractor and shall be subject to the final interpretation of the contractor. All work shall comply with the relevant standards and regulations. The contractor shall be responsible for the final interpretation of the plan and shall be responsible for the final interpretation of the plan.
- Notes**
- Planning Application Boundary
 - Asphalt standard concrete paving flag, Dimension: 400x400mm depth, Colour: Natural
 - Asphalt standard tactile concrete paving flag, Dimension: 400x400mm depth, Colour: Buff
 - Commercial concrete block paving type A1, Product: Eira, Dimension: 200x300x40mm depth, Colour: Charcoal
 - Commercial concrete block paving type A2, Product: Eira, Dimension: 200x300x40mm depth, Colour: Charcoal
 - Clay brick paving, Dimension: 215x102x40mm depth, Colour: To match architectural palette
 - Railing and single gate, Dimension: 1000mm high, Colour: To match architectural palette
 - Seamless Tree, Product: Underplant, Depth: 1000mm, Depth: minimum 1000mm
 - Herbaceous, Ornamental Grass and Shrub, Product: To match architectural palette, Depth: minimum growing medium depth.

01	15.10.19	Updates	SEW
Rev	Date	Reason for Issue	Chk

Keyplan

Scale Bar

0 10m 20m

N

sew Studio
Egret
West

3 Brewhouse Yard
London
EC1V 4JG
0207 549 1730

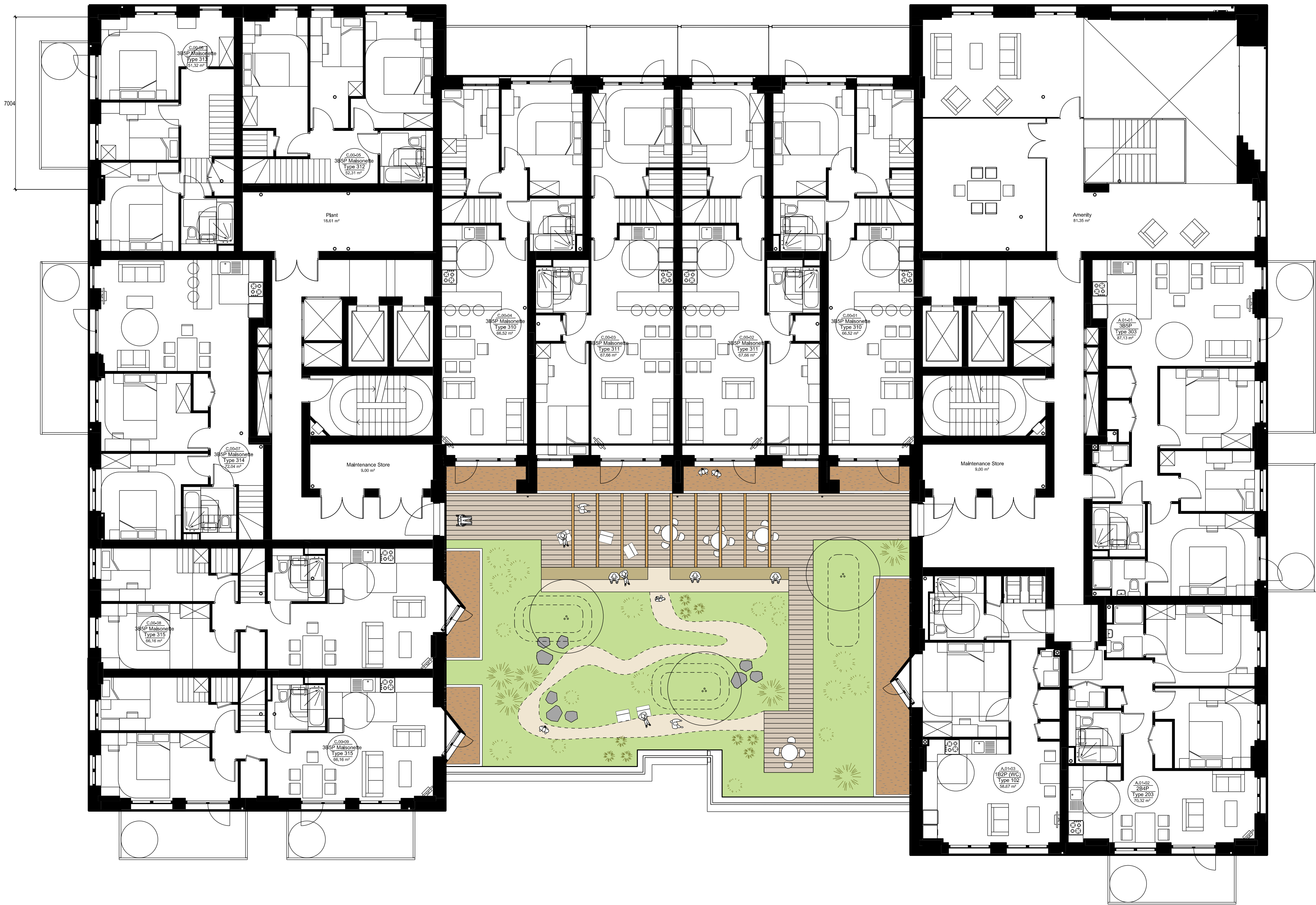
hello@egretwest.com
egretwest.com
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Client
Joseph Homes

Project
1 Vinyl Square
The Old Vinyl Factory

Drawing Title
Ground Floor
General Arrangement Plan

Project Number 0348	Status FOR INFO
Scale at A1 (A3) 1:100	Date 02.10.19
Drawn by TC	Checked by SEW
Drawing Number 0348-SEW-ZZ-00-DR-L-601101	Revision 01



General Notes

Notes

Composite timber deck
Colour: Natural

Clay brick paving
Dimensions: 215x102.5mm depth
Colour: To match architectural palette

Self-lining gravel
Dimensions: 50mm
Colour: Silver grey

Railings
Dimensions: 1000mm high
Colour: To match architectural palette

Roller Planter
Dimensions: 300mm high
Material: Powder coated steel
Colour: To match architectural palette

Large specimen shrubs
Soil depth: minimum 600mm

Herbaceous, Ornamental Grass and Shrub
Planting
Density: 300-400mm minimum growing medium depth

Localised mounding around large specimen shrubs
Soil mounded 600mm high at 1:3 gradient

Linear sundock bench
Material: Treated timber
Dimensions: 900mm high
Accessories: Allowance for arm and back rests

Pergola
Material: Steel and timber with treated wire
Dimensions: 2200mm high
Accessories: Allowance for two level planters with screens

Modular flexible seating
Material: Steel
Dimensions: Varied 2 & 4 person table and chair set

Single seating units
Material: Treated timber
Dimensions: 500x500x400mm

Informal natural play elements
Types: Boulders, logs, stepping stones

Rev	Date	Updates	Reason for Issue	CHK
01	15.10.19	Updates		SEW

Keyplan

N

Scale Bar

0 10m 20m

sew

Studio
Egret
West

3 Brewhouse Yard
London
EC1V 4JG
0207 549 1730

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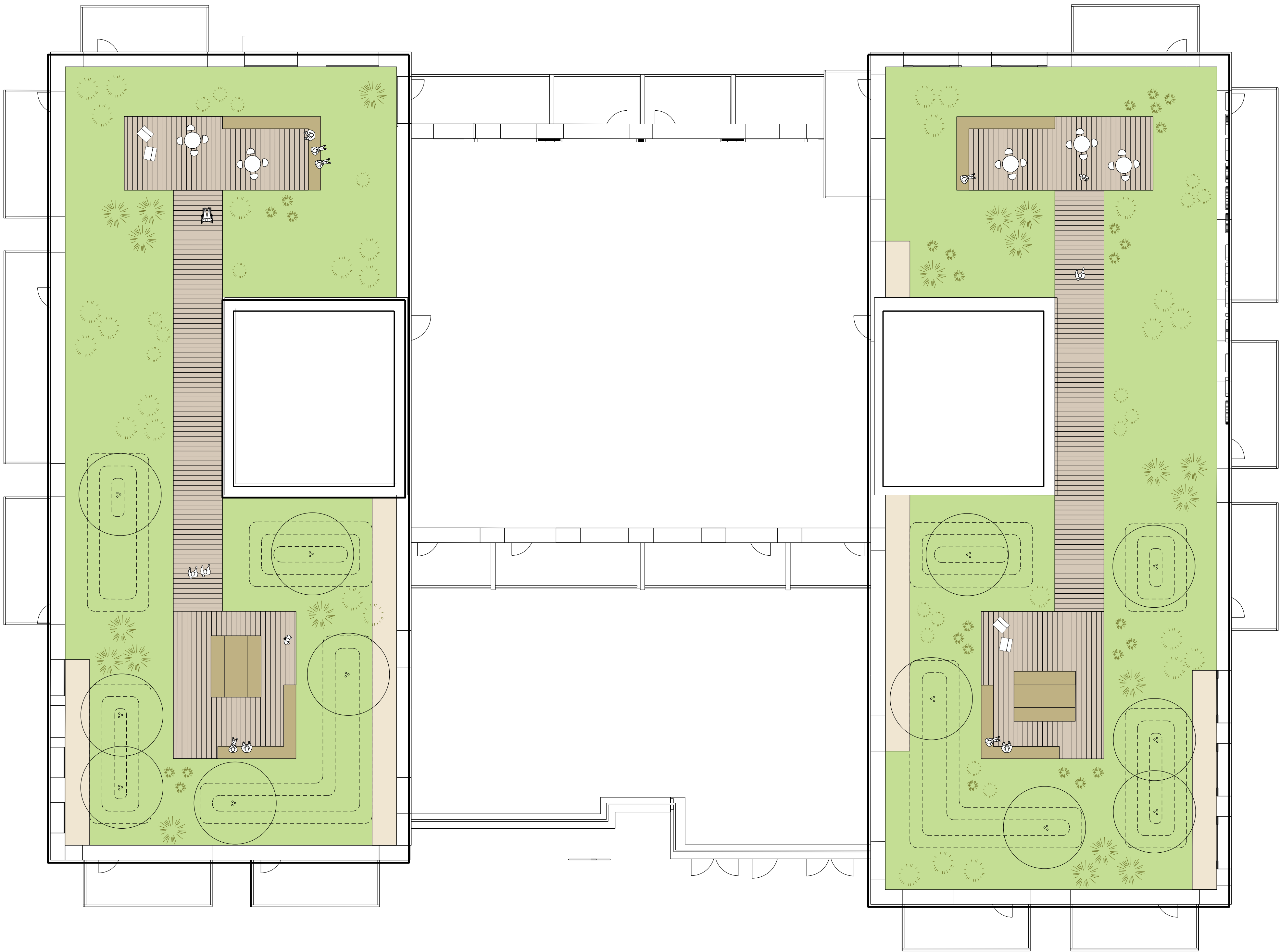
Client
Joseph Homes

Project
1 Vinyl Square
The Old Vinyl Factory

Drawing Title
First Floor
General Arrangement Plan

Project Number 0348	Status FOR INFO
Scale at A1 (A3) 1:100	Date 02.10.19
Drawn by TC	Checked by SEW

Drawing Number 0348-SEW-ZZ-01-DR-L-601103	Revision 01
--	----------------



General Notes

For further details, please refer to the relevant sections of the specification. All dimensions are to be checked on site by the contractor and confirmed in writing to the client. All dimensions are to be checked on site by the contractor and confirmed in writing to the client. All dimensions are to be checked on site by the contractor and confirmed in writing to the client.

Notes

- Composite timber deck
Colour: Natural
- Self-binding gravel
Depth: 100mm
Colour: Silver grey
- Permeable mulch area
Mulch: 100mm
Mulch: 100mm
- Hydrangea, Ornamental Grass and Shrub
Planting
Depth: 200-400mm minimum growing medium
depth
- Localised mulching around permeable mulch
area trees
Mulch: 100mm High at 1:1 gradient
- Upper outdoor bench
Material: Teak
Dimensions: 400mm High
Accessories: Recessed for arm and back rests
- Modular seating
Material: Steel
Dimensions: Varies 2 & 4 person table and chair
set
- Large group table and bench
Material: Teak
Dimensions: 3000mm length
- Single seating unit
Material: Steel & Teak
Dimensions: 800x500x400mm

Rev	Date	Reason for Issue	SEW	CHK
01	15.10.19	Updates		

Keyplan



sew Studio
Egret
West
3 Brewhouse Yard
London
EC1V 4JG
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Client
Joseph Homes

Project
1 Vinyl Square
The Old Vinyl Factory

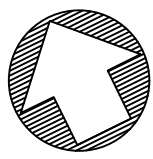
Drawing Title
Roof Level

Project Number 0348	Status FOR INFO
Scale at A1 (A3) 1:100	Date 02.10.19
Drawn by TC	Checked by SEW

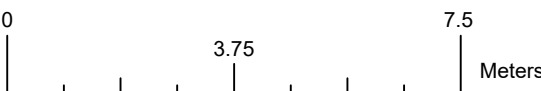
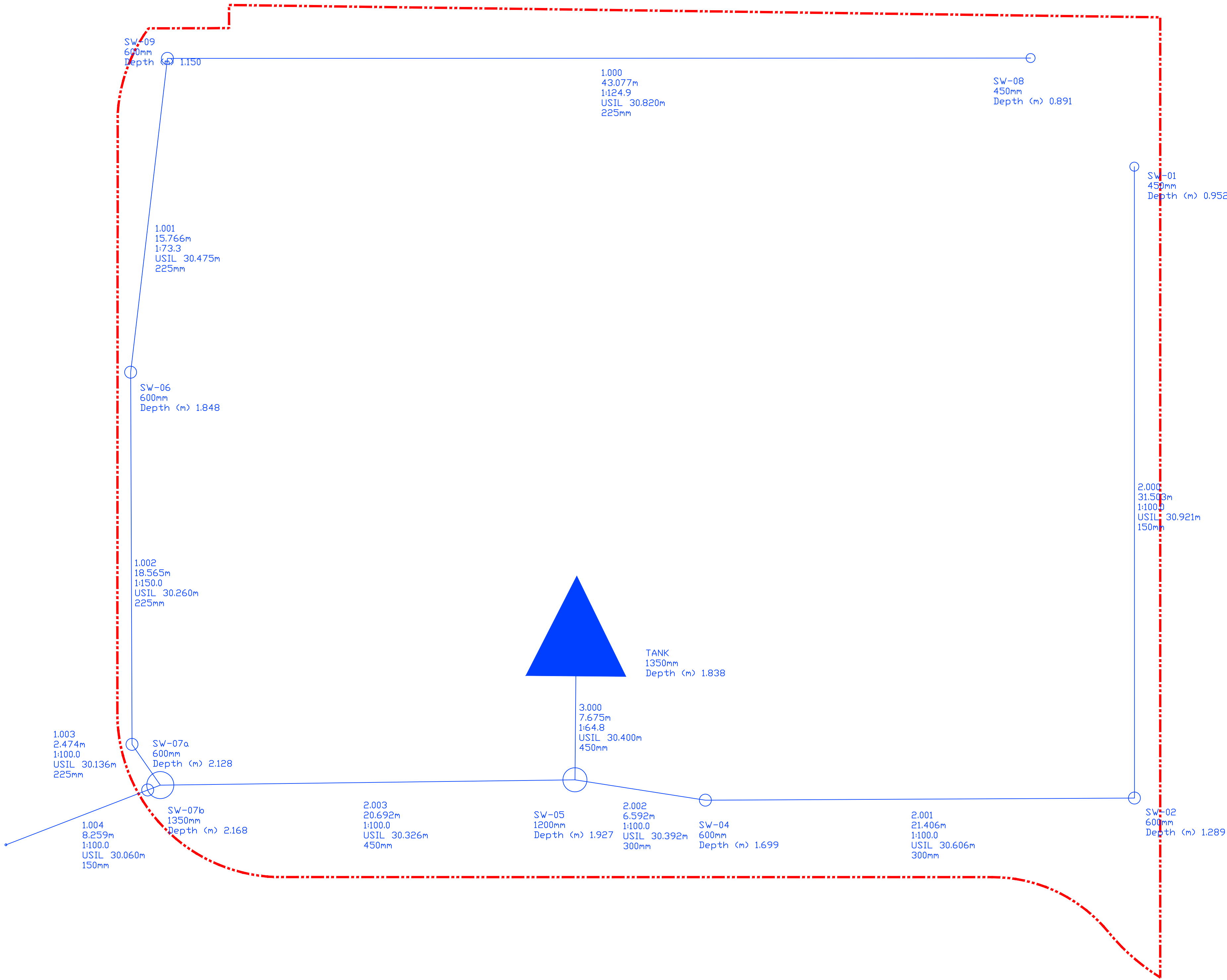
Drawing Number	Revision
0348-SEW-ZZ-RF-DR-L-501105	01

Appendix H

Proposed Surface Water Design Calculations



Blyth Road



- GENERAL NOTES
- 1.1. THIS DRAWING IS COPYRIGHT AND SHOULD NOT BE REPRODUCED IN WHOLE OR PART WITHOUT THE WRITTEN CONSENT OF PATRICK PARSONS LTD.
 - 1.2. DO NOT SCALE FROM THIS DRAWING.
 - 1.3. LOCATIONS OF ALL EXISTING SERVICES ON-SITE TO BE CONFIRMED & PROVIDED TO THE ENGINEER PRIOR TO COMMENCEMENT OF WORKS.
 - 1.4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT PATRICK PARSONS LTD DRAWINGS & SPECIFICATIONS.

P1	INITIAL ISSUE.	17.10.19	JA
Rev.	Amendments	Date	By

Revisions



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W. www.patrickparsons.co.uk

Client
Joseph Homes

Project
**Veneer Building, The Old Vinyl
Factory**

Drawing
**Microdrainage Export Surface
Water Drainage Layout**

Scales 1:125 At original size A1

Drawn	JA	Checked	AD
Date	OCT 19		

Status
PRELIMINARY

Dwg. No. **L19091-C-0225** Rev. **P1**

Patrick Parsons Limited		Page 1
Waterloo House Thornton Street Newcastle Upon Tyne, NE1 4AP	L19091 Vinyl Sq	
Date 17/10/2019 File SW_Network_With_Tank.MDX	Designed by MG Checked by AD	
Innovyze	Network 2018.1.1	

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)	100	PIMP (%)	100
M5-60 (mm)	20.800	Add Flow / Climate Change (%)	0
Ratio R	0.438	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

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.022	4-8	0.005

Total Area Contributing (ha) = 0.026

Total Pipe Volume (m³) = 10.369

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Waterloo House Thornton Street Newcastle Upon Tyne, NE1 4AP	L19091 Vinyl Sq	
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Innovyze	Network 2018.1.1	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	40	0.010	0.004	0.004
1.001	User	-	40	0.006	0.002	0.002
1.002	User	-	60	0.004	0.002	0.002
1.003	-	-	100	0.000	0.000	0.000
2.000	User	-	40	0.005	0.002	0.002
	User	-	60	0.006	0.003	0.005
2.001	-	-	100	0.000	0.000	0.000
2.002	-	-	100	0.000	0.000	0.000
3.000	User	-	60	0.020	0.012	0.012
2.003	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.051	0.026	0.026

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	5
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.800	Storm Duration (mins)	30
Ratio R	0.438		

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Waterloo House Thornton Street Newcastle Upon Tyne, NE1 4AP	L19091 Vinyl Sq	
Date 17/10/2019 File SW_Network_With_Tank.MDX	Designed by MG Checked by AD	
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Online Controls for Storm

Hydro-Brake® Optimum Manhole: SW-07b, DS/PN: 1.004, Volume (m³): 6.3

Unit Reference	MD-SHE-0044-1200-2000-1200
Design Head (m)	2.000
Design Flow (l/s)	1.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	44
Invert Level (m)	30.060
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	1.2
Flush-Flo™	0.194	0.7
Kick-Flo®	0.391	0.6
Mean Flow over Head Range	-	0.9

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	0.7	1.200	1.0	3.000	1.4	7.000	2.1
0.200	0.7	1.400	1.0	3.500	1.5	7.500	2.2
0.300	0.7	1.600	1.1	4.000	1.6	8.000	2.3
0.400	0.6	1.800	1.1	4.500	1.7	8.500	2.3
0.500	0.6	2.000	1.2	5.000	1.8	9.000	2.4
0.600	0.7	2.200	1.3	5.500	1.9	9.500	2.5
0.800	0.8	2.400	1.3	6.000	2.0		
1.000	0.9	2.600	1.4	6.500	2.1		

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Waterloo House Thornton Street Newcastle Upon Tyne, NE1 4AP	L19091 Vinyl Sq	
Date 17/10/2019 File SW_Network_With_Tank.MDX	Designed by MG Checked by AD	
Innovyze	Network 2018.1.1	

Storage Structures for Storm

Cellular Storage Manhole: TANK, DS/PN: 3.000

Invert Level (m) 30.400 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	25.0	0.0	0.600	25.0	0.0
0.020	25.0	0.0	0.800	25.0	0.0
0.400	25.0	0.0	0.801	0.0	0.0

Time Area Diagram for Green Roof at Pipe Number 1.002 (Storm)

Area (m³) 87 Evaporation (mm/day) 3
Depression Storage (mm) 5 Decay Coefficient 0.050

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 0.001581		32 36 0.000319		64 68 0.000064		96 100 0.000013	
4 8 0.001294		36 40 0.000261		68 72 0.000053		100 104 0.000011	
8 12 0.001060		40 44 0.000214		72 76 0.000043		104 108 0.000009	
12 16 0.000868		44 48 0.000175		76 80 0.000035		108 112 0.000007	
16 20 0.000710		48 52 0.000143		80 84 0.000029		112 116 0.000006	
20 24 0.000582		52 56 0.000117		84 88 0.000024		116 120 0.000005	
24 28 0.000476		56 60 0.000096		88 92 0.000019			
28 32 0.000390		60 64 0.000079		92 96 0.000016			

Time Area Diagram for Green Roof at Pipe Number 1.003 (Storm)

Area (m³) 174 Evaporation (mm/day) 3
Depression Storage (mm) 5 Decay Coefficient 0.050

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 0.003162		32 36 0.000638		64 68 0.000129		96 100 0.000026	
4 8 0.002589		36 40 0.000523		68 72 0.000106		100 104 0.000021	
8 12 0.002120		40 44 0.000428		72 76 0.000086		104 108 0.000017	
12 16 0.001735		44 48 0.000350		76 80 0.000071		108 112 0.000014	
16 20 0.001421		48 52 0.000287		80 84 0.000058		112 116 0.000012	
20 24 0.001163		52 56 0.000235		84 88 0.000047		116 120 0.000010	
24 28 0.000952		56 60 0.000192		88 92 0.000039			
28 32 0.000780		60 64 0.000157		92 96 0.000032			

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Waterloo House Thornton Street Newcastle Upon Tyne, NE1 4AP	L19091 Vinyl Sq	
Date 17/10/2019 File SW_Network_With_Tank.MDX	Designed by MG Checked by AD	
Innovyze	Network 2018.1.1	

Time Area Diagram for Green Roof at Pipe Number 2.001 (Storm)

Area (m³) 87 Evaporation (mm/day) 3
Depression Storage (mm) 5 Decay Coefficient 0.050

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 0.001581		32 36 0.000319		64 68 0.000064		96 100 0.000013	
4 8 0.001294		36 40 0.000261		68 72 0.000053		100 104 0.000011	
8 12 0.001060		40 44 0.000214		72 76 0.000043		104 108 0.000009	
12 16 0.000868		44 48 0.000175		76 80 0.000035		108 112 0.000007	
16 20 0.000710		48 52 0.000143		80 84 0.000029		112 116 0.000006	
20 24 0.000582		52 56 0.000117		84 88 0.000024		116 120 0.000005	
24 28 0.000476		56 60 0.000096		88 92 0.000019			
28 32 0.000390		60 64 0.000079		92 96 0.000016			

Time Area Diagram for Green Roof at Pipe Number 2.002 (Storm)

Area (m³) 87 Evaporation (mm/day) 3
Depression Storage (mm) 5 Decay Coefficient 0.050

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 0.001581		32 36 0.000319		64 68 0.000064		96 100 0.000013	
4 8 0.001294		36 40 0.000261		68 72 0.000053		100 104 0.000011	
8 12 0.001060		40 44 0.000214		72 76 0.000043		104 108 0.000009	
12 16 0.000868		44 48 0.000175		76 80 0.000035		108 112 0.000007	
16 20 0.000710		48 52 0.000143		80 84 0.000029		112 116 0.000006	
20 24 0.000582		52 56 0.000117		84 88 0.000024		116 120 0.000005	
24 28 0.000476		56 60 0.000096		88 92 0.000019			
28 32 0.000390		60 64 0.000079		92 96 0.000016			

Time Area Diagram for Green Roof at Pipe Number 2.003 (Storm)

Area (m³) 87 Evaporation (mm/day) 3
Depression Storage (mm) 5 Decay Coefficient 0.050

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 0.001581		32 36 0.000319		64 68 0.000064		96 100 0.000013	
4 8 0.001294		36 40 0.000261		68 72 0.000053		100 104 0.000011	
8 12 0.001060		40 44 0.000214		72 76 0.000043		104 108 0.000009	
12 16 0.000868		44 48 0.000175		76 80 0.000035		108 112 0.000007	
16 20 0.000710		48 52 0.000143		80 84 0.000029		112 116 0.000006	
20 24 0.000582		52 56 0.000117		84 88 0.000024		116 120 0.000005	
24 28 0.000476		56 60 0.000096		88 92 0.000019			
28 32 0.000390		60 64 0.000079		92 96 0.000016			

Patrick Parsons Limited		Page 6
Waterloo House Thornton Street Newcastle Upon Tyne, NE1 4AP	L19091 Vinyl Sq	
Date 17/10/2019 File SW_Network_With_Tank.MDX	Designed by MG Checked by AD	
Innovyze	Network 2018.1.1	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
 Number of Online Controls 1 Number of Time/Area Diagrams 5
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.439
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 20.700 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600,
 720, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

									Water
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)
1.000	SW-08	240 Winter	100	+40%	100/120 Summer				31.609
1.001	SW-09	240 Winter	100	+40%	30/180 Winter				31.609
1.002	SW-06	240 Winter	100	+40%	30/15 Winter				31.609
1.003	SW-07a	240 Winter	100	+40%	1/60 Winter				31.608
2.000	SW-01	240 Winter	100	+40%	100/120 Winter				31.608
2.001	SW-02	240 Winter	100	+40%	100/60 Summer				31.608
2.002	SW-04	240 Winter	100	+40%	30/180 Winter				31.608
3.000	TANK	240 Winter	100	+40%	100/30 Winter				31.608
2.003	SW-05	240 Winter	100	+40%	100/30 Summer				31.608
1.004	SW-07b	240 Winter	100	+40%	1/15 Summer				31.608

		Surcharged		Flooded	Pipe			
PN	US/MH Name	Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW-08	0.564	0.000	0.01		0.5	FLOOD RISK	
1.001	SW-09	0.909	0.000	0.01		0.6	FLOOD RISK	
1.002	SW-06	1.124	0.000	0.03		1.0	SURCHARGED	

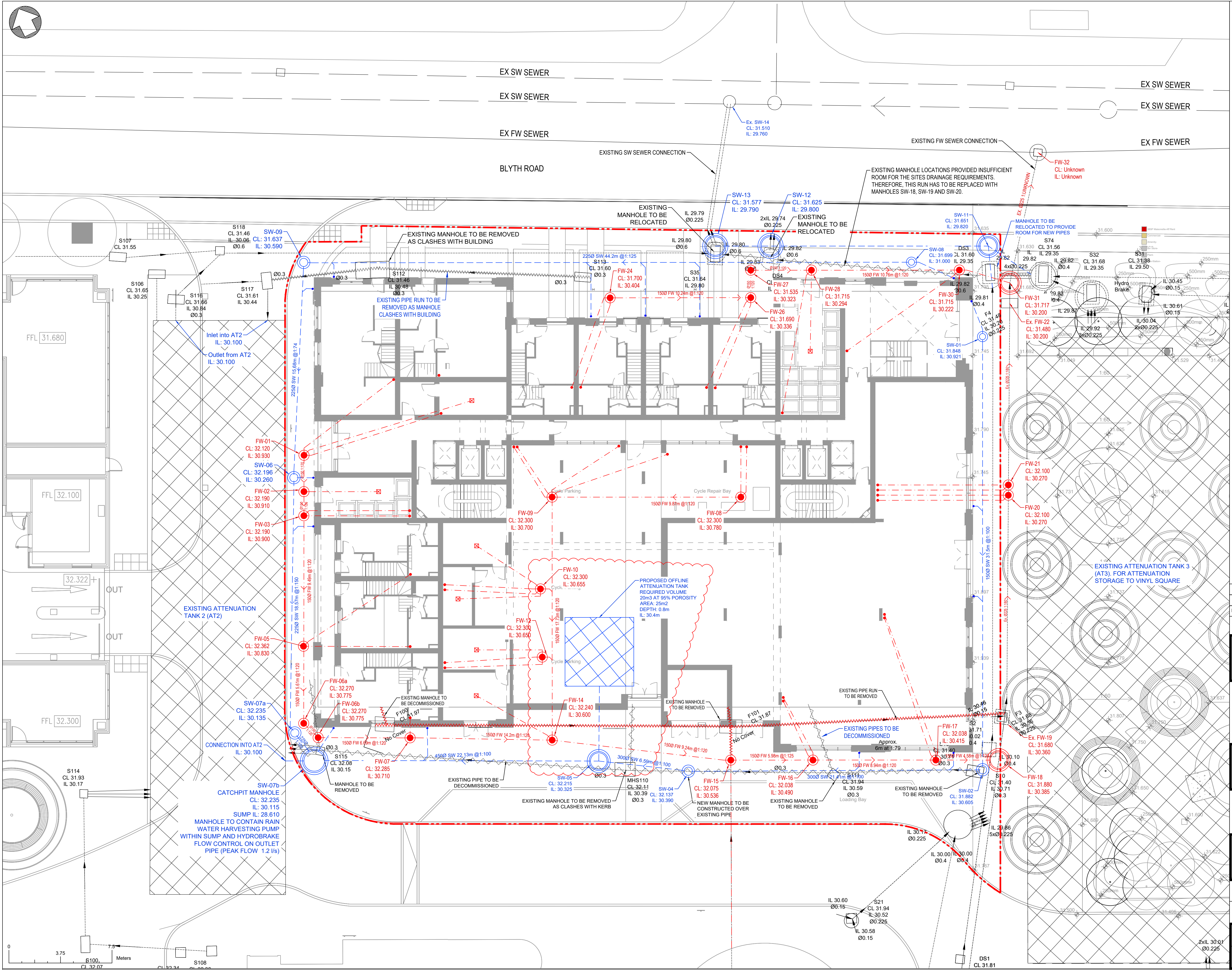
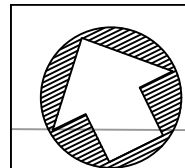
Patrick Parsons Limited		Page 7
Waterloo House Thornton Street Newcastle Upon Tyne, NE1 4AP	L19091 Vinyl Sq	
Date 17/10/2019 File SW_Network_With_Tank.MDX	Designed by MG Checked by AD	
Innovyze	Network 2018.1.1	

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

PN	US/MH Name	Surcharged Flooded		Flow / Overflow		Pipe Flow	Status	Level Exceeded
		Depth (m)	Volume (m³)	Cap.	(l/s)	(l/s)		
1.003	SW-07a	1.247	0.000	0.08		2.5	SURCHARGED	
2.000	SW-01	0.537	0.000	0.04		0.6	FLOOD RISK	
2.001	SW-02	0.702	0.000	0.01		1.4	FLOOD RISK	
2.002	SW-04	0.916	0.000	0.03		1.7	SURCHARGED	
3.000	TANK	0.758	0.000	0.01		1.1	SURCHARGED	
2.003	SW-05	0.832	0.000	0.01		1.7	SURCHARGED	
1.004	SW-07b	1.398	0.000	0.07		1.1	SURCHARGED	

Appendix I

Proposed Drainage Layout



GENERAL NOTES

- 1.1. THIS DRAWING IS COPYRIGHT AND SHOULD NOT BE REPRODUCED IN WHOLE OR PART WITHOUT THE WRITTEN CONSENT OF PATRICK PARSONS LTD.
- 1.2. DO NOT SCALE FROM THIS DRAWING.
- 1.3. LOCATIONS OF ALL EXISTING SERVICES ON-SITE TO BE CONFIRMED & PROVIDED TO THE ENGINEER PRIOR TO COMMENCEMENT OF WORKS.
- 1.4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT PATRICK PARSONS LTD DRAWINGS & SPECIFICATIONS.

DRAWING NOTES:

- 1.1 SVP, RWP AND STUBSTACK LOCATIONS ARE APPROXIMATE. TO BE CONFIRMED WITH THE ARCHITECT.
- 1.2 THE LAYOUT IS BASED OFF AVAILABLE THE OLD VINYL FACTORY ASBUILT NETWORK INFORMATION.
- 1.3 THE DRAINAGE LAYOUT IS DEPENDENT ON THE STRUCTURAL LAYOUT OF THE BUILDING. THEREFORE IS SUBJECT TO CHANGE WITH ANY CHANGES OR UPDATES WITH THE STRUCTURE.
- 1.4 THE CAPACITY OF THE EXISTING NETWORK IS BASED OFF ALAN BAXTER LTD'S SURFACE WATER CALCULATIONS.
- 1.5 THIS DRAWING CANNOT BE ISSUED FOR CONSTRUCTION.

LEGEND

- SITE BOUNDARY
- - - FOUL WATER DRAIN WITH SIZE, GRADIENT, DISTANCE AND DIRECTION. DISTANCE GIVEN BETWEEN CENTRES OF MHS.
- - - SURFACE WATER DRAIN WITH SIZE, GRADIENT AND DIRECTION. DISTANCE AND DROP GIVEN BETWEEN CENTRES OF MHS.
- SURFACE WATER MANHOLE
- FOUL WATER MANHOLE
- POLYPROPYLENE INSPECTION CHAMBERS
- ATTENUATION TANK
- EXISTING PIPES AND SEWER FEATURES TO BE REMOVED

P2	SECOND ISSUE. REFER TO REV CLOUD	25.10.19	JA
P1	INITIAL ISSUE.	15.10.19	JA
Rev.	Amendments	Date	By

Revisions

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Client
Joseph Homes

Project
Veneer Building, The Old Vinyl Factory

Drawing
Proposed Drainage Layout

Scales 1:125 At original size A1

Drawn JA	Checked AD
Date OCT 19	

Status
PRELIMINARY

Dwg No. **L19091-C-0220** Rev. **P2**

Appendix J

London Sustainable Drainage Proforma

1. Project & Site Details	Project / Site Name (including sub-catchment / stage / phase where appropriate)	1 Vinyl Square, The Old Vinyl Factory, Hayes
	Address & post code	1 Vinyl Square, The Old Vinyl Factory, Blyth Road, Hayes, London, UB3 1SY
	OS Grid ref. (Easting, Northing)	E 509170 N 179641
	LPA reference (if applicable)	
	Brief description of proposed work	Full planning application for the redevelopment of the site to provide 139 residential dwellings (C3 use class), 395sqm (GIA) commercial floorspace (flexible A1/A2/A3/A5/B1 use class), car parking, cycle parking and landscaping
	Total site Area	2240 m ²
	Total existing impervious area	2073 m ²
	Total proposed impervious area	790 m ²
	Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?	No. Flood Zone 1
	Existing drainage connection type and location	
	Designer Name	Jacob Anderson
	Designer Position	Civil Engineer
Designer Company	Patrick Parsons Ltd	

2. Proposed Discharge Arrangements	2a. Infiltration Feasibility		
	Superficial geology classification	Lynch Hill Gravel Member - Sand And Gravel	
	Bedrock geology classification	London Clay Formation - Clay, Silt And Sand	
	Site infiltration rate	0.0001383	m/s
	Depth to groundwater level	3	m below ground level
	Is infiltration feasible?	No	
	2b. Drainage Hierarchy		
		<i>Feasible (Y/N)</i>	<i>Proposed (Y/N)</i>
	1 store rainwater for later use	Y	Y
	2 use infiltration techniques, such as porous surfaces in non-clay areas	N	N
	3 attenuate rainwater in ponds or open water features for gradual release	N	N
	4 attenuate rainwater by storing in tanks or sealed water features for gradual release	Y	Y
	5 discharge rainwater direct to a watercourse	N	N
	6 discharge rainwater to a surface water sewer/drain	Y	Y
	7 discharge rainwater to the combined sewer.	N	N
	2c. Proposed Discharge Details		
Proposed discharge location	The Old Vinyl Factory surface water sewer		
Has the owner/regulator of the discharge location been consulted?	Yes		

3. Drainage Strategy	3a. Discharge Rates & Required Storage				
		Greenfield (GF) runoff rate (l/s)	Existing discharge rate (l/s)	Required storage for GF rate (m ³)	Proposed discharge rate (l/s)
	Qbar	0.4			
	1 in 1	1		8.3	1.2
	1 in 30	2.1		17	1.2
	1 in 100	2.5		25	1.2
	1 in 100 + CC			25	1.2
	Climate change allowance used		40%		
	3b. Principal Method of Flow Control		Hydrobrake		
	3c. Proposed SuDS Measures				
		Catchment area (m ²)	Plan area (m ²)	Storage vol. (m ³)	
	Rainwater harvesting	0		0	
	Infiltration systems	0		0	
	Green roofs	948	948	14	
	Blue roofs	0	0	0	
	Filter strips	0	0	0	
	Filter drains	0	0	0	
	Bioretention / tree pits	0	0	0	
	Pervious pavements	0	0	0	
	Swales	0	0	0	
Basins/ponds	0	0	0		
Attenuation tanks	1292		25		
Total	2240	948	39		

4. Supporting Information	4a. Discharge & Drainage Strategy	Page/section of drainage report
	Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	Page 5
	Drainage hierarchy (2b)	Page 8
	Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	Appendix D & Appendix G
	Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	Appendix F
	Proposed SuDS measures & specifications (3b)	Pages 11 - 17
	4b. Other Supporting Details	Page/section of drainage report
	Detailed Development Layout	All Appendices
	Detailed drainage design drawings, including exceedance flow routes	Appendix G
	Detailed landscaping plans	Appendix E
	Maintenance strategy	Pages 14, 15 & 16
	Demonstration of how the proposed SuDS measures improve:	
	a) water quality of the runoff?	Page 12
	b) biodiversity?	N/A
	c) amenity?	N/A

UK locations:

Newcastle upon Tyne

London

Glasgow

Huddersfield

Birmingham

Guildford

International locations

Dubai

Sydney



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