HOARE LEA

1 Museum Street, London Rainwater / Greywater Harvesting Feasibility Study.

Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
P01	15.11.2024	Initial issue	SP	SD	RM
P02	26.11.2024	Second issue incorporating comments	SP	SD	RM
P03	17.12.2024	Comments update	SP	SD	RM

Project number: 05/12837
Document reference: 0512837-HLE-XX-XX-T-M-00001 - Design Note Rainwater Harvesting Feasibility rev P03.docx

Hoare Lea LLP is a limited liability partnership and is registered in England and Wales with registered number OC407254.
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1. Introduction

1.1 Background

This document is written in response to the planning permission ref: 2023/2510/P, dated 7 March 2024 for the addresses comprising: Selkirk House, 166 High Holborn, 1 Museum Street, 10-12 Museum Street, 35-41 New Oxford Street and 16A-18 West Central Street, London, WC1A 1JR, hereafter referred to as 'the Site'

43 – Rainwater / Greywater harvesting:
Prior to commencement of development other than site clearance & preparation, a feasibility assessment for rainwater/greywater recycling should be submitted to and approved in writing by the local planning authority. If considered feasible, details shall be submitted to the local authority and approved in writing. The development shall thereafter be constructed in accordance with the approved details.

1.2 Executive summary

Rainwater and Greywater harvesting has been considered for the various proposed buildings on the Site, with the following assessments:

1 Museum Street building:
Rainwater harvesting is feasible for a system sized to serve the landscape irrigation system.

Greywater collection from showers and wash hand basins is not considered feasible due to space restrictions for segregated plant and drainage systems.

West Central St buildings:
Rainwater harvesting is feasible for a system sized to serve the landscape irrigation system.

Greywater collection from showers and wash hand basins is not considered feasible due to space restrictions for segregated plant and drainage systems.

Vine Lane Buildings:
Rainwater harvesting is not feasible due to insufficient demand for harvested rainwater for irrigation and space restrictions at ground level.

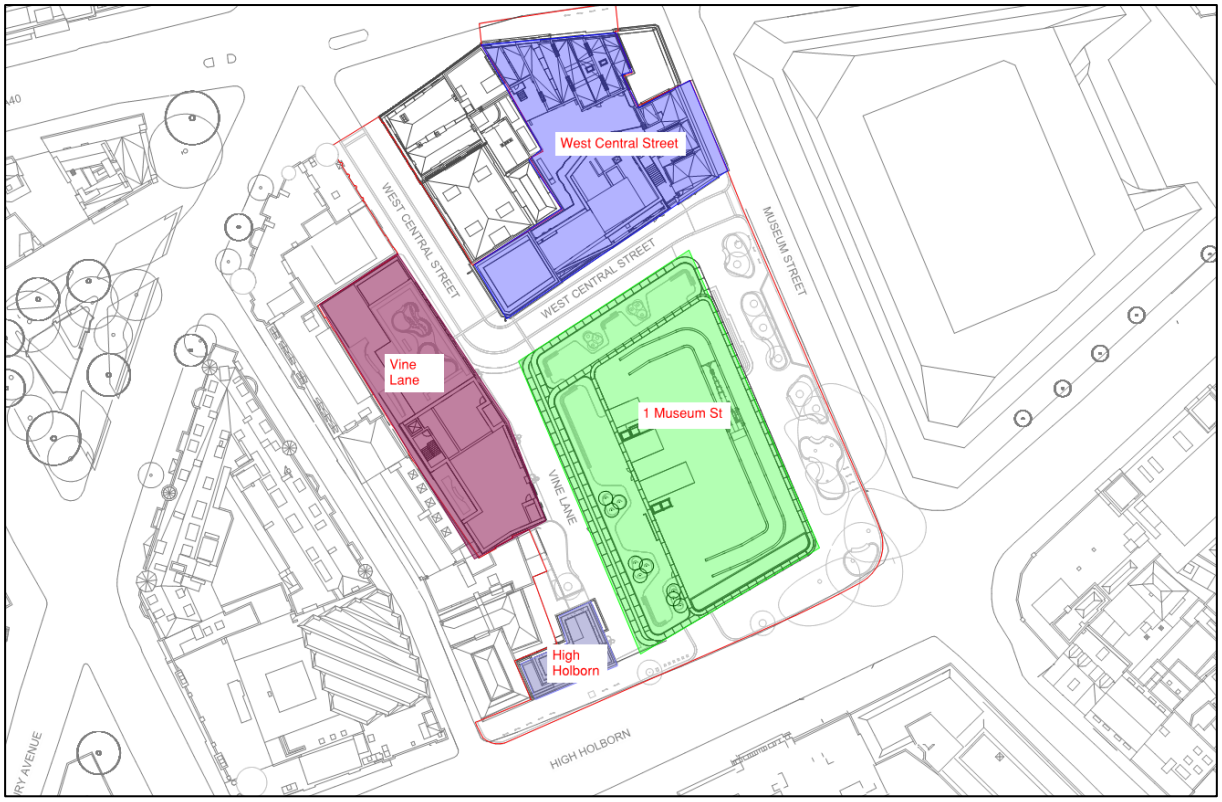
Greywater collection from showers and wash hand basins is not considered feasible due to space restrictions for segregated plant and drainage systems.

High Holborn Building:
Rainwater harvesting is not feasible due to insufficient demand for harvested rainwater for irrigation and space restrictions at ground level.

Greywater collection from showers and wash hand basins is not considered feasible due to space restrictions for segregated plant and drainage systems.

1.3 Project description

The proposed development forms a 5-hectare site bounded by High Holborn, Museum Street and New Oxford Street, in central London. The scheme comprises several buildings: 1 Museum Street as an office-led tower, whilst West Central Street block, Vine Lane block and High Holborn building will provide low rise residential use with active ground floor spaces.



The Building Services design work for the site is split across more than one consultant.

- 1 Museum Street building services: Hoare Lea LLP
- West Central Street building services: Scotch Partners LLP
- Vine Lane Building Services: Scotch Partners LLP
- High Holborn Building Services: Scotch Partners LLP

The following sections of this report relating to those separate buildings have been authored by the respective consultant listed above.

2. Rain / greywater harvesting for 1 Museum Street building

2.1 Rainwater harvesting

The current rainwater design includes a combination of blue roofs and an attenuation tank at basement level. Rainwater is required to route to a below ground attenuation tank to reduce rainwater flow going to the external sewer.

To compliment this system, rainwater harvesting will be provided, with a collection tank to serve the roof landscape irrigation. This harvesting system will be located in the B2 basement plant area. The proposed system is shown in figure 1.

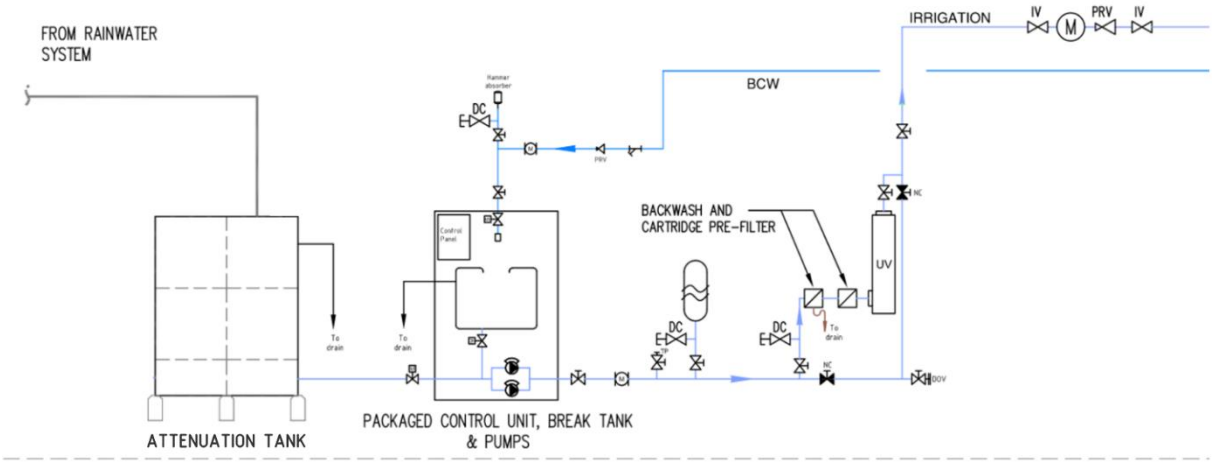


Figure 1 – Proposed rainwater harvesting system schematic

This system is subject to further detailed design during the extended demolition period of the project.

2.2 Greywater harvesting

Greywater harvesting from wash hand basins and showers has not been considered feasible due to combined space restrictions for the following required systems:

- Separated above and below ground drainage networks for grey water and foul systems
- Separated below ground foul and wastewater pumping stations
- Additional greywater treatment plant including larger holding tank, filtration tank and additional pumping stations.

The proposed basement layout is shown in figure 2, indicating the compressed nature of existing required building systems. Additional space for a greywater harvesting plant room is highly restricted by the necessity to accommodate other essential systems and end of trip facilities within the existing basement. Scope for additional below ground storage tanks is restricted due to extensive ground stabilisation piling and associated pile caps in the basement slab area.

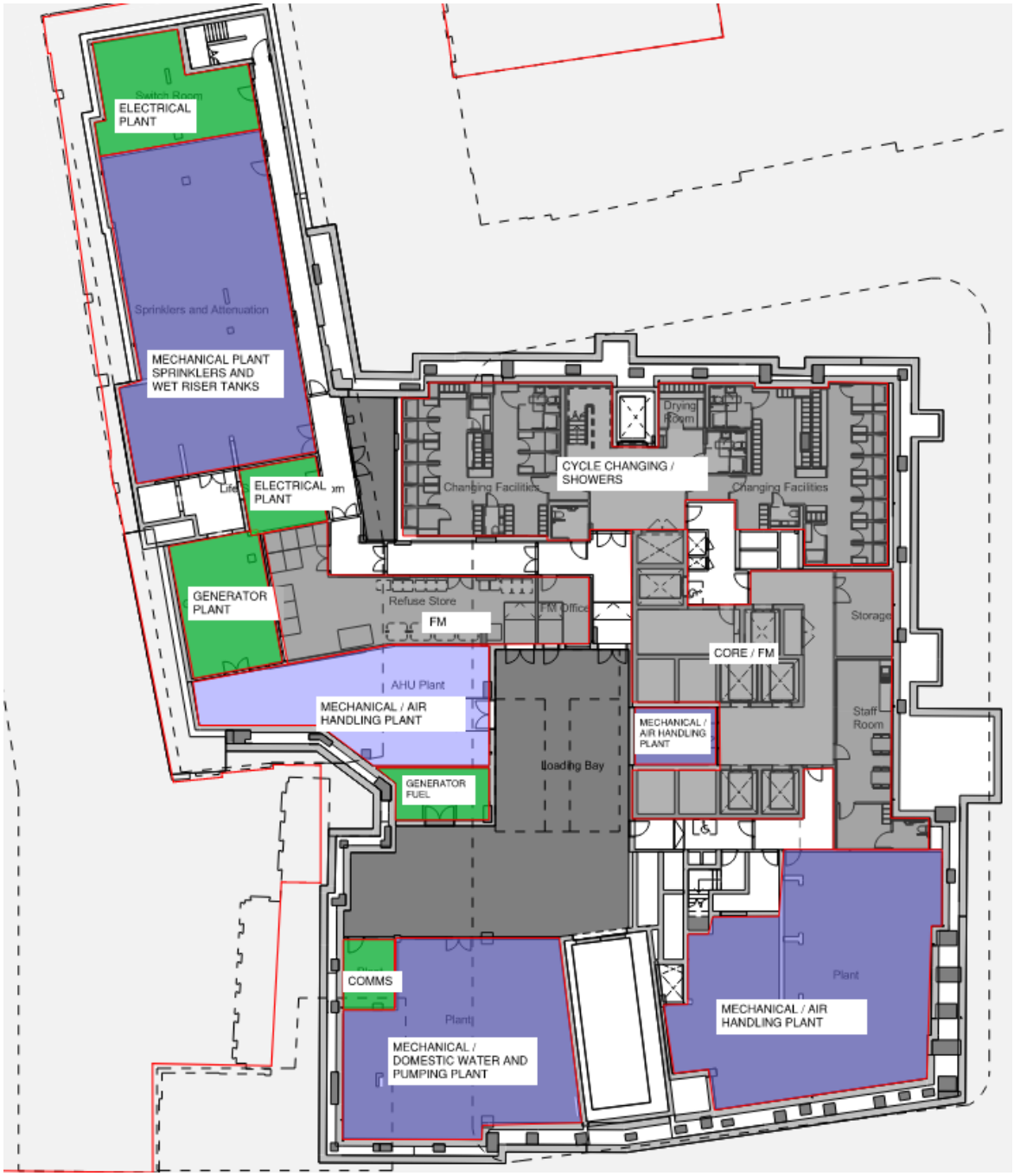


Figure 2 – 1 Museum Street B2 level

2.3 Conclusion for 1 Museum Street

Rainwater harvesting is feasible for a system sized to serve the landscape irrigation system.

Greywater collection from showers and wash hand basins is not considered feasible due to space restrictions for segregated plant and drainage systems.

3. Rain / greywater harvesting for West Central Street buildings

3.1 Opportunities for water re-use

The potential use cases for harvested rainwater for West Central Street are considered to be:

1. WC flushing
2. Landscape irrigation

The only use case considered viable for harvested greywater is considered to be WC flushing, as we understand that the soaps, detergents and other contaminants found in greywater can render it unsuitable for irrigation use.

3.2 Rainwater harvesting

The current rainwater design includes a combination of blue roofs and an attenuation tank at basement level. The attenuation tank is required for West Central Street buildings to reduce the rainwater flow rate going to the external sewer.

To complement this system, a small rainwater harvesting system will be provided, with a small collection tank linked to the rainwater attenuation system to harvest rainwater for irrigation purposes on the 1st floor communal courtyard area. The plant will be located at B1 level and sized to meet the predicted irrigation requirements of the soft landscaping.

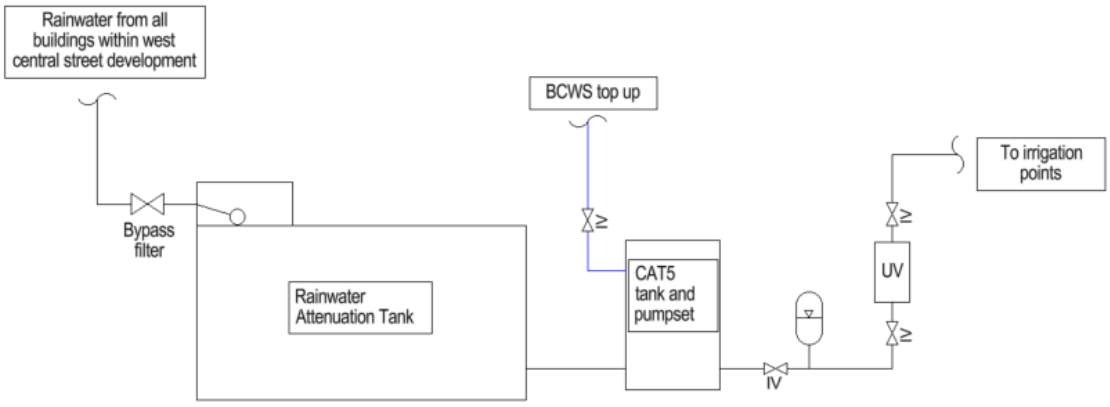


Figure 3, SP typical Stage 2 rainwater harvesting schematic

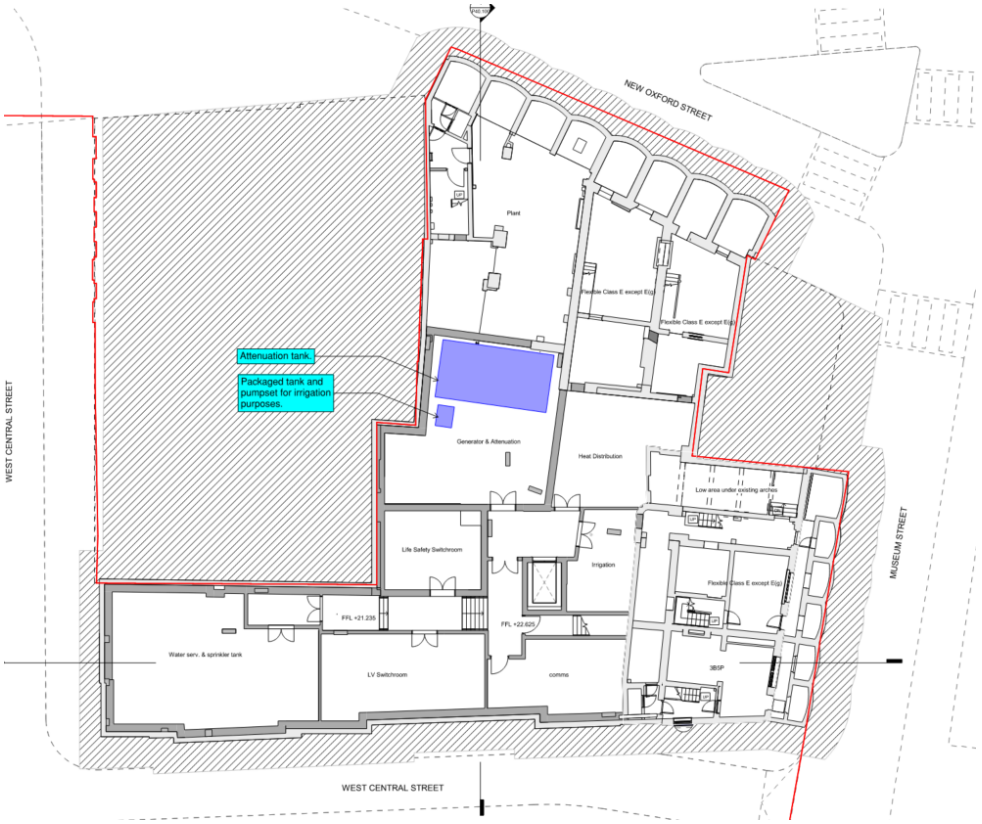


Figure 4 - Location of proposed attenuation tank

It is not proposed to utilise harvested rainwater for WC flushing. This is due to 2 primary reasons:

1. The nature and arrangement of the site dictates that the services distribution is heavily decentralised with multiple sets of rising infrastructure to each of the dwellings, with most risers serving only a few dwellings. This means that the additional infrastructure to distribute harvested rainwater for WC flushing would be disproportionately extensive and would also risk increasing the extent of intervention into the retained building fabric of the Listed Buildings, where existing services distribution routes are proposed to be re-used as far as practicable, due to the need for additional horizontal and vertical distribution
2. The extent of stored harvested rainwater required to support WC flushing would be significant and would not be able to be practically accommodated within the retained basement extents of the West Central Street site.

3.3 Greywater Harvesting

Greywater harvesting from hand wash basins and showers has not been considered feasible due to combined space restrictions.

Each drainage riser would require two drainage stacks one for foul water (drainage from WC's) and one for grey water (drainage from WHB's, showers and baths). This will increase the size of the risers within the apartments due to cross over zones for the drainage and additional water distribution and would risk increasing the extent of intervention required into the retained building fabric of the Listed Buildings where existing drainage routes are proposed to be re-used as far as practicable.

Introducing grey water drainage to West Central Street will also require a large holding tank, filtration tank and additional pumping stations. The extent of plant required for the harvested greywater required

to support WC flushing would be significant and would not be able to be practically accommodated within the retained basement extents of the West Central Street site.

3.4 Conclusion

Rainwater harvesting is feasible for a system sized to serve the landscape irrigation system and is now proposed.

Greywater collection from showers and wash hand basins is not considered feasible due to space restrictions for segregated plant and drainage systems.

4. Rain / greywater harvesting for Vine Lane building

4.1 Opportunities for water re-use

The potential use cases for harvested rainwater for Vine Lane are considered to be:

1. WC flushing
2. Landscape irrigation

The only use case considered viable for harvested greywater is considered to be WC flushing, as we understand that the soaps, detergents and other contaminants found in greywater can render it unsuitable for irrigation use.

4.2 Rainwater harvesting

The current rainwater design includes a combination of blue roofs and a centralised attenuation tank at basement level within the 1MS curtilage. The attenuation tank is required for Vine Lane to reduce the rainwater flow rate going to the external sewer.

It is proposed that a connection is provided from the 1MS rainwater harvesting system to provide an irrigation supply for the limited extent of soft landscaping requiring irrigation proposed on Vine Lane.

Dedicated rainwater harvesting for irrigation purposes is not considered to be technically feasible due to the limited extent of soft landscaping requiring irrigation, which is expected to lead to low turn-over of water and stagnation.

4.3 Greywater Harvesting

Grey water harvesting from hand wash basins and showers has not been considered feasible due to combined space restrictions.

Each drainage riser would require two drainage stacks one for foul water (drainage from WCs) and one for grey water (drainage from WHBs, showers and baths). This will increase the size of the risers within the apartments due to cross over zones for the drainage. The low-rise arrangement of the block results in a high number of SVPs being required per dwelling when compared to a higher rise arrangement across a similar or smaller footprint.

Introducing grey water drainage to Vine Lane will also require a large holding tank, filtration tank and additional pumping stations. The extent of plant required for the harvested greywater required to support WC flushing would be significant and would not be able to be practically accommodated within the ground floor extents of the Vine Lane site.

4.4 Conclusion

Dedicated rainwater harvesting for irrigation purposes is not considered to be technically feasible due to the limited extent of soft landscaping requiring irrigation, which is expected to lead to low turn-over of water and stagnation.

Greywater collection from showers and wash hand basins is not considered feasible due to space restrictions for segregated plant and drainage systems.

5. Rain / greywater harvesting for High Holborn building

5.1 Opportunities for water re-use

The only use case considered viable for harvested rainwater or greywater for the High Holborn building is considered to be WC flushing, due to the very limited extent of soft landscaping proposed for this small block.

5.2 Rainwater harvesting

The current rainwater design does not include an attenuation tank due to space restrictions at ground floor.

There is a limited extent of soft landscaping for this development so no need for irrigation storage.

The image below shows that the ground floor is already under significant pressure. There is no location for an attenuation tank to store water for rainwater harvesting.

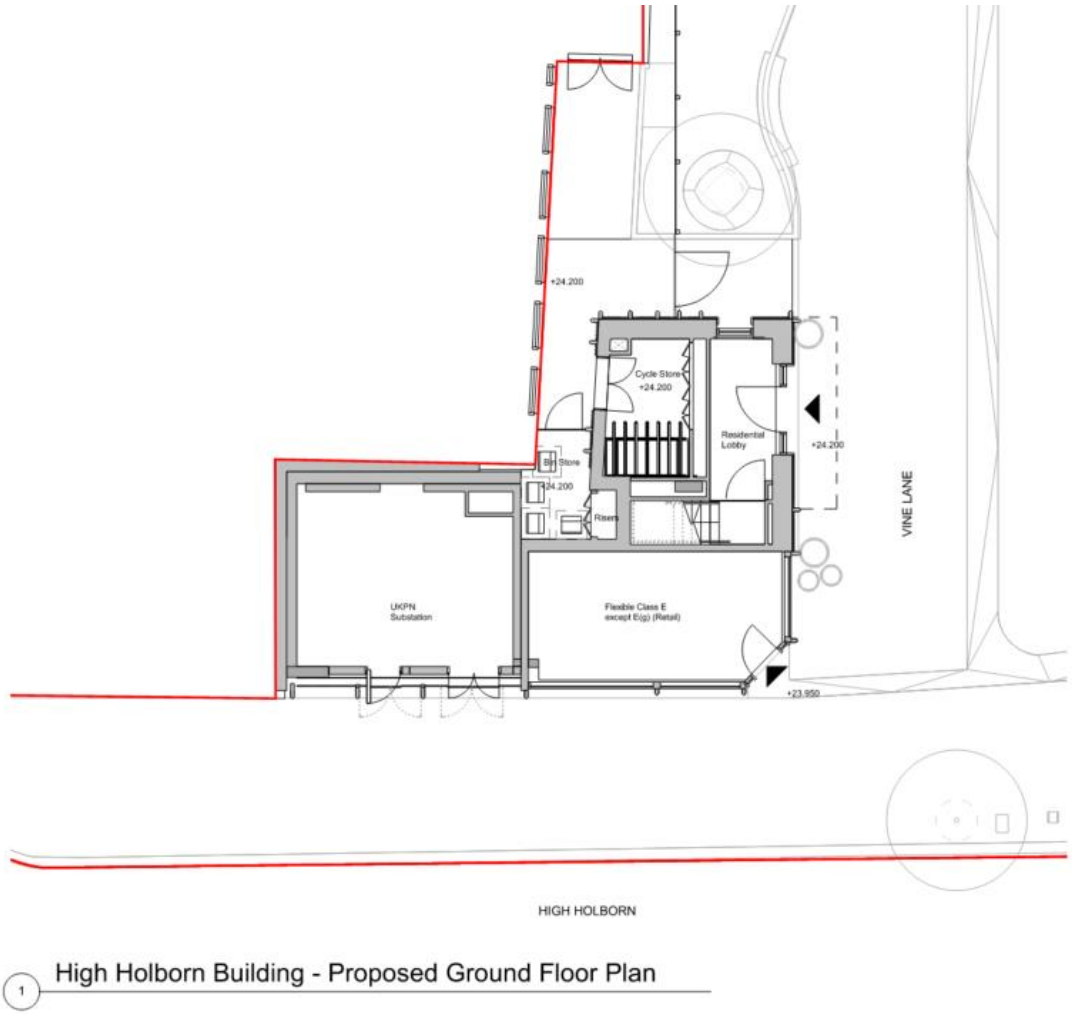


Figure 5 - High Holborn Ground floor

5.3 Greywater Harvesting

Grey water harvesting from hand wash basins and showers has not been considered feasible due to combined space restrictions.

Each drainage riser would require two drainage stacks one for foul water (drainage from WC's) and one for grey water (drainage from WHB's, showers and baths). This will increase the size of the risers within the apartments due to cross over zones for the drainage.

Introducing grey water drainage to High Holborn will also require a modest holding tank, filtration tank and additional pumping stations. The extent of plant required for the harvested greywater required to support WC flushing would be significant compared to the overall footprint of the building and would not be able to be practically accommodated within the ground floor extents of the high Holborn site.

5.4 Conclusion

Rainwater harvesting is not feasible for High Holborn due to space limitations within the basement.

Greywater collection from showers and wash hand basins is not considered feasible due to space restrictions for segregated plant and drainage systems.