NORMAN BROMLEY
PARTNERSHIP

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ABBEY ROAD – PHASE 2

FEASABILITY REPORT FOR RAINWATER AND GREYWATER HARVESTING




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PROJECT REVISION SHEET

Revision No.	Date	Details	Changes	Author	Approved
0	*27/11/2020*	*For Comments*	*N/A*	*MR*	*MR*
1	*02/12/2020*		*Comments included*	*MR*	*MR*
2	*04/12/2020*		*Further CBRE comments included*	*MR*	*MR*

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1.0 INTRODUCTION

This report has been provided in response to Planning Condition 17 which states the following:-

17 Rainwater and greywater harvesting

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

Reason: To ensure the development contributes to minimising the need for further water infrastructure in an area of water stress in accordance with policies CC2 and CC3 of the London Borough of Camden Local plan Policies.

The options are to re-use collected rainwater (rainwater harvesting) or recycling waste water from showers and wash hand basins (grey water harvesting). These could be used for garden watering and toilet flushing. Both uses have been considered in this report.

2.0 RAINWATER AND GREYWATER USED FOR TOILET FLUSHING

The options are to re-use collected rainwater (rainwater harvesting) or recycling waste water from showers and wash hand basins (grey water harvesting). The water collected and treated can then be utilised for the flushing of toilets or urinals.

Recycling of attenuated rainwater is considered uneconomical for use within the proposed building as only a small number of toilets (18 No) and urinals (1 no) are proposed. This means that the additional cost and complexity of the system would outweigh water saving benefits. A duplication of the internal piping system would be required as well as the provision of storage tanks, pump, filters and controller which would increase the operational and capital cost investments against the benefits.

In addition, the introduction of a rainwater and/or greywater harvesting systems into the building will require the introduction of additional plant space that is not achievable in the limited space available without negatively impacting the design and appearance of the building. The building has been designed to the optimum arrangement and strictly adheres to the areas provided in the client brief. Additional plant space would result in the footprint of the building having to increase which would be contrary to the consented scheme.

For a relatively small rainwater and greywater harvesting system serving only a small number of WC's and urinals, which is the case for the Abbey Road phase 2 project, the environmental impact is worse than mains water when you consider the energy used to manufacture the components and the carbon emissions associated with transporting the equipment and tanks to site and for the annual maintenance contractors visits.

The energy used in the producing the tank is a major part of the impact of the system and the table below shows the primary energy requirements for the production of the materials for a 5m3 rainwater tank.

Tank material	Tank weight (kg, for a 5m^3 tank)	Primary energy (MJ/kg)	Total primary energy required for tank materials (MJ)
Fibreglass	250	114	28500
Polypropylene	180	115	20700
Polyethylene	170	76	12920

Comparison of the primary energy requirement for production of materials for a RWH tank.
(Data from Eco-profiles of the European plastics industry).

A further reason to not install a rainwater or greywater harvesting system is the installation, running and maintenance costs. Whole life costings are included below.

Whole Life Costing

Based on the building occupancy numbers provided by the client it is calculated, using the advanced methods found within BS8515, BS8525 and BS8542 that the buildings water demand for WC flushing and urinals is approximately 1,000ltrs per day.

The building is provided with green roofs which are very effective at retaining all of the rainfall from more frequent events providing valuable ”interception” in line with best practice. Therefore any downstream rainwater harvesting system is likely to only fill in less frequent (ie. more intense) events and may remain empty or underutilised for long periods.

The rainwater stored would therefore be generally insufficient to serve the WC’s and urinals and the introduction of a greywater installation would be required to meet a high proportion of the demand. This is therefore included in the costs below.

The calculations detail a demand of 1000 ltrs per day to serve the W.C’s and urinals in the building. The provision of a rainwater harvesting system will therefore save approximately 300,000 ltrs (300 m3) per annum.

The running cost of the system pump is 1kw/hr per 1000lt of treated water therefore 1 kWh per day, approximately 306 kWh per annum.

The annual maintenance cost for a rainwater and greywater harvesting system of this size is £1,500.00

Whole Life Costing

Whole life costing includes costs for (1) installation, (2) maintenance, (3) operating cost and (4) avoided cost. Summary of whole life costing is listed as below:

(1) Installation	£70,000.00	
(2) Maintenance	£1,500 pa	
(3) Operating cost; fuel	£45.00 pa	Based on £0.15 kwh

(4) Total avoided cost	£720.00 pa	Based on £2.40 m^3

The whole life costs (25 years) would be in the order of:

(£70,000 + (25 x £1,500) + (25 x £45)) – (£720 x 25) = £90,625.00

The above figure concludes that the installation will have no financial return but will cost approximately £90,625.00 over 25 years.

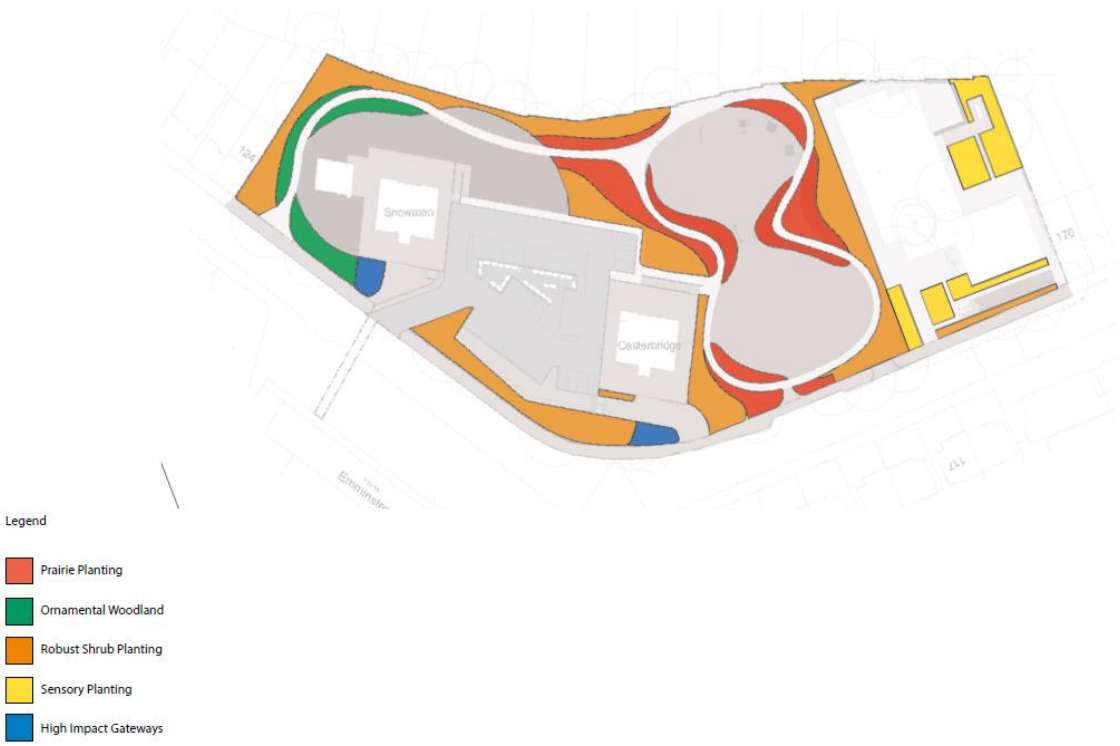
3.0 RAINWATER USED FOR GARDEN WATERING

The Proposal

The design proposals for Abbey Area Phase 2 are split into three main parcels;

1. The construction of an entirely new landscape typology that provides foreground and setting for the new Surgery and Community Centre. It is a mix of planted areas and circulation made up of both permeable and impermeable surfaces.
2. An extended park environment that occupies areas that are currently lawns with dispersed play elements. A portion of the new park is extended over what is currently car parking and vehicular circulation paved with tarmac.
3. A reorganised car park and service area between the Snowbridge and Casterbridge towers. The proposal consolidates this area as the only vehicular area on the site that accessed from a new entrance from Abbey Road's northern arm.

The site area excluding Snowman and Casterbridge houses and the proposed building is approximately 9580m2. In terms of planting, the design has been developed to allow for a simple and achievable maintenance regime which will be implemented by the Cooperative. The main green open space (outside the enclosed areas associated with the proposed building) is a mixture of planting types with large areas of either lawns and meadow grass.



The ornamental planting element is split between 5 key planting typologies all of which have designed around low maintenance principals, they are both vigorous and drought tolerant. Additionally, the intended aesthetic is a natural and dynamic mix of species that over time will establish a balance where weaker specimens will be overtaken by the stronger varieties within the mix.

Possibilities for Re-use of Rainwater in the Landscape

The rainwater capture (for re-use) in this development is limited to that precipitation that falls on to the roof of the roof of the Surgery/Community Centre which itself is positioned on the eastern margin of the site, it is only considered viable to use rainwater in the immediate vicinity of the new building.

These are the options that have been considered for retention of water for re-use;

1. Storage of rainwater within the building – gravity-supplied to external tap within communal courtyard.
2. Storage of rainwater in underground tank – pump-supplied to external tap within communal courtyard.
3. Traditional rainwater pipes supplying water to external water butt with outlet.
4. Gravity fed ‘Leaky Pipe’ ground irrigation from internal storage tank.

There are health and safety concerns over using untreated rainwater to supply external taps in a publicly accessible space which makes managing options 1 and 2 difficult also accommodating the collection tanks internally is challenging which may obviate Option

4. The building has been designed to the optimum arrangement and strictly adheres to the areas provided in the client brief. Additional plant space would result in the footprint of the building having to increase which would be contrary to the consented scheme.

Option 3 is a viable and proven method however space in the courtyard is limited, storage will be limited by this paucity of space however we will seek to add a water butt at a RWP position where the façade will accommodate them.

4.0 CONCLUSION

This report concludes that it is not feasible or practical to introduce a rainwater or greywater harvesting system into the Abbey Road phase 2 project. Environmental, space, capital and operational cost reasons for this are included in sections 2.0 and 3.0 of this report.

It has been calculated that the whole life costing of a rainwater and greywater harvesting system used to provide water for the flushing of toilets will be in the region of £90,000 over 25 years and the annual maintenance charge to the council would be £1,500 per annum which is more than double the cost of the water saved.

The building has been designed to the optimum arrangement and strictly adheres to the areas provided in the client brief. The additional plant space required to incorporate the tanks, pumps and controllers associated with a rainwater or greywater harvesting system would result in the footprint of the building having to increase which would be contrary to the consented scheme.

It is proposed that a water butt with tap be included in the courtyard supplied via the rainwater downpipe to store water which can be used for watering plants.