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PROJECT: **QUEENS ROAD, RICHMOND, SURREY**

PROJECT NO. **L10.717**

DOCUMENT TITLE: **CIVIL ENGINEERING INFRASTRUCTURE REPORT FOR PLANNING**

DOCUMENT NO: **L10.717 – ER – 01/PL1**

Issue	Date	Description	Orig.	PE	PD	Issue Check
	29.04.10	Issued for Planning	RS	RS	VB	

QUEENS ROAD, RICHMOND, SURREY CIVIL ENGINEERING INFRASTRUCTURE REPORT FOR PLANNING

C O N T E N T S:

1.0 INTRODUCTION

1.1 General Description

The property at No 8 Queens Road, known as 'The Lass of Richmond Hill' is a 2 storey structure with a part basement under. It was constructed in 1902 and a single storey extension to the rear of the property was added in the late 1990's. The rear of the site currently serves as car parking for the licensed premises with storage sheds provided adjacent to the boundary wall between the subject site and the adjoining 'Hill House site.

FOM Properties Ltd are proposing to demolish the single storey extension, refurbish the existing 2 storey building and construct a new part 2 storey over ground residential building on the footprint of the existing car park.

The refurbished building will contain 4 apartments comprising of:

- 2 No. 2 bed apartments with a bathroom and 2 en-suites
- 2 No. 1 bed apartments with a single bathroom.

The proposed floor area of the new part 2 storey over ground residential dwelling is 790.7m². The building will comprise of:

- 4 No. en-suite bedrooms and a self contained studio apartment at basement level
- 1 No. en-suite bedrooms, a bathroom and a kitchen at ground floor level.

8 car parking spaces in total, 4 for the apartments and 4 for the residential building, will be provided on the northern eastern boundary of the site to serve the proposed development

1.2 Scope of this Report

This report describes the proposed civil engineering infrastructure for the development and how it connects to the public infrastructure serving the area. In particular, foul and surface water drainage aspects are considered. This report should be read in conjunction with the following drawings submitted with the Planning Application:

Dwg No. L10.717-100/PL1 'Proposed Foul & Surface Water Layout at Ground Level'
Dwg No. L10.717-101/PL1 'Proposed Lower Ground Drainage'
Dwg No. L10.717-110/PL1 'Standard Drainage Details'

2.0 SURFACE WATER DRAINAGE SYSTEM

2.1 Existing Surface Water Infrastructure

The existing site comprises of the 2 storey 'The Lass of Richmond Hill' structure fronting onto Queens Road on the north western boundary with sheds and carparking occupying the remainder of the site. The site is therefore fully hardstanding with surface water runoff from the roof of the buildings, sheds and the tarmac carparking collected by a buried network draining to a manhole adjacent to the boundary wall with Richmond Park (Ref Manhole S1.4- see Dwg L10.717-100/PL1). Outflow from the manhole drains down the hill in a north eastern direction parallel with Richmond Park boundary wall.

2.2 Proposed Surface Water Drainage System

2.2.1 Drainage at Ground

A new surface water network serving the proposed new part 2 storey over ground dwelling will be installed as part of the development. It is also proposed to relay a new surface water network to serve the refurbished building. The existing outfall manhole (Ref Manhole S1.4- see Dwg L10.717-100/PL1) and connection to the public surface water sewer will be retained.

2.2.2 Lower Ground Drainage

The levels of the surrounding surface water public sewers dictate that it is not possible to drain the lower ground floor lightwells by gravity. Surface water outflow from the lightwells will therefore be collected by a buried pipe network under the lower ground floor slab and will discharge to a storage tank before being pumped to Manhole S1.4 at ground level where it will drain by gravity to the public surface water sewer. The storage tank will be designed to retain water for an 8-hour storm event with a 100-year return period. The 8-hour period is used in the case of a power cut during such a storm or in the event of the pumps breaking down. Warning lights with a reserve battery pack should be installed at surface level to alert home.

2.2.2.1 Sizing of 8 hour Storage Tank

The WINDES computer program gives a rainfall intensity of 9.03mm/hr for an 8-hour storm event with a 100-year return period.

Therefore, applying the 100-year storm event implies a total rainfall of 8hr x 9.03mm/hr = 72mm of rain over the lower ground floor lightwell areas during a possible 8 hour power cut.

Catchment area for basement lightwells = $100m^2$

Volume of storage required for 8-hour storm = $100m^2$ x 0.072m = 7.2 m^3

- ⇨ Tank Size = 4.5m x 1.6m x 0.5m deep.

2.3 **Sustainability**

The development of this site will result in a reduction in the paved and impermeable areas that generate surface water runoff from the site which results in the overall surface water flow from the site is being reduced. Both the existing and proposed flows are calculated below.

Existing Flow:
The existing site is 100% hardstanding. Therefore assuming a rainfall intensity of 50mm/hour over the total site area of 1,364m², the existing surface water runoff from the site is 18.8l/s.

Proposed Flow:
As with the existing flow, a rainfall intensity of 50mm/hour is assumed. The sedum green roof to the new dwelling is assumed to intercept the first 5mm of rainfall, a rainfall intensity of 45mm/hour is therefore assumed to discharge from same.

The proposed development will generate the following flows:

- Roof Area to refurbished apartment building =174m²
  Flow = 174x 50mm/hour = 2.4l/s
- Roof Area to new building with sedum green roof =262m²
  Flow = 262x 45mm/hour = 3.3l/s
- Roof Area to new building with sedum green roof =55m²
  Flow = 55x 50mm/hour = 0.8l/s
- Hardstanding at ground level =230m²
  Flow = 230x 50mm/hour = 3.2l/s
- Lower ground floor floor lightwells = 100m².
  Pumped to ground floor at rate of 2l/s.

Total flow from proposed development = 11.7l/s

2.3.1 **SUDS Devices – 'Green Roof'**

Run-off from natural greenfield areas contributes very little pollution and sediment to rivers and for most rainfall events direct run-off from greenfield sites to rivers does not take place with rainfall percolating into the ground. By contrast urban run-off, when drained by pipe systems, results in run-off from virtually every rainfall event with high levels of pollution, particularly in the first phase of run-off, with little of the rainfall percolating to the ground. To prevent this happening, interception storage is provided so that the first 5mm of rainfall from the developed site is intercepted and retained on site thereby replicating the run-off characteristics of the pre-development greenfield site.

In the context of the subject site interception storage has been provided by:

- introducing a sedum green roof to the new building to 'intercept' the first 5mm of rainfall falling on same.

- replacing a significant area of the existing hardstanding with a grassed lawn, thereby facilitating infiltration of rainwater into the ground.

3.0 FOUL DRAINAGE SYSTEM

3.1 Existing Foul Sewer Infrastructure

Foul effluent from the existing pub/restaurant drains by gravity to the existing 150mm diameter public sewer running along Stafford Place

The foul flow generated by the existing pub/restaurant is calculated below. The loading ratio and flows per day assumed are noted in the table.

Existing Occupancy / Usage

	Area (m^2)	Loading ratio (m^2/person)	Occupancy (Persons)	Flow (Litres / day per person)	Total Flow (Litres per day)
Front Pub Section	123.9	1	124	10	1,240
Rear Restaurant	224.1	1	224	15	3,360
Number of staff for pub and restaurant			7	60	420
Office serving the Pub	68.5	10	7	45	315
Managers 2 bed apartment				317	317
Total					**5,652 litres / day**

Total existing water demand = **5,652 litres/day.**

∴ Total existing foul flow = 5,652 litres/day

∴ Existing Peak foul flow = $\frac{6x5{,}652}{24x60^2} = 0.39l/s$

3.2 Proposed Foul Sewer Infrastructure

The foul drainage networks for the apartments within the existing refurbished structure and the new part 2 storey over ground residential building are dealt with separately below:

4 No. Apartments within the existing refurbished structure:

Foul effluent from the toilets and kitchen waste at ground and 1st floor is collected by a drainage network slung to the underside of the ground floor. The slung drainage penetrates the existing basement retaining wall and connects to a buried gravity network draining in a northern eastern direction towards manhole F1.4 located at the north eastern boundary of the site.

New Part 2 storey over ground residential building:

Foul effluent from the toilets and kitchen waste at ground and 1st floor is collected by a drainage network slung to the underside of the ground floor slab. The slung drainage penetrates the lower ground floor retaining wall and connects to a buried gravity network draining in a northern eastern direction towards manhole F1.4 located at the north eastern boundary of the site.

At lower ground floor level the foul pop ups in the slab connect to a buried network which drains by gravity to pump sump manhole F2.2 located in a utility room in the north eastern corner of the slab. 24 hour storage for the foul effluent will be provided for, at lower ground floor level, in the event of a pump break down or electricity cut. Refer to section 3.2.1 below for calculation of the 24 hour storage volume required. The foul waste will be pumped by duty and duty assist pumps via a 75mm diameter rising main to manhole F1.3 at ground level.

The network drains to manhole F1.4 at which point it combines with the foul flow from the apartments before discharging through a new 150mm diameter concrete pipe at 1:150 to the existing 150mm diameter public sewer on Stafford Place.

With regard to the foul flow generated by the proposed development, a breakdown of the uses within the proposed development is listed below:

- The existing pub/restaurant building will partially demolished and refurbished to provide 4 apartments comprising of:
  - 2 No. 2 bed with a bathroom and 2 en-suites (water demand of 407l/day/apartment)
  - 2 No. 1 bed with a single bathroom. (water demand of 217l/day/apartment)
- The new part 2 storey over ground residential dwelling (GFA 790.7m²) comprising of:
  - 4 No. en-suite bedrooms and a self contained studio apartment at basement level
  - 1 No. en-suite bedrooms, a bathroom and a kitchen at ground floor level.
  - To assess the water demand from the residential dwelling, the bedrooms have been converted to an equivalent number of apartments. The 4 en-suite bedrooms and self contained studio apartment at lower ground floor level are taken to be equivalent to 5 No. 1 bed apartments with a single bathroom (water demand of 217l/day/apartment). The en-suite bedrooms, bathroom and kitchen at ground floor level are taken to be equivalent to 2 No.1 bed apartments with a single bathroom (water demand of 217l/day/apartment).

The proposed water demand is therefore estimated as follows:

Proposed Development Occupancy / Usage

Building	**Use**	**Flow (litres/day**	**Total Flow (litres /day)**
Refurbished Pub / Restaurant	2 No. 2 bed apartments with a bathroom and 2 en-suites	2x407	814
	2 No. 1 bed apartments with a single bedroom	2x217	434
New 3 storey residential building with 5 No. en-suite bedrooms and self contained studio apartment	Lower ground floor level: *5 No. 1 bed apartments with a single en-suite	5x217	1085
	Ground Floor: *2 No. 1 bed apartments with a single en-suite	2x217	434
Total			**2,767**
***Each en-suite bedroom conservatively assumed to generate the flow for a 1 bed apartment with a single bathroom.**			

Total proposed water demand = 2,767 litres/day

∴ Total proposed foul flow = 2,767 litres day

∴ Proposed Peak foul flow $= \frac{6x2{,}767}{24x60^2} = 0.19l/s$

From these figures, it can be seen that the water demand and hence the foul flow for the proposed development will be significantly less than the demand for the existing development.

The proposed 150mm diameter outfall pipe at 1 in 100 to the public sewer has a capacity of 14.06l/s.

As there is no increase in foul flow leaving the development, the existing public pipe networks are therefore adequate for the proposed flows.

3.2.1 **Sizing of 24 hour Storage Tank at Lower Ground Floor Level**

From the table above in 3.2, it can be seen that the proposed foul flow at lower ground flow level is 1085 litres per day. A holding tank with a storage volume of 1.1m³ will be provided adjacent to the pump sump to provide 24 hour storage for foul waste is the event of a pump breakdown or electricity cut.

3.3 Flood Risk Assessment

This section describes recorded occurrences of flooding and protection measures for the proposed development.

3.3.1 Occurrences of Flooding

(Source: Environment Agency Flood Maps: www.maps.environment-agency.gov.uk)

The subject site was inspected on the Environment Agency Flood Maps and it was found there was no assessment of flood risk for the area. The records note that the most likely reason for this is that the site is located outside a floodplain. From inspection of the topography of the site and adjoining lands, it is clear that the site is not located in a low lying area and is in fact at a high elevation relative to the surrounding lands. In the event of heavy rains, the surrounding roads have significant falls to carry any away flood water that may occur.

3.3.2 Protection Measures

Given the existing levels of the surrounding public sewers, it is not possible to drain the lower ground floor by gravity to either the foul and surface water sewers. Both foul and surface water runoff at this level will, therefore, be pumped to ground level and discharge by gravity to the public sewers.

In the event of a pump breakdowns or electricity faults, the following will be provided to prevent flooding of the lower ground.

-24 hour storage for the foul flow from the WC's, sinks etc at lower ground floor level will be provided at basement level

-8 hour storage for surface water flow from the lightwells for the 100 year storm event will be provided at basement level.

In the event of the public foul main surcharging on Queens Road/Stafford Place, a non return valve will be provided on the 150mm foul pipe discharge from the site on Stafford Place.