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Structural Engineers

14181 - Lancaster Grove

Surface Water Drainage Profoma

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Project:				Job No:	
Lancaster Grove				14181	
Section:				Sheet No:	
Drainage Strategy					
By:	Date:	Chk'd by:	Date:	App'd by:	Date:
CG	22/07/15	IJ			

1. Introduction

The site address is 5 Lancaster Grove, London, NW3 4 HE. The approximate National Grid Reference of the site is TQ 26891 84669.

Lyons O'Neill were appointed in July 2015 to carry out a Surface Water Drainage Strategy and Basement Impact Assessment (BIA) to accompany the planning application submitted by John Pardey.

The Surface Water Drainage Strategy has been produced in accordance with the guidance given within Camden planning documents, national framework guidance and current best practice.

Written by: Charlotte Garven MEng

Signed:

Checked by: Ian Jewison BEng CEng MIStructE

Signed:

2. Design Limitations

It has been assumed that the discharge connection points will be located to the rear of the site where there is an existing capped connection to the foul and surface water drainage system. Exact locations are to be confirmed on site.

2.1. Compliance of Design

A Section 106 of the Water industry Act 1991 agreement will be made with the relevant water authority board, Thames Water, to ensure the sewers have sufficient capacity to accommodate the anticipated flow rates from the site.

Table 1: Summary of Compliance

Criteria	Requirements Summary
Thames Water flooding prevention in accordance with Sewers for Adoption	No part of the site will flood in a 1 in 30 year storm event
Building Control	The drainage will be designed to comply with Building Regulations Part H
Mayor's Preferred Standard	Limit rainfall runoff rates to greenfield rates which will be modeled at the mean annual rainfall event, Q_{bar}
Environment Agency PPS25	Storage volume to accommodate a 1 in 100 year storm including 30% for climate change

3. Surface Water

The NPPF states that developments should give "priority to the use of sustainable drainage systems". SUDs are designed to mimic natural drainage methods and reduce the burden on the sewer system following the Pitt review (2008) which found that two thirds of flooded properties in June/July 2007 were are a result of surface water overloading the sewer system.

The Flood and Water Management Act 2010 requires all new developments to have drainage plans for surface water on site. The initial plan alongside a Flood Risk Assessment was carried out by Three Countries Flood Risk Assessment and has been developed by Lyons O'Neill in the design development.

3.1. SUDs Hierarchy

The SUDs hierarchy offers techniques to reduce flood risk, pollution and increase biodiversity and sets out the most sustainable methods which if not employed should be fully justified.

Store rainwater for later use
From the Architectural design and access statement:
"Vertical rain gardens using a tree box system or similar will utilize the rainwater runoff from the rear portion of the roof with terraces with water from the paths falling to planting beds. There is also the potential to utilize storm crates in area under the paving to store water for plant irrigation. Water butts will be sited to the communal garden to store the water from the roofs within the garden."

Use infiltration techniques, such as porous surfaces in non-clay areas
The site is founded on London Clay which is a highly predictable material which is widely encountered and tested across London. The Geotechnical Engineer has advised that a suitable permeability of around 10^{-7} m/sec would apply at this site. As such, it is not considered a viable option to use infiltration techniques to reduce the volume of discharge.

Attenuate rainwater in ponds or open water features for gradual release
There is no available space on site to house open water features on the site, however below ground storage tanks will be used for a gradual release of rainwater into the surface water sewer/drain in the road.

Discharge rainwater direct to a watercourse
The proximity of the site to the nearest watercourse does not make this feasible.

Discharge rainwater to a surface water sewer/drain
This will be carried out if a separate surface water drainage system exists in the existing road.

Discharge rainwater to the combined sewer
This will be carried out if no separate surface water drainage system exists in the existing road. No surface water will be discharged into a foul water sewer.

3.2. Disposal Method

A site specific ground investigation was carried out by Southern Testing and found the soil infiltration rates not suitable for soakaway drainage due to their high clay/silt content. Thus a positive drainage solution was developed which discharged runoff into the public sewer system. The surface water flow rates will be restricted to greenfield runoff rates (Qbar) from the proposed impermeable areas. Anticipated surface water flow rates will be calculated using the Wallingford Modified Rational method in

accordance with BS EN 752:2008 "Drain and sewer systems outside buildings".

3.3. Design Criteria

The storage volume has been based on the 1:100 year storm event plus 30% climate change. A vortex flow control device will be used at the outlet to limit the rainfall runoff rate to greenfield rates if the level of the sewer is low enough, alternatively a positive pumped system will be used as a method of protecting the basement from localized flood events.

The pipe network was designed to ensure that a 1 in 30 year storm event would not produce flooding. It is assumed that a 1 in 100 year storm would exceed the capacity of the pipe network alone and would surcharge the system and into the attenuation storage system which has been designed to accommodate this storm event. A 5 minute storm duration was assumed when designing the pipe network as this provided the highest rainfall intensity and was therefore the most onerous of cases.

The external landscaping falls have been designed and set by the Landscape Architect. There will be a linear drain around the perimeter of the building to collect rainwater runoff from the vertical faces of the building and to collect stormwater and to act as a precaution to prevent water from entering the building.

3.4. Maintenance

The site owner possesses the primary responsibility for overseeing and implementing the maintenance and management plan and designating a person who will be responsible for the proper operation and maintenance of the sewers.

A maintenance log should be kept which details the physical conditions of the structures, depth of sediment in structure, evidence of overtopping or debris blockages and maintenance required of each structure. The logs should be stored on file and made available upon request to the Council or any other stakeholder upon request.

Regular maintenance should be carried out in accordance with manufacturer's recommendations and should include:

- Inspection of gulleys and gratings to ensure debris is removed and the gullies can work at their intended capacity.
- Vents, inlets and outlets for the attenuation should be checked annually and following a large storm event to ensure they are operating as designed and remain in good working condition.
- Internal gullies should be filled with water every 3 months to reduce the release of unpleasant smells by ensuring they do not dry out.

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Appendix 1 - Surface Water Drainage Proforma

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Surface Water Drainage Strategy

1. Site Details

Site	14181 - Lancaster Grove
Address & post code or LPA reference	5 Lancaster Grove, London, NW3 4HE
Grid Reference	TQ 26891 84669
Is the existing site developed or Greenfield?	Developed
Is the development in LFRZ or in an area known to be at risk of surface water or ground water flooding?	The site is shown as low risk in the site specific Flood Risk Assessment which has been carried out
Total Site Area served by drainage system (ha)	0.098

2. Impermeable Area

	Existing	Proposed	Difference
Impermeable area (ha)	0.04156	0.05206	0.0105
Drainage Method	Sewer	Sewer	N/A

3. Proposing to Discharge Surface Water via

	Yes	No	Evidence that this is possible?
Infiltration		✓	
To watercourse		✓	
To surface water sewer	✓		Existing site drains to sewer
Combination of above		✓	

4. Peak Discharge Rates

	Existing Rates (l/s)	Proposed Rates (l/s)	Difference (l/s)	% Difference
Greenfield Qbar	9.1	N/A	N/A	N/A
1 in 1	7.1	8.9	1.8	25
1 in 30	17.0	21.3	4.3	25
1 in 100	21.6	27	5.4	25
1 in 100 plus climate change	N/A	36.1	N/A	N/A

Surface Water Drainage Strategy

5. Calculate additional volumes for storage

	Existing Volume (m3)	Proposed Volume (m3)	Difference (m3)
Greenfield Runoff Volume	N/A	N/A	N/A
1 in 1 6 hour	10.8	13.5	2.7
1 in 30 6 hour	21.6	27.0	5.4
1 in 100 6 hour	27.0	33.8	6.8
1 in 100 6 hour plus climate change	N/A	43.9	N/A

6. Calculation of attenuation storage

Storage Attenuation volume required to meet green field runoff rates (m3)	10m3
Storage Attenuation volume required to reduce rates by 50% (m3)	N/A - discharge volumes are increasing
Storage Attenuation volume required to meet [OTHER RATE] rates (m3)	N/A - discharge volumes are increasing
Storage Attenuation volume required to retain rates as existing (m3)	N/A - discharge volumes are increasing

7. How is stormwater stored on site?

Infiltration	State the Site's Geology and known Source Protection Zones (SPZ)	London Clay
	Are infiltration rates suitable?	Unlikely
	State the difference between a proposed infiltration device base and the ground water (GW) level	Unknown
	Were infiltration rates obtained by desk study or infiltration test?	Desk Study
	Is the site contaminated? If yes, consider advice from others on whether infiltration can happen.	Unknown
In light of the above, is infiltration feasible?	Yes/No? If the answer is No, please identify how the storm water will be stored prior to release	No, Stormwater will be stored in attenuation tanks for gradual release into the public sewer

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Surface Water Drainage Strategy

Storage Requirements
The developer must confirm that either of the two methods for dealing with the amount of water that needs to be stored on site.

Option 1 Simple - Store both the additional volume and attenuation volume in order to make a final discharge from site at the greenfirled runoff rate. This is preferred if not infiltration can be made on site. This very simply satisfies the runoff rates and volume criteria.
Option 2 Complex - If some of the additional volume of water can be infiltrated back into the ground, the remainder can be discharged at a very low rate of 2l/sec/heactare. A combined storage calculation using the partial permissible rate of 2 l/s/hectare and the attenuation rate used to slow the runoff from site.

Please confirm what option has been chosen and how much storage is required on site	Option 1 Simple - 16.8m3

8. Please confirm

Which Drainage Systems measures have been used?	Attenuation tanks
Drainage system can contain the 1 in 30 year storm event without flooding	Yes
Drainage system can contain the 1 in 100 year storm event without flooding	Yes
Drainage system can contain the 1 in 100 year + 30% climate change storm event without flooding	Yes
Any flooding between the 1 in 30 year and the 1 in 100 year plus climate change storm events will be safely contained on site.	Yes
How are the rates being restricted?	Vortex flow control/positive pumped system
Please confirm the owners/adopters of the entire drainage systems throughout the development. Please list all the owners	Optic Realm Ltd
How is the entire drainage system maintained?	Please refer to Section 3.4

9. Evidence

Proforma Section	Document reference where details quoted above are taken from	Page Number
Section 2	Existing and proposed site plans (1409_1000 Topographical Survey/1409_1999 Proposed Lower Floor Site Plan)	/
Section 3	Existing site plan and flood risk assessment	/
Section 4	Attached supporting calculations	7, 8
Section 5	Attached supporting calculations	7, 8
Section 6	Attached supporting calculations	7, 8
Section 7	Flood Risk Assessment by Three Countries Flood Risk Assessment	/
Section 8	Attached supporting calculations and covering sheet	5, 7, 8

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Appendix 2 - Surface Water Drainage Calculations

Existing Surface Water

Using Wallingford Modified Rational Method in accordance with BS EN 752:2008, where $Q = C_v C_r A i$

C_v = 0.75

C_r = 1.44

A = Area: 990 m2

of which is impermeable: 415.6 m2

Return Period (1 in ...)	Storm Duration (mins)	i = Rainfall Intensity (mm/hr)	Q = Peak Runoff Rate (l/s)	Volume of Runoff (m3)
1	5	57	7.1	2.1
	10	39	4.9	2.9
	15	32	4.0	3.6
	30	20	2.5	4.5
	60	13	1.6	5.8
	120	8	1.0	7.2
	240	5	0.6	9.0
	360	4	0.5	10.8
2.3	5	73.3	9.1	2.7
	10	51	6.4	3.8
	15	41.2	5.1	4.6
	30	26.2	3.3	5.9
	60	16.2	2.0	7.3
	120	9.8	1.2	8.8
	240	5.8	0.7	10.4
	360	4.2	0.5	11.3
30	5	136	17.0	5.1
	10	96	12.0	7.2
	15	78	9.7	8.8
	30	50	6.2	11.2
	60	31	3.9	13.9
	120	18	2.2	16.2
	240	11	1.4	19.8
	360	8	1.0	21.6
100	5	173	21.6	6.5
	10	124	15.5	9.3
	15	101	12.6	11.3
	30	65	8.1	14.6
	60	41	5.1	18.4
	120	24	3.0	21.6
	240	14	1.7	25.2
	360	10	1.2	27.0
MAX			22	27

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Job	14181 - Lancaster Grove	Date	Jul-15	Page	
Title	Surface Water Drainage - Supporting Calculations	By	CG	Chkd	IJ

Proposed Surface Water

Using Wallingford Modified Rational Method in accordance with BS EN 752:2008, where $Q = C_v C_r A i$

C_v = 0.75 A = Area: 990 m2
C_r = 1.44 of which is impermeable: 520.6 m2

Limiting Runoff rates: = 5.0 l/s

Return Period (1 in ...)	Storm Duration (mins)	i = Rainfall Intensity (mm/hr)	Q = Peak Runoff Rate (l/s)	Volume of Runoff (m3)	Volume of Runoff to be Attenuated (m3)
1	5	57	8.9	2.7	0
	10	39	6.1	3.7	0
	15	32	5.0	4.5	0
	30	20	3.1	5.6	0
	60	13	2.0	7.3	0
	120	8	1.3	9.0	0
	240	5	0.8	11.3	0
	360	4	0.6	13.5	0
30	5	136	21.3	6.4	0
	10	96	15.0	9.0	0
	15	78	12.2	11.0	2
	30	50	7.8	14.1	3
	60	31	4.8	17.4	0
	120	18	2.8	20.3	0
	240	11	1.7	24.8	0
	360	8	1.3	27.0	0
100	5	173	27.0	8.1	0
	10	124	19.4	11.6	0
	15	101	15.8	14.2	3
	30	65	10.2	18.3	6
	60	41	6.4	23.1	4
	120	24	3.8	27.0	0
	240	14	2.2	31.5	0
	360	10	1.6	33.8	0
100 + 30%	5	231	36.1	10.8	0
	10	165	25.8	15.5	0
	15	135	21.1	19.0	5
	30	86	13.4	24.2	10
	60	52	8.1	29.3	9
	120	30	4.7	33.8	0
	240	17	2.7	38.3	0
	360	13	2.0	43.9	0

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Appendix 3 - Thames Water Correspondance

London Borough of Camden
Camden Town Hall
Argyle Street
Euston Road
London
WC1H 8EQ

Our DTS Ref: 46153
Your Ref: 2015/2366/P

15 May 2015

Dear Sir/Madam

Re: CLIFFORD PUGH HOUSE 5-7, LANCASTER GROVE, LONDON, NW3 4HE

Waste Comments
Thames Water requests that the Applicant should incorporate within their proposal, protection to the property by installing for example, a non-return valve or other suitable device to avoid the risk of backflow at a later date, on the assumption that the sewerage network may surcharge to ground level during storm conditions.

Surface Water Drainage - With regard to surface water drainage it is the responsibility of a developer to make proper provision for drainage to ground, water courses or a suitable sewer. In respect of surface water it is recommended that the applicant should ensure that storm flows are attenuated or regulated into the receiving public network through on or off site storage. When it is proposed to connect to a combined public sewer, the site drainage should be separate and combined at the final manhole nearest the boundary. Connections are not permitted for the removal of groundwater. Where the developer proposes to discharge to a public sewer, prior approval from Thames Water Developer Services will be required. They can be contacted on 0800 009 3921. Reason - to ensure that the surface water discharge from the site shall not be detrimental to the existing sewerage system.

There are public sewers crossing or close to your development. In order to protect public sewers and to ensure that Thames Water can gain access to those sewers for future repair and maintenance, approval should be sought from Thames Water where the erection of a building or an extension to a building or underpinning work would be over the line of, or would come within 3 metres of, a public sewer. Thames Water will usually refuse such approval in respect of the construction of new buildings, but approval may be granted in some cases for extensions to existing buildings. The applicant is advised to contact Thames Water Developer Services on [redacted] to discuss the options available at this site.

Thames Water would advise that with regard to sewerage infrastructure capacity, we would not have any objection to the above planning application.

No impact piling shall take place until a piling method statement (detailing the depth and type of piling to be undertaken and the methodology by which such piling will be carried out, including measures to prevent and minimise the potential for damage to subsurface sewerage infrastructure, and the programme for the works) has been submitted to and approved in writing by the local planning authority in consultation

with Thames Water. Any piling must be undertaken in accordance with the terms of the approved piling method statement. Reason: The proposed works will be in close proximity to underground sewerage utility infrastructure. Piling has the potential to impact on local underground sewerage utility infrastructure. The applicant is advised to contact Thames Water Developer Services on [redacted] to discuss the details of the piling method statement.

'We would expect the developer to demonstrate what measures he will undertake to minimise groundwater discharges into the public sewer. Groundwater discharges typically result from construction site dewatering, deep excavations, basement infiltration, borehole installation, testing and site remediation. Any discharge made without a permit is deemed illegal and may result in prosecution under the provisions of the Water Industry Act 1991. Should the Local Planning Authority be minded to approve the planning application, Thames Water would like the following informative attached to the planning permission:"A Groundwater Risk Management Permit from Thames Water will be required for discharging groundwater into a public sewer. Any discharge made without a permit is deemed illegal and may result in prosecution under the provisions of the Water Industry Act 1991. We would expect the developer to demonstrate what measures he will undertake to minimise groundwater discharges into the public sewer. Permit enquiries should be directed to Thames Water's Risk Management Team by telephoning [redacted] or by emailing [redacted] Application forms should be completed on line via [redacted]

Water Comments
On the basis of information provided, Thames Water would advise that with regard to water infrastructure capacity, we would not have any objection to the above planning application.

Thames Water recommend the following informative be attached to this planning permission. Thames Water will aim to provide customers with a minimum pressure of 10m head (approx 1 bar) and a flow rate of 9 litres/minute at the point where it leaves Thames Waters pipes. The developer should take account of this minimum pressure in the design of the proposed development.

No impact piling shall take place until a piling method statement (detailing the depth and type of piling to be undertaken and the methodology by which such piling will be carried out, including measures to prevent and minimise the potential for damage to subsurface water infrastructure, and the programme for the works) has been submitted to and approved in writing by the local planning authority in consultation with Thames Water. Any piling must be undertaken in accordance with the terms of the approved piling method statement. Reason: The proposed works will be in close proximity to underground water utility infrastructure. Piling has the potential to impact on local underground water utility infrastructure. The applicant is advised to contact Thames Water Developer Services on [redacted] to discuss the details of the piling method statement.

Yours faithfully
Development Planning Department

Development Planning,
Thames Water,
Maple Lodge STW,
Denham Way,
Rickmansworth,
WD3 9SQ
[redacted]