Northumberland Terrace (Phase 3)

798 – 808 High Road

Tottenham

London

Drainage Strategy Report

Job Number: 19068

Revision: P04

Date: 12th March 2020

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Document Control

Remarks		Drainage Strategy Report						Date
Rev	P01	Prepared	NG	Checked	NG	Approved	KL	17/10/19
Rev	P02	Prepared	NL	Checked	NG	Approved	KL	22/11/19
Rev	P03	Prepared	NG	Checked	NG	Approved	KL	24/02/20
Rev	P04	Prepared	NG	Checked	NG	Approved	KL	12/03/20

1. Introduction

Lyons O'Neill has been instructed by F3 Architects to prepare a Drainage Strategy Report to support an application for planning and listed building consent application for a major development in North London referred to as Northumberland Terrace.

2. Site Description

2.1. Site Location

The site is located at 798 - 808 High Road (and land to the rear), North London. The site has an area is 0.3765 ha (3,765 m^2) and is located at the National Grid reference TQ3392391438 and E533923, N191438. Figure 1 shows the site location and redline planning boundary for the site. A copy of the site plan has been enclosed as Appendix A of this report.

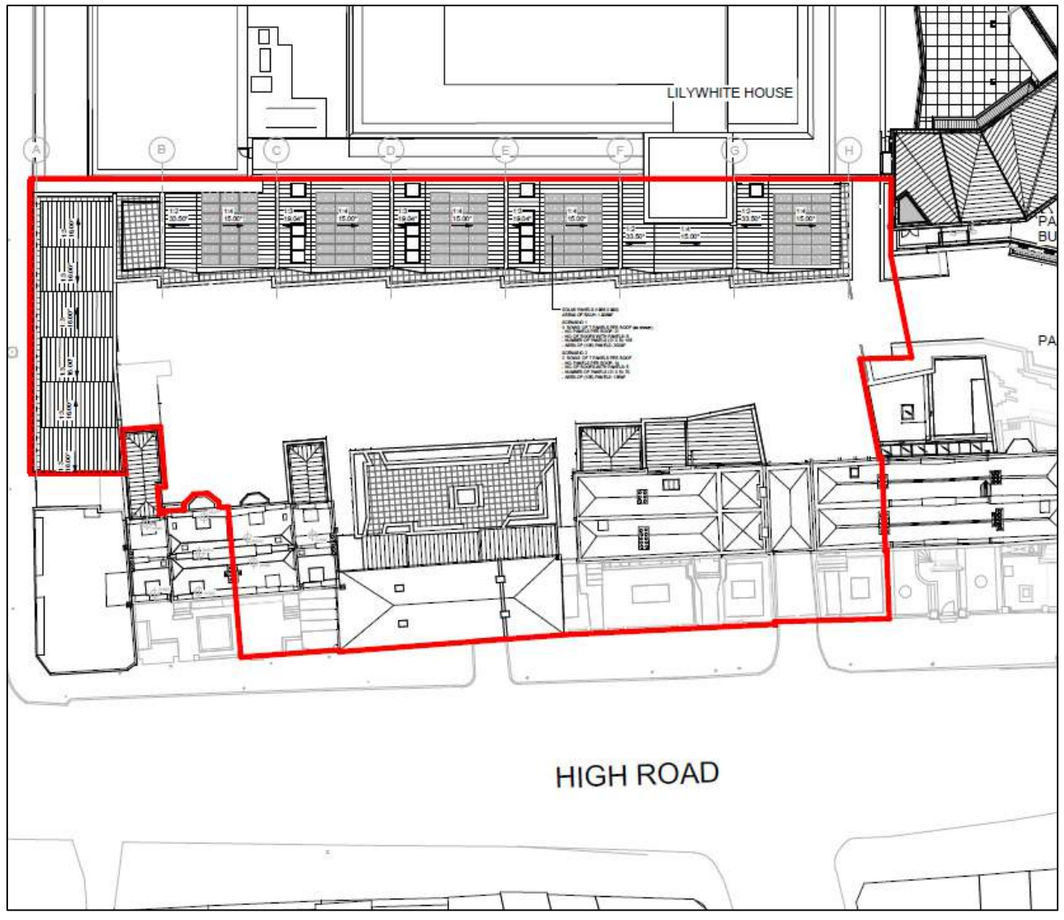


Figure 1 – Site Location

2.2. Existing Development

The land that is being proposed for redevelopment is to the rear of properties 798 – 814 High Road in Tottenham with some being Grade II Listed. The existing site comprises of existing buildings, hard standing and some soft permeable areas. A copy of the existing topographic survey of the site has been enclosed as Appendix B of this report.

2.3. Proposed Development

Proposals in a full planning application for the erection of a four storey building with flexible A1/A2/A3/B1/D1/D2 use; external alterations to 798-808 High Road; change of use of 798-808 High Road to a flexible A1/A2/A3/B1/D1/D2 use; demolition of rear extensions to Nos. 798, 800-802, 804-806, 808 and 814 High Road; erection of new rear extensions to Nos. 798, 800-802, 804-806 and 808 High Road; hard and soft landscaping works; and associated works.

Proposals include listed building consent for internal and external alterations to 798-808 High Road, including the demolition of rear extensions Nos. 798, 800-802, 804-806 and 808 High Road; erection of new rear extensions to Nos. 798, 800-802, 804-806 and 808 High Road; and associated works.

A copy of the proposed site plans are enclosed as Appendix C of this report.

3. Planning Policy

This report has been prepared in line with national, regional and local planning policy. The following strategic documents have been used as guidance to prepare this report:

3.1. National Planning Policy Framework (NPPF) – February 2019

Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate (paragraph 165).

The systems used should:

a) take account of advice from the lead local flood authority;

b) have appropriate proposed minimum operational standards;

c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and

d) where possible, provide multifunctional benefits.

3.2. Emerging Draft New London Plan – Intend to Publish, December 2019

The new London Plan carries considerable weight therefore the drainage design will adhere to the new *Policy SI13 – Sustainable Drainage.*

Policy SI13 – Sustainable Drainage

A. Lead Local Flood Authorities should identify – through their Local Flood Risk Management Strategies and Surface Water Management Plans – areas where there are particular surface water management issues and aim to reduce these risks.

B. 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 in line with the following drainage hierarchy:
   1. rainwater harvesting (including a combination of green and blue roofs)
   2. infiltration techniques and green roofs
   3. rainwater attenuation in open water features for gradual release
   4. rainwater discharge direct to a watercourse (unless not appropriate)
   5. rainwater attenuation above ground (including blue roofs)
   6. rainwater attenuation below ground
   7. rainwater discharge to a surface water sewer or drain
   8. rainwater discharge to a combined sewer

C. Development proposals for impermeable paving should be refused where appropriate, including on small surfaces such as front gardens and driveways.

D. Drainage should be designed and implemented in ways that address issues of water use efficiency, river water quality, biodiversity, amenity and recreation.

3.3. Haringey Local Plan – February 2013

SP5: Water Management and Flooding

The Council will require all development in Haringey to be water efficient during construction and operation and to reduce all forms of flood risk. All development shall:

- Improve the water environment, water quality and drainage systems;
- Minimise water use and illustrate how development would contribute to general and flash flooding;
- All development in these areas will take account of flood risk vulnerability classification as set out in paragraph 100 of the NPPF and will apply the NPPF Sequential Test and Exception Test;
- Implement measures to prevent (or mitigate as last resort) local surface water and downstream flooding;
- Implement Sustainable Drainage Systems from strategic to individual site level to improve water attenuation, quality and amenity;
- Restore and enhance the Blue Ribbon Network including Pymmes Brook, Moselle Brook, the River Lee and its tributaries, deculverting wherever feasible, to improve water quality and amenity of these waterways and to help reduce flood risk (in line with London River Action Plan); and
- Require higher resilience and levels of flood protection for critical infrastructure to ensure the protection of essential services such as water and power.

In order to facilitate this, the Council:

- Has carried out a joint SFRA (Strategic Flood Risk Assessment) Stage 1 for the whole borough;
- Has carried out a Sequential Test for the Areas of Development (Growth Areas and Areas of Change);
- Has carrying out, in association with other north London boroughs in the Drain London subregion, a Surface Water Management Plan to identify issues with drainage networks and the effects of new development.

3.4. Haringey Development Management DPD – July 2017

DM25 – Sustainable Drainage Systems

A. All proposals for new development must seek to manage surface water as close to its source as possible in line with the London Plan drainage hierarchy.

B. The Council will require Sustainable Drainage Systems (SuDS) to be sensitively incorporated into new development by way of site layout and design, having regard to the following requirements:

- All major development proposals will be required to reduce surface water flows to a greenfield run-off rate for a 1 in 100 year critical storm event;
- All minor development proposals should aim to achieve a greenfield run-off rate and, at a minimum, achieve a 50 per cent reduction on existing site run-off rates;
  All other development should seek to achieve a greenfield run-off rate and include at least one 'at source' SuDS measure resulting in a net improvement in water quantity or quality discharging to a sewer; and
- For all development where a greenfield runoff rate cannot be achieved justification must be provided to demonstrate that the run-off rate has been reduced as much as possible. C

C. Where Sustainable Drainage Systems are implemented they will be expected to:

- Meet the requirements set out in the Council's relevant local standards and guidance, or national standards where agreed;
- Incorporate measures identified in the Surface Water Management Plan;
- Be designed to maximise biodiversity and local amenity benefits, and where appropriate, ensure that SuDS techniques provide for clean and safe water at the surface;
- Improve water quality; and
- Function effectively over the lifespan of the development.

D. Where SuDS cannot be implemented due to site constraints (such as land contamination or space limitations) robust justification must be provided along with proposed alternative sustainable approaches to surface water management.

3.5. Mayor of London – Sustainable Design and Construction (SPG) – April 2014

This document advises that if greenfield runoff rates are not proposed, developers will be expected to demonstrate how all opportunities to minimise final site run-off have been taken.

4. Existing Drainage

4.1. Existing Private Drainage

No CCTV drainage survey has been undertaken at this stage however a utilities drawing has been used to best piece together how the existing drainage network is functioning. A CCTV drainage survey will be required in due course to understand the existing site drainage in more detail.

4.2. Existing Public Drainage

The Thames Water asset map shows a 610mm ø public surface water sewer and 305 mm ø public foul water sewer in High Street and 305mm ø public surface water sewer in Northumberland Park Road. A copy of the Thames Water asset map is included as Appendix D of this report. Figure 2 shows a screenshot of the asset map infrastructure in close proximity to the site.

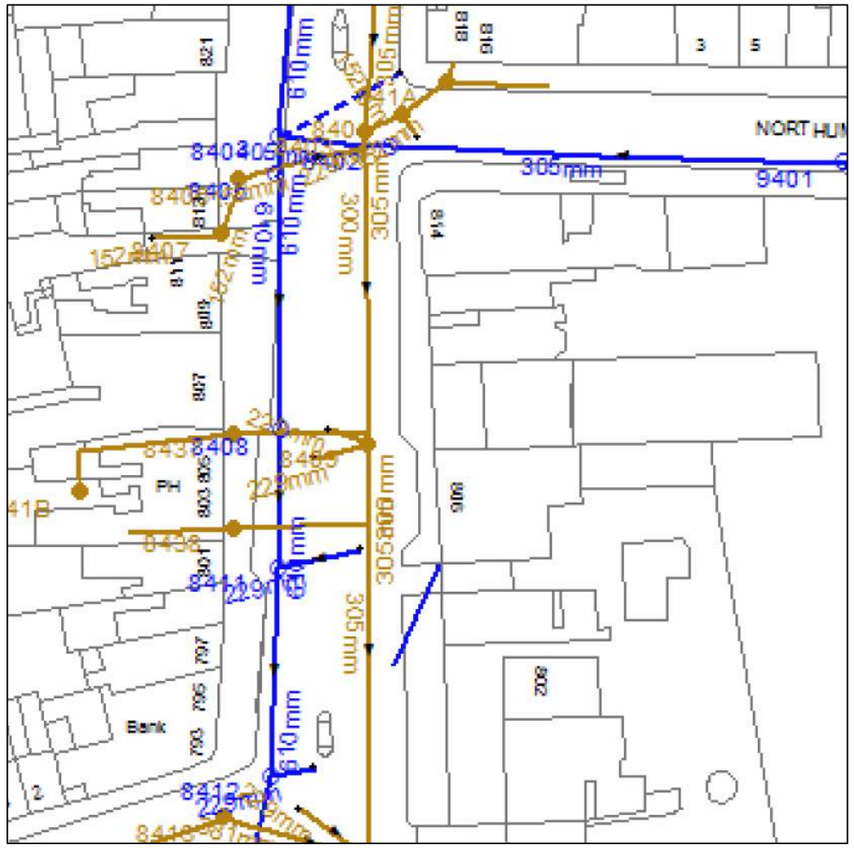


Figure 2 – Thames Water Asset Plan

5. Drainage Hierarchy

New Policy SI13 (Sustainable Drainage) of the emerging 'draft' London Plan states that a development 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:

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 in line with the following drainage hierarchy:

1. rainwater harvesting (including a combination of green and blue roofs)
2. infiltration techniques and green roofs
3. rainwater attenuation in open water features for gradual release
4. rainwater discharge direct to a watercourse (unless not appropriate)
5. rainwater attenuation above ground (including blue roofs)
6. rainwater attenuation below ground
7. rainwater discharge to a surface water sewer or drain
8. rainwater discharge to a combined sewer

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

Table 1 – Feasibility of SuDS Components

Feasibility of SuDS Components	
Infiltrating SuDS	No
Permeable Pavements	No
Green Roofs	No
Rainwater Harvesting	No
Swales	No
Rills and Channels	No
Bio-retention Systems	No
Retention Ponds and Wetlands	No
Wetlands	No
Geo-cellular Systems	**Yes**
Proprietary Treatment Systems	No
Filter Drains and Filter Strips	No

Store rainwater for later use

Rainwater harvesting and green/brown roofs are often the preferred SuDS as they intercept water at high level and provide other sustainability benefits such as reducing the water demand of the building and increasing biodiversity.

The feasibility of rainwater harvesting will depend on the water reuse demands for the building which will be determined in due course however the design and capacity of attenuation cannot be included in the below ground drainage calculations.

The key benefits of rainwater harvesting are easy to maintain, reducing water bills, reduces demand on groundwater, reduces flooding and soil erosion and can be used for non-drinking purposes.

Green roofs slow the runoff rates from the site however the SuDS manual states that *"the hydraulic performance of green/brown roofs during extreme events tends to be fairly similar to standard roofs".* Therefore green roofs provide sustainability benefits however they cannot be included in the below ground drainage calculations. Although rainwater harvesting and green roofs are feasible they will not be used within the proposals for this development.

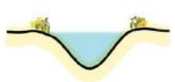
Use infiltration techniques

A site assessment report was produced by Southern Testing in January 2017. Borehole BH09/01 has indicated that Kempton Park Gravels are present at a depth of 1.5 m to 5.4 m below ground level (bgl). Groundwater was also encountered during the investigation initially at 3.9 m bgl rising to 3.3m bgl (8.78 m AOD) and a second strike at 19.6 m bgl rising to 17.3 m bgl. A desk study report on contamination was produced by Southern Testing in July 2016. In summary a number of potential contamination impacts were identified from on-site and off-site sources. Therefore

although the Kempton Park Gravel is a suitable infiltration media the ground conditions are not suitable for disposal of surface water from the site (refer to Appendix E).

Attenuate rainwater in ponds or open water features for gradual release

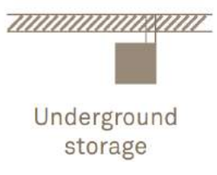
This part of London is highly urbanised with no ponds or open water features in close proximity to the site. Therefore this method of surface water disposal is not suitable.



Pond / Basin

Attenuate rainwater by storing in tanks or sealed water features for gradual release

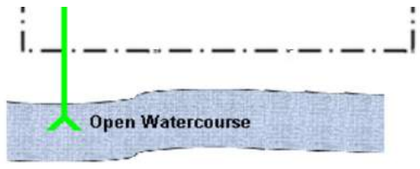
Proposals are to use a surface water attenuation tank to store surface water and then release at a restricted discharge rate to the sewer. Therefore attenuating rainwater is a viable option.



Underground storage

Discharge rainwater direct to a watercourse

There is no watercourse in close proximity to the site therefore, this method of surface water disposal is not suitable.

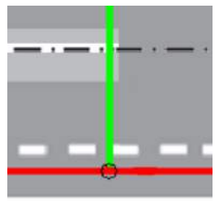


Discharge rainwater to a surface water sewer/drain

There are no surface water sewers in close proximity to the site.

Discharge rainwater to the combined sewer

Proposals are to construct new connection(s) from the site to the public sewer for both foul and surface water.



6. Proposed Surface Water Drainage Strategy

6.1. Impermeable and Permeable Areas

The existing site has an area of 3,765 m^2 (100%) of which 3,765m^2 (100%) is impermeable surfaces that positively drain to the existing network.

The proposed site has an area of 3,765 m^2 (100%) of which 3,515m^2 (93%) will be impermeable surfaces that positively drain to the proposed network.

6.2. Peak Rate of Runoff

At this stage, the proposed surface water drainage will connect to the 300 mm diameter sewer located in Northumberland Road where approval will be required. The asset map provided by Thames Water demonstrates that levels will allow a gravity connection to the public sewer.

In accordance with the Haringey Development DPD Policy DM25, developments should ensure that there is no increase in flood elsewhere, and should seek to achieve Greenfield (GF) rates of runoff. There are two approaches for setting the maximum allowable GF discharge rates as detailed in Figure 2 which depend on whether the volume of runoff can be managed.

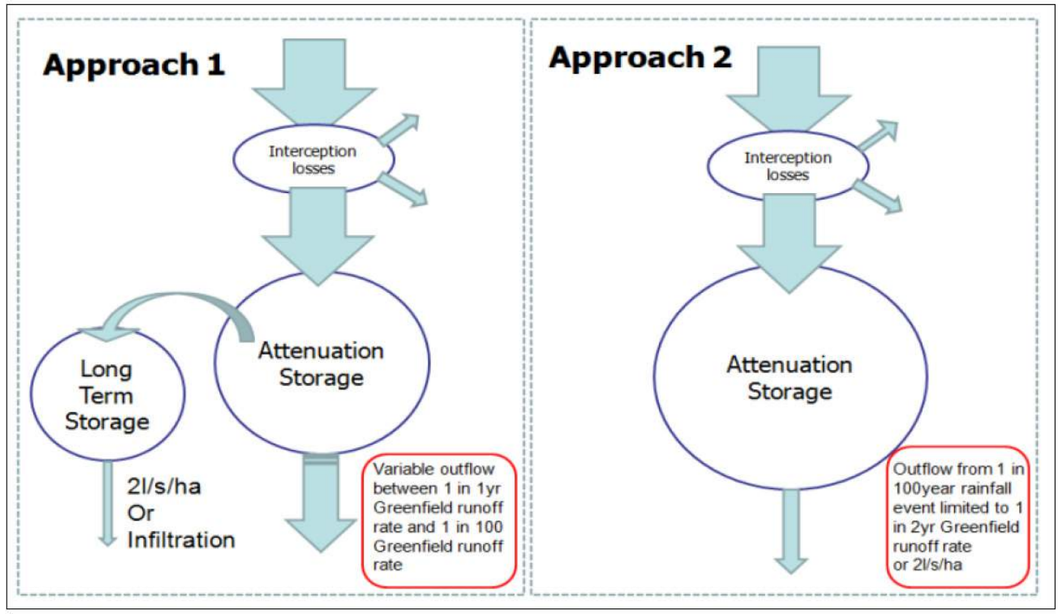


Figure 2 – Two approaches for managing flows & volumes from a development site

As IoH124 and FSR are considered outdated methods for calculating runoff and rainfall, FEH data has been used which are more up to date and was the preferred method for estimating rainfall and runoff. The following table provides an outline to the anticipated runoff rates for Haringey based on a clay soil using FEH methodology as per the SuDS Design Requirements for LLFA Technical Assessment Document. A copy of the greenfield runoff rates are enclosed as Appendix F.

Table 2 – Runoff Rates

Return Period	Greenfield Runoff Rates for Site (l/sec)	PDL Sites – 3 Times Greenfield Runoff (l/sec)
1 in 1 year	1.5	4.4
1 in 2 year (Qbar)	1.8	5.4
1 in 30 year	4.2	12.6
1 in 100 year	5.8	17.4

6.3. Volume of Runoff

Attenuation can be provided in the form of geo-cellular crates wrapped in an impermeable membrane where an adjacent manhole chamber will have a flow control device to restrict discharge from the site to 5.4 l/sec

6.4. Pre-development Runoff Rates

In accordance with the Modified Rational Method, the peak existing run-off from the site is calculated from the formula:

$Q = 3.61 \times C_v \times i \times A$

where C_v is the volumetric runoff coefficient, A is the catchment area in hectares and i Is the peak rainfall intensity in mm/hr.

For the peak 1 in 1 year return period storm event this gives an existing discharge rate from the site of: $Q_1 = 3.61 \times 1.0 \times 0.3765 \times 21.82 = 29.65$ l/sec

and for the peak 1 in 30 year return period storm event this gives an existing discharge rate from the site of: $Q_{30} = 3.61 \times 1.0 \times 0.3765 \times 59.28 = 80.6$ l/sec

and for the peak 1 in 100 year return period storm event this gives an existing discharge rate from the site of: $Q_{100} = 3.61 \times 1.0 \times 0.3765 \times 81.47 = 110.7$ l/sec

6.5. Proposed Limiting Discharge Rate

Proposals are to restrict discharge rates to the Q_{Bar} 1 in 2 year PDL Greenfield runoff rate of 5.4 l/sec in order to avoid local drainage system failure. A limiting discharge rate of 5.4 l/sec is considered as far as reasonably practicable without compromising the performance and operation of flow control devices such as a hydrobrake.

A discharge rate of 5.4 l/sec would provide betterment in terms of flood risk by reducing existing runoff rates during extreme events i.e. the 1 in 100 year event. This provides a 95% betterment on the existing 100-year pre-development runoff rate of 110.7 l/sec.

A copy of the Micro Drainage calculations sheets are included as Appendix G, SuDS Proforma as Appendix H and the preliminary site drainage layout is included as Appendix I of this report.

6.6. Attenuation Storage

In order to achieve a discharge rate of 5.4 l/sec, attenuation storage will be required. An estimated storage volume of 300 m³ will be required to accommodate the 1 in 100 year plus 40% CC storm event.

6.7. Maintenance

A SuDS Maintenance Plan in accordance with CIRIA RP992 will be prepared at a later stage if required.

7. Foul Water Drainage

7.1. Existing Foul Flows

It has been assumed that all the existing properties fronting the street drain to the public foul sewer located in High Road.

7.2. Proposed Foul Flows

The proposed peak foul flow has been assessed as 4.2 l/sec however this is based on preliminary design information and may vary slightly as the design process moves forward.

7.3. Consultation

A pre-planning enquiry will need to be submitted to Thames Water to confirm capacity within the public sewer for the proposed development. A Section 106 application will be required for permission to connect to the public sewer in due course.

8. Conclusion

This report has been prepared in accordance the upcoming emerging 'draft' London Plan which requires development proposals to utilise (SuDS) where practical, aim to achieve Greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible.

The proposed development site has an area of approximately 0.3765 ha (3,765 m^2) of which 3,515 m^2 (93%) will be impermeable surfaces that positively drains to the proposed network.

A limiting discharge rate of 5.4 l/sec is considered as far as reasonably practicable without compromising the performance and operation of flow control devices such as a hydrobrake. In order to achieve a discharge rate of 5.4 l/sec, attenuation storage will be required. An estimated storage volume of 300 m^3 will be required to accommodate the 100 year plus storm event plus a 40% allowance for climate change.

Greenfield runoff rates have calculated based on the methodology explained within the Haringey SuDS Design Requirements LLFA Technical Assessment document by multiplying by a factor of three.

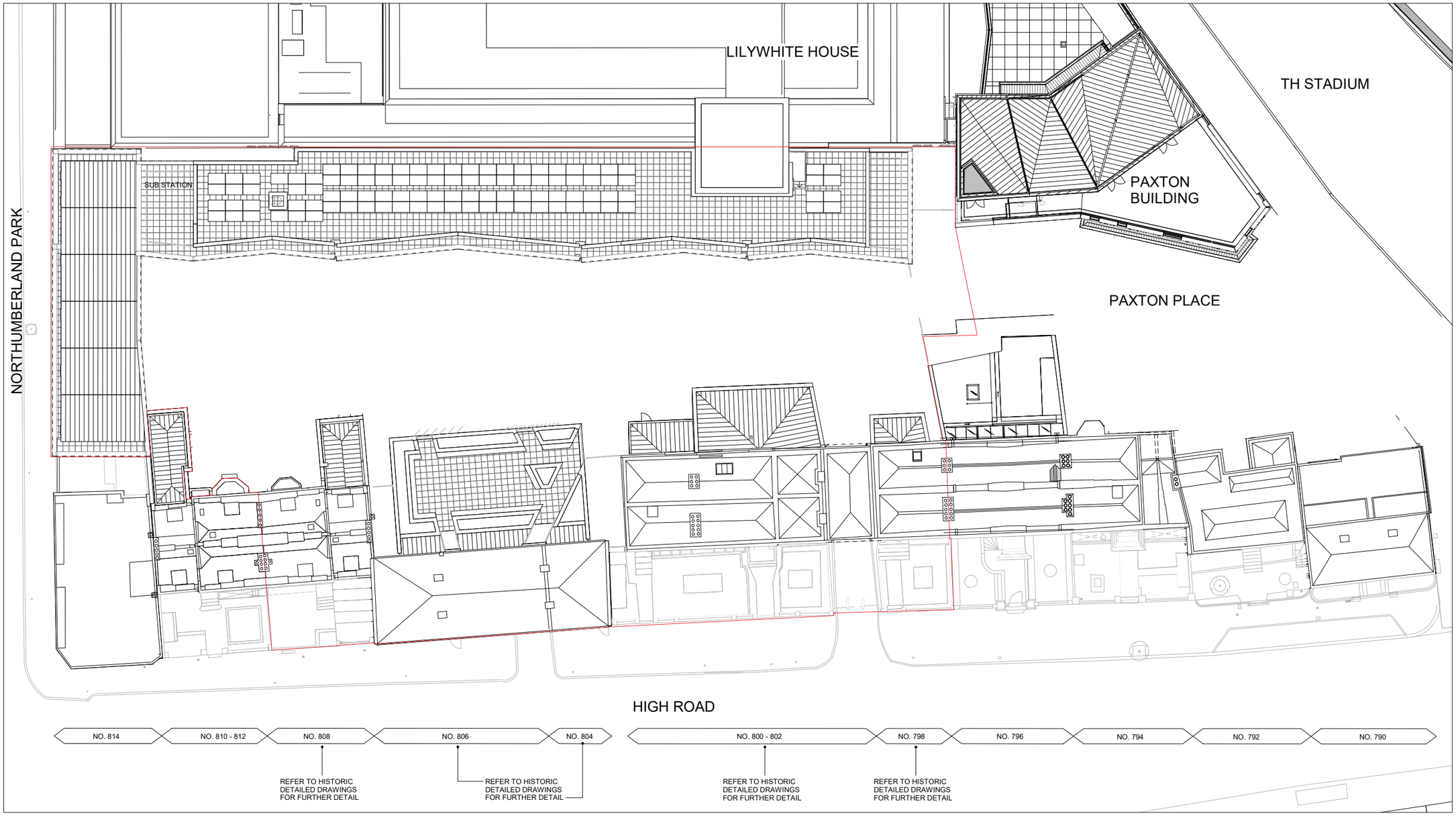
The proposed drainage strategy is fully complaint with national, regional and local planning policy.

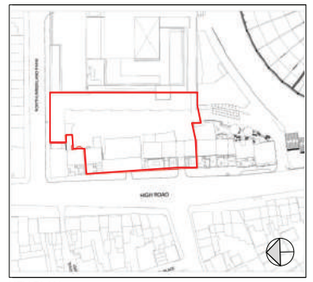
The proposed peak foul flow has been assessed as 4.2 l/sec however this is based on preliminary design information and may vary slightly as the design process moves forward.

A CCTV drainage survey of the existing drainage network is required to re-use any existing connections.

Applications for Thames Water approvals are required in due course.

Appendix A – Site Location Plan





KEY PLAN

NOTES:

DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS, SPECIFICATIONS, DOCUMENTS AND CONSULTANT INFORMATION.

CAD DRAWINGS BASED ON SURVEY INFORMATION BY OTHERS; ALL DIMENSIONS TO BE SITE CHECKED.

M&E ITEMS SHOWN INDICATIVELY AND ARE SUBJECT TO FURTHER SITE INVESTIGATIONS AND END USER SPECIFICATION REQUIREMENTS.

INTERNAL FURNITURE LAYOUTS SHOWN FOR INDICATIVE PURPOSES.

LANDSCAPING/PUBLIC REALM SHOWN FOR INDICATIVE PURPOSES ONLY - REFER TO RE-FORM LANDSCAPE ARCHITECTS DRAWINGS FOR DETAILS.

KEY:

APPLICATION BOUNDARY

NO. XX — BUILDING EXTENT

No.	DATE	DESCRIPTION	DRN	CHK
P1	26/02/2020	PLANNING	RM	AC

REVISION HISTORY

Architect

F3 ARCHITECTURE + INTERIORS

A: 5 Rochester Mews - London - NW1 9JB
T: 020 7267 8332
W: f3architects.com
E: info@f3architects.com

Health and Safety

Project Name

NORTHUMBERLAND TERRACE PHASE 3: NOS. 798 TO 808 HIGH ROAD AND LAND TO REAR

798-808 HIGH ROAD
LONDON
N17 0BX

Drawing Title

PROPOSED ROOF PLAN

Date	Status
26/02/2020	PLANNING

Drawn By	Checked By	Approved By	Scale	Size	Project Reference
RM	AC	IL	1 : 200	A1	171121

Project	Agent	Zone	Level	Type	Role	Drawing No.	Revision
NT-1000	ZZ	RF	GA	A	-	20016	P1

Appendix B – Existing Topographic Survey

TOTTENHAM HIGH ROAD

TOTTENHAM HIGH ROAD

NORTHUMBERLAND PARK

SAINSBURY'S CAR PARK

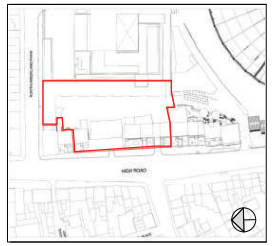
SAINSBURY'S CAR PARK

SAINSBURY'S CAR PARK

SAINSBURY'S

SAINSBURY'S

Appendix C – Preliminary Site Layouts



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798-808 HIGH ROAD
LONDON
N17 0BX

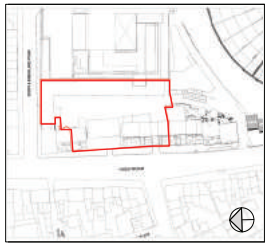
Drawing Title

PROPOSED GROUND FLOOR PLAN

Date	Status
26/02/2020	PLANNING

Drawn By	Checked By	Approved By	Scale	Size	Project Reference
RM	AC	IL	1 : 200	A1	171121

Project	Agent	Zone	Level	Type	Role	Drawing No.	Revision
NT-1000-ZZ-L00-GA-A- 20011							P1



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Project	Agent	Zone	Level	Type	Role	Drawing No.	Revision
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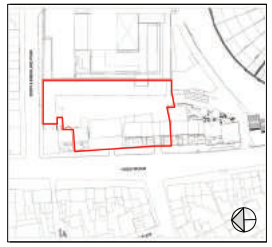

KEY PLAN

NOTES:

DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS, SPECIFICATIONS, DOCUMENTS AND CONSULTANT INFORMATION.

CAD DRAWINGS BASED ON SURVEY INFORMATION BY OTHERS. ALL DIMENSIONS TO BE SITE CHECKED.

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KEY:

APPLICATION BOUNDARY

NO. XX — BUILDING EXTENT

No.	DATE	DESCRIPTION	DRN	CHK
P1	26/02/2020	PLANNING	RM	AC

REVISION HISTORY

Architect

F3 ARCHITECTURE + INTERIORS

A: 5 Rochester Mews - London - NW1 9JB
T: 020 7267 8332
W: f3architects.com
E: info@f3architects.com

Health and Safety

Project Name

NORTHUMBERLAND TERRACE PHASE 3:
NOS. 798 TO 808 HIGH ROAD AND LAND TO REAR
798-808 HIGH ROAD
LONDON
N17 0BX

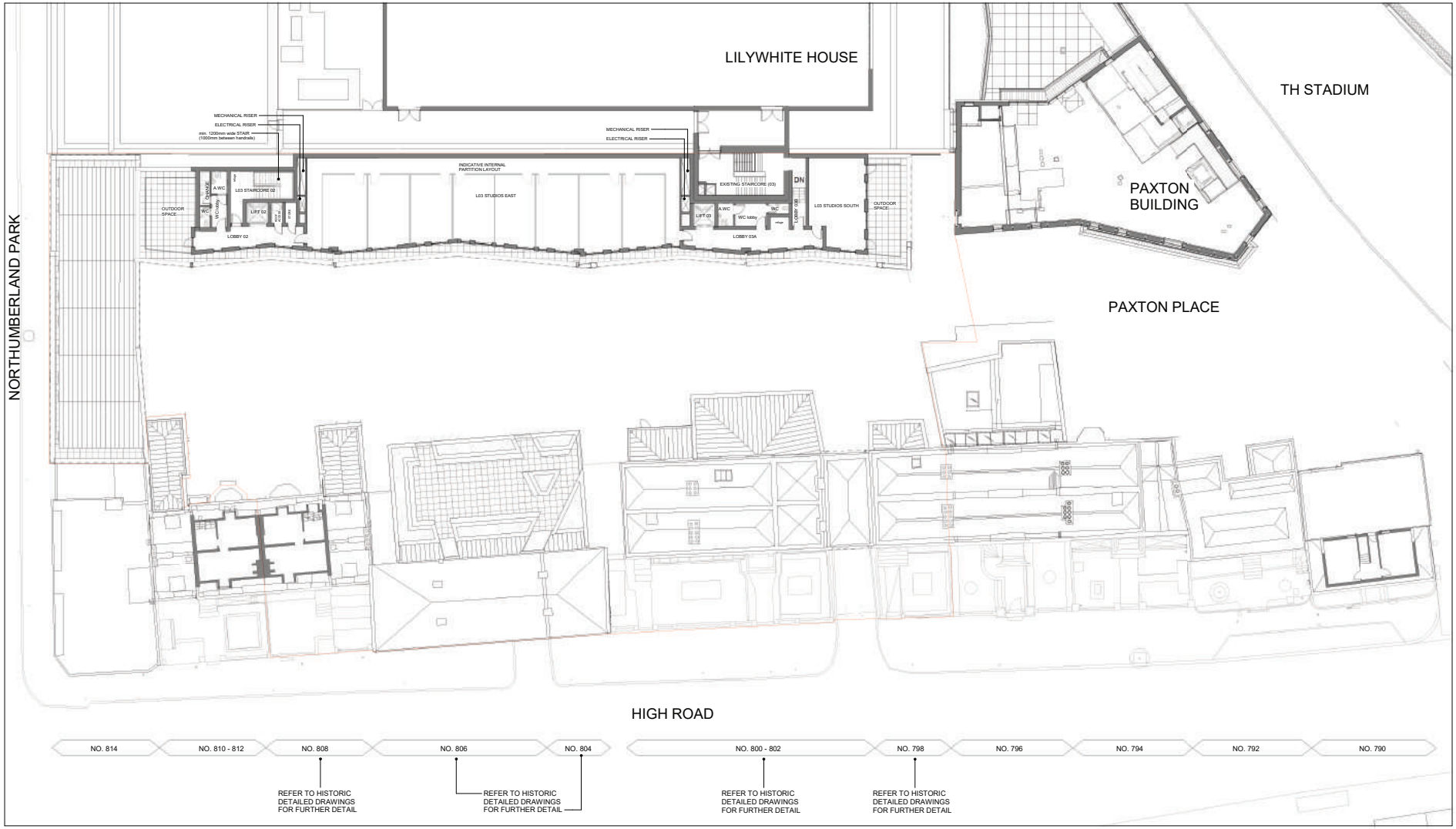
Drawing Title

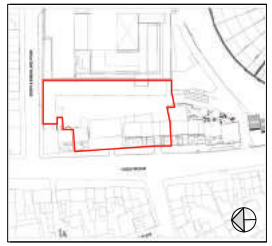
PROPOSED SECOND FLOOR PLAN

Date	Status
26/02/2020	PLANNING

Drawn By	Checked By	Approved By	Scale	Size	Project Reference
RM	AC	IL	1 : 200	A1	171121

Project	Agent	Zone	Level	Type	Role	Drawing No.	Revision
NT-1000-ZZ-L02-GA-A- 20013							P1





KEY PLAN

NOTES:

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KEY:

APPLICATION BOUNDARY

NO. XX — BUILDING EXTENT

No.	DATE	DESCRIPTION	DRN	CHK
P1	26/02/2020	PLANNING	RM	AC

REVISION HISTORY

Architect

F3 ARCHITECTURE + INTERIORS

A: 5 Rochester Mews - London - NW1 9JB
T: 020 7267 8332
W: f3architects.com
E: info@f3architects.com

Health and Safety

Project Name

NORTHUMBERLAND TERRACE PHASE 3:
NOS. 798 TO 808 HIGH ROAD AND
LAND TO REAR
798-808 HIGH ROAD
LONDON
N17 0BX

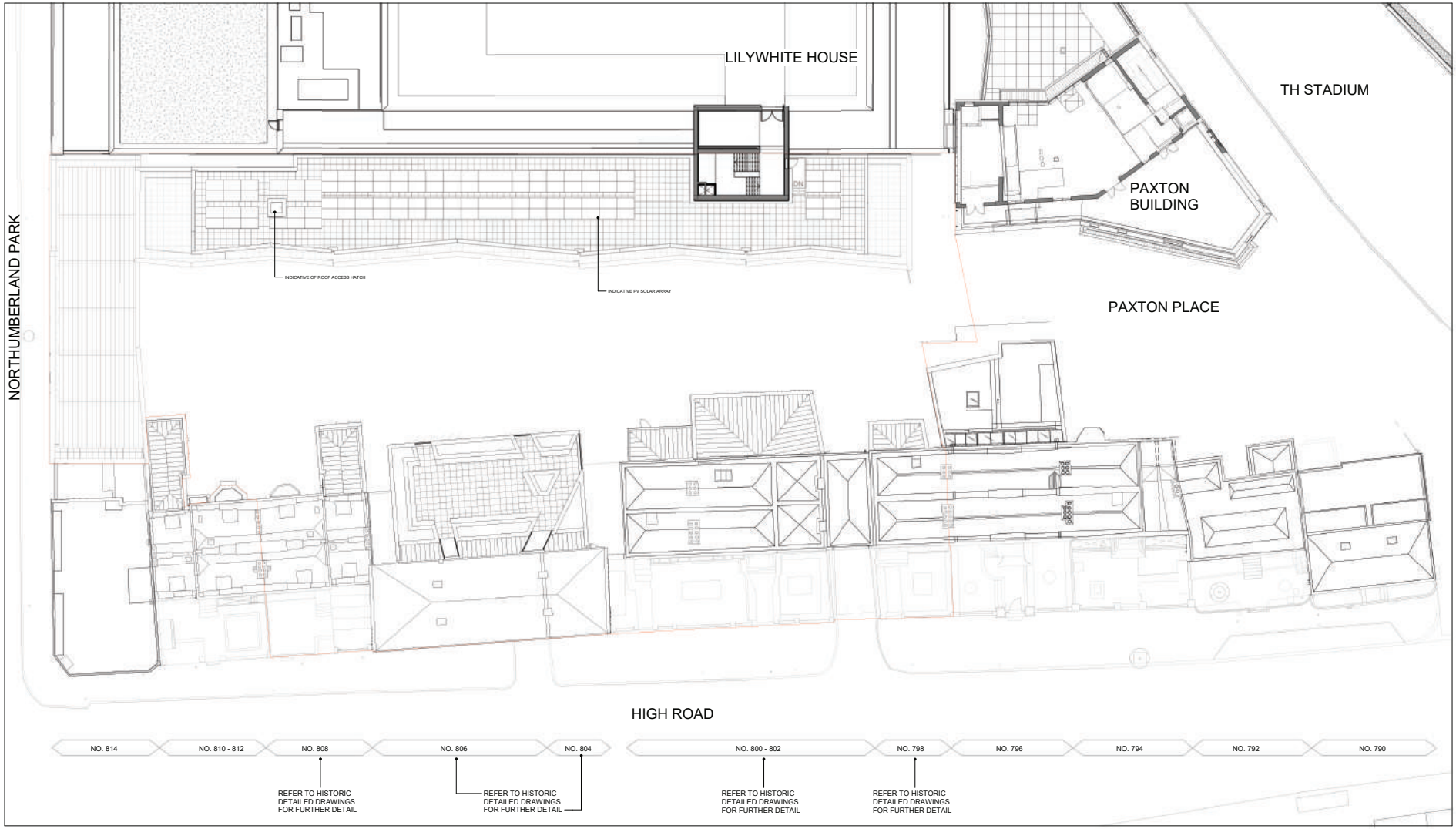
Drawing Title

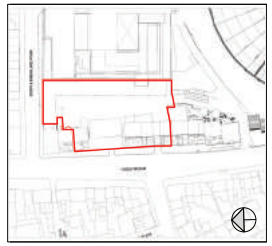
PROPOSED THIRD FLOOR PLAN

Date	Status
26/02/2020	PLANNING

Drawn By	Checked By	Approved By	Scale	Size	Project Reference
RM	AC	IL	1 : 200	A1	171121

Project	Agent	Zone	Level	Type	Role	Drawing No.	Revision
NT-1000-ZZ-L03-GA-A- 20014							P1





KEY PLAN

NOTES:

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KEY:

APPLICATION BOUNDARY

NO. XX — BUILDING EXTENT

No.	DATE	DESCRIPTION	DRN	CHK
P1	26/02/2020	PLANNING	RM	AC

REVISION HISTORY

Architect

ARCHITECTURE + INTERIORS

A: 5 Rochester Mews - London - NW1 9JB
T: 020 7267 8332
W: f3architects.com
E: info@f3architects.com

Health and Safety

Project Name

NORTHUMBERLAND TERRACE PHASE 3:
NOS. 798 TO 808 HIGH ROAD AND
LAND TO REAR
798-808 HIGH ROAD
LONDON
N17 0BX

Drawing Title

PROPOSED FOURTH FLOOR PLAN

Date	Status
26/02/2020	PLANNING

Drawn By	Checked By	Approved By	Scale	Size	Project Reference
RM	AC	IL	1 : 200	A1	171121

Project	Agent	Zone	Level	Type	Role	Drawing No.	Revision
NT-1000-ZZ-L04-GA-A- 20015							P1

Appendix D – Thames Water Asset Map

 Date: 18/06/15 Scale: 1:2098 Map Centre: 533983,191315 Data updated: 26/03/15 Wastewater Plan A3

Foul Sewer	Foul Manhole
Surface Sewer	Surface Manhole
Combined Sewer	Combined Manhole
Abandoned Sewer	Abandoned Manhole
Pressure Main	Other Manhole
Private Asset (Colour denotes effluent type)	End Item
Proposed Asset (Colour denotes effluent type)	S104 Boundary

emma.bousted@urs.com

Thames Water

Appendix E – Ground Investigation

The Geotechnics report contained the results of a single groundwater monitoring visit on the 28th September 2009 of the vibrating wire piezometers (VWP) installed. For the vibrating wire piezometer installed in BH09/05 at a depth of 19.0mbgl (-7.0mOD) i.e. within the London Clay the recorded standing water level was 8.92mAOD.

Buro Happold stated in their report that the Thanet Sand is confined by the Lambeth Group and will be under sub-artesian pressure. They also commented that the London Clay was in hydraulic continuity with the Kempton Park Gravels and where groundwater entries were encountered within the London Clay they coincided with layers or lenses of granular materials or claystone horizons. Furthermore they also concluded that the London Clay was under drained by the Lambeth Group.

On the basis of the above results and observations, groundwater entries should be allowed when carrying out any excavations, pile construction within the Kempton Parks Gravels, London Clay. Lambeth Group and Thanet Sand. Furthermore, higher perched water entries should also be allowed from within the made ground and Enfield Silt materials.

C PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

7 Swelling and Shrinkage

The Enfield Silt materials were typically classified as clays of low to high plasticity. The number of reported tests was limited and, subject to further confirmatory testing, these materials should be assumed to be of NHBC Medium Volume Change Potential.

The underlying Kempton Park Gravels will have negligible swelling and shrinkage Potential.

The underlying London Clay materials have a classification of NHBC High Volume Change Potential. However given the presence of the overlying non-shrinkable Kempton Park Gravels, and the depth of these materials, no specific precautions in relation to swelling and shrinkage of the London Clay materials is anticipated.

8 Soakaways

Subject to confirmatory testing, and on the basis of the particle size distributions carried out on the Kempton Park Gravels, they are expected to have good soakage properties. Drainage of the site to soakaways installed within the Kempton Park Gravels could be considered. However storage would be reduced due to the groundwater table. Furthermore, noting that the depth of the made ground and Enfield Silt materials was sometimes in the region of 3.1-3.3mbgl, the surface of the gravels could be deep, making the installation of soakaway chambers into these materials impractical.

Discharge of soakaways into made ground should be avoided as inundation of made ground would lead to collapse settlements of these materials. In addition, ground contamination would need to be considered as discharge of water in contaminated ground is not permitted by the Environment Agency.

Appendix F – Greenfield Runoff Rates

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by: Niall Greenan

Site name: Northumberland Terrace

Site location: Northumberland Rd, Tottenham, London

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude: 51.60593° N

Longitude: 0.06752° W

Reference: 523804789

Date: Feb 20 2020 16:48

Runoff estimation approach FEH Statistical

Site characteristics

Total site area (ha): 0.3765

Methodology

Q_{MED} estimation method: Specify QMed manually

Q_{MED} (l/s): 1.6

Q_{BAR} / Q_{MED} factor: 1.14

Hydrological characteristics

	Default	Edited
SAAR (mm):	625	625
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):		1.82
1 in 1 year (l/s):		1.54
1 in 30 years (l/s):		4.18
1 in 100 year (l/s):		5.8
1 in 200 years (l/s):		6.8

Appendix G – Micro Drainage Calculation Sheets

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 474 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	11.108	0.408	0.0	5.4	5.4	135.6	O K
30 min Summer	11.220	0.520	0.0	5.4	5.4	173.0	O K
60 min Summer	11.323	0.623	0.0	5.4	5.4	207.0	O K
120 min Summer	11.470	0.770	0.0	5.4	5.4	255.9	O K
180 min Summer	11.542	0.842	0.0	5.5	5.5	279.8	O K
240 min Summer	11.577	0.877	0.0	5.6	5.6	291.7	O K
360 min Summer	11.592	0.892	0.0	5.7	5.7	296.6	O K
480 min Summer	11.575	0.875	0.0	5.6	5.6	290.9	O K
600 min Summer	11.551	0.851	0.0	5.6	5.6	282.9	O K
720 min Summer	11.524	0.824	0.0	5.5	5.5	274.0	O K
960 min Summer	11.469	0.769	0.0	5.4	5.4	255.6	O K
1440 min Summer	11.362	0.662	0.0	5.4	5.4	220.1	O K
2160 min Summer	11.213	0.513	0.0	5.4	5.4	170.6	O K
2880 min Summer	11.087	0.387	0.0	5.4	5.4	128.7	O K
4320 min Summer	10.929	0.229	0.0	5.4	5.4	76.1	O K
5760 min Summer	10.852	0.152	0.0	5.2	5.2	50.5	O K
7200 min Summer	10.822	0.122	0.0	4.8	4.8	40.5	O K
8640 min Summer	10.808	0.108	0.0	4.2	4.2	35.8	O K
10080 min Summer	10.798	0.098	0.0	3.8	3.8	32.6	O K
15 min Winter	11.108	0.408	0.0	5.4	5.4	135.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	166.296	0.0	138.4	26
30 min Summer	106.866	0.0	178.2	40
60 min Summer	65.333	0.0	220.3	70
120 min Summer	42.102	0.0	284.2	128
180 min Summer	31.992	0.0	324.1	186
240 min Summer	26.056	0.0	352.0	244
360 min Summer	19.167	0.0	388.4	360
480 min Summer	15.221	0.0	411.3	420
600 min Summer	12.646	0.0	427.1	482
720 min Summer	10.828	0.0	438.8	544
960 min Summer	8.424	0.0	455.0	676
1440 min Summer	5.846	0.0	473.2	952
2160 min Summer	4.032	0.0	491.7	1352
2880 min Summer	3.101	0.0	504.0	1704
4320 min Summer	2.153	0.0	524.1	2380
5760 min Summer	1.672	0.0	544.2	3016
7200 min Summer	1.386	0.0	563.8	3680
8640 min Summer	1.196	0.0	583.4	4416
10080 min Summer	1.061	0.0	602.9	5144
15 min Winter	166.296	0.0	138.4	26

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	11.220	0.520	0.0	5.4	5.4	173.0	O K
60 min Winter	11.323	0.623	0.0	5.4	5.4	207.1	O K
120 min Winter	11.471	0.771	0.0	5.4	5.4	256.4	O K
180 min Winter	11.545	0.845	0.0	5.5	5.5	280.9	O K
240 min Winter	11.582	0.882	0.0	5.6	5.6	293.2	O K
360 min Winter	11.600	0.900	0.0	5.7	5.7	299.2	O K
480 min Winter	11.581	0.881	0.0	5.6	5.6	293.0	O K
600 min Winter	11.550	0.850	0.0	5.6	5.6	282.8	O K
720 min Winter	11.520	0.820	0.0	5.5	5.5	272.7	O K
960 min Winter	11.453	0.753	0.0	5.4	5.4	250.3	O K
1440 min Winter	11.313	0.613	0.0	5.4	5.4	203.9	O K
2160 min Winter	11.099	0.399	0.0	5.4	5.4	132.7	O K
2880 min Winter	10.952	0.252	0.0	5.4	5.4	83.9	O K
4320 min Winter	10.826	0.126	0.0	4.9	4.9	41.9	O K
5760 min Winter	10.800	0.100	0.0	3.9	3.9	33.3	O K
7200 min Winter	10.787	0.087	0.0	3.3	3.3	29.0	O K
8640 min Winter	10.779	0.079	0.0	2.8	2.8	26.3	O K
10080 min Winter	10.773	0.073	0.0	2.5	2.5	24.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	106.866	0.0	178.2	40
60 min Winter	65.333	0.0	220.3	68
120 min Winter	42.102	0.0	284.2	124
180 min Winter	31.992	0.0	324.1	182
240 min Winter	26.056	0.0	352.0	238
360 min Winter	19.167	0.0	388.4	350
480 min Winter	15.221	0.0	411.3	454
600 min Winter	12.646	0.0	427.1	492
720 min Winter	10.828	0.0	438.8	564
960 min Winter	8.424	0.0	455.0	720
1440 min Winter	5.846	0.0	473.3	1026
2160 min Winter	4.032	0.0	491.7	1408
2880 min Winter	3.101	0.0	504.0	1732
4320 min Winter	2.153	0.0	524.2	2292
5760 min Winter	1.672	0.0	544.2	2992
7200 min Winter	1.386	0.0	563.8	3680
8640 min Winter	1.196	0.0	583.4	4408
10080 min Winter	1.061	0.0	603.0	5144

Rainfall Details

Rainfall Model	FEH	Site Location GB	533905 191448	Winter Storms	Yes	Shortest Storm (mins)	15
Return Period (years)	100	Data Type	Point	Cv (Summer)	0.900	Longest Storm (mins)	10080
FEH Rainfall Version	2013	Summer Storms	Yes	Cv (Winter)	0.900	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.377

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.126	4	8	0.126	8	12	0.126

Appendix H – SuDS Proforma

1. Project & Site Details

Project / Site Name (including sub-catchment / stage / phase where appropriate)	Northumberland Terrace
Address & post code	Northumberland Park Road, Tottenham, London
OS Grid ref. (Easting, Northing)	E 533923
	N 191438
LPA reference (if applicable)	N/A
Brief description of proposed work	The proposals consist of a new-build four storey building stretching across an L shape footprint.
Total site Area	3,765 m^2
Total existing impervious area	3,765 m^2
Total proposed impervious area	3,515 m^2
Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?	Located in CDA Group4_061
Existing drainage connection type and location	To public surface water sewer in High Road.
Designer Name	Niall Greenan
Designer Position	Head of Civil Engineering
Designer Company	Lyons O'Neill

2. Proposed Discharge Arrangements

2a. Infiltration Feasibility

Superficial geology classification	Kempton Park Gravel Member
Bedrock geology classification	London Clay Formation
Site infiltration rate	0 m/s
Depth to groundwater level	3.9 m below ground level
Is infiltration feasible?	No

2b. Drainage Hierarchy

	Feasible (Y/N)	*Proposed (Y/N)*
1 store rainwater for later use	Y	N
2 use infiltration techniques, such as porous surfaces in non-clay areas	Y	Y
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	Re-use existing subject to survey.
Has the owner/regulator of the discharge location been consulted?	No

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	GF x 3 = 5.4			
1 in 1	GF x 3 = 4.4	29.6	90	5.4
1 in 30	GF x 3 = 12.6	59.3	161	5.4
1 in 100	GF x 3 = 17.4	81.5	213	5.4
1 in 100 + CC				5.4
Climate change allowance used		40%		

3b. Principal Method of Flow Control	Hydrobrake

3c. Proposed SuDS Measures

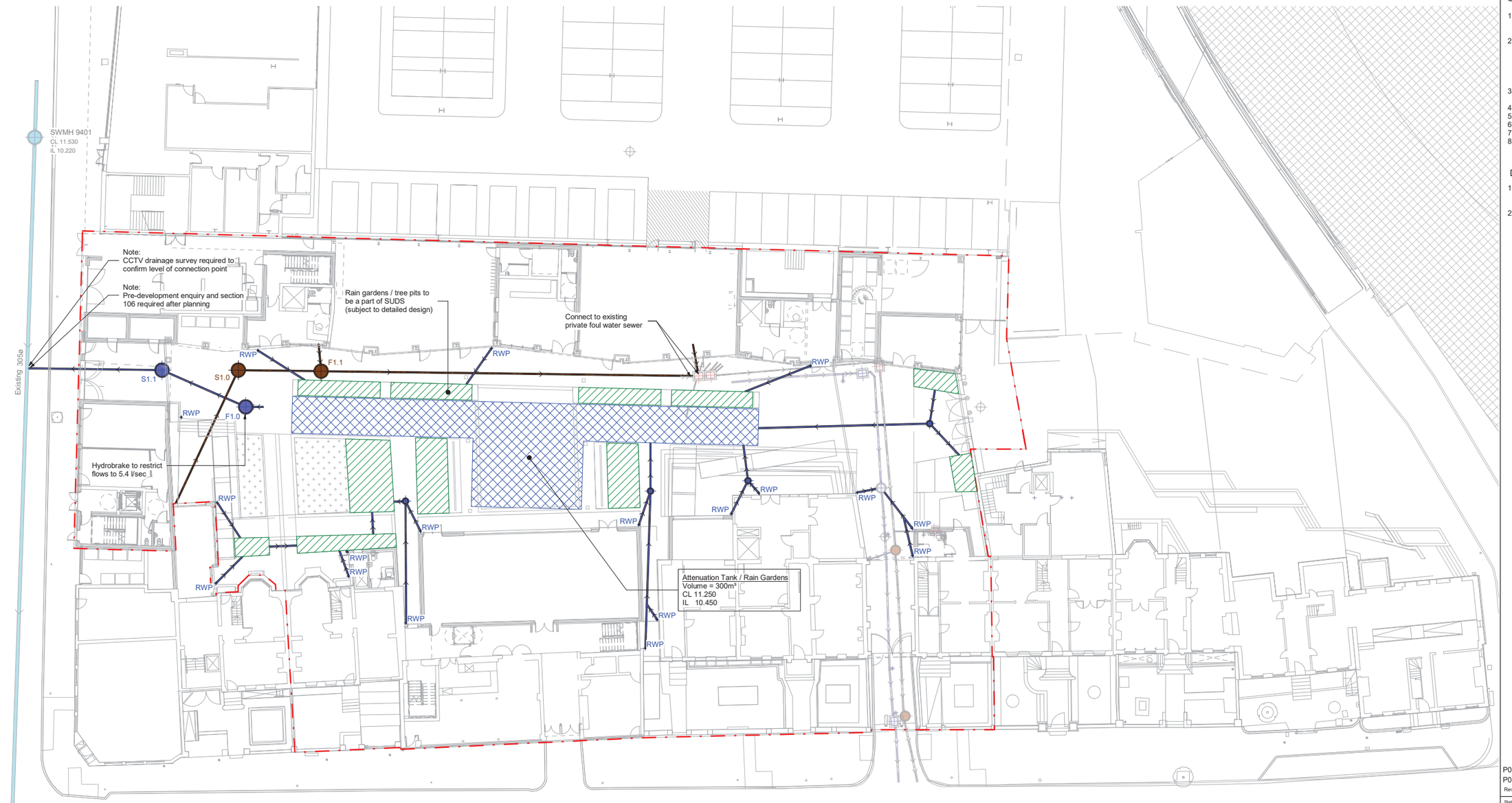
	Catchment area (m^2)	*Plan area (m^2)*	*Storage vol. (m^3)*
Rainwater harvesting	0		0
Infiltration systems	0		0
Green roofs	0	0	0
Blue roofs	0	0	0
Filter strips	0	0	0
Filter drains	0	0	0
Bioretention / tree pits	155	0	155
Pervious pavements	0	0	0
Swales	0	0	0
Basins/ponds	0	0	0
Attenuation tanks	3610		3610
Total	**3765**	**0**	**3765**

4. Supporting Information

4a. Discharge & Drainage Strategy	*Page/section of drainage report*
Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	Appendix E
Drainage hierarchy (2b)	Page 6, Section 5
Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	Appenidx A to I
Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	Appendix G
Proposed SuDS measures & specifications (3b)	Pa

4b. Other Supporting Details	*Page/section of drainage report*
Detailed Development Layout	Appendix A
Detailed drainage design drawings, including exceedance flow routes	Appendix A to I
Detailed landscaping plans	Appendix C
Maintenance strategy	O&M Manual
Demonstration of how the proposed SuDS measures improve:	
a) water quality of the runoff?	N/A
b) biodiversity?	N/A
c) amenity?	Manages runoff

Appendix I – Preliminary Site Drainage Layout



Legend:

- Proposed Private Foul Water Access Chamber
- Proposed Private Surface Water Access Chamber
- Existing Public Surface Water Access Chamber
- Proposed Private Surface Water Drainage Runs
- Proposed Private Foul Water Drainage Runs
- Existing Public Surface Water Drainage Runs
- RWP — Proposed Rain Water Pipe
- Proposed Rain Garden
- Proposed Attenuation Tank
- Site Boundary

General Notes

1. This drawing is to be read in conjunction with all relevant Architect's and engineers drawings and specifications.
2. This drawing is only to be scaled from for the purposes of estimating and approximate sizing only. If exact dimensions are relied upon, written dimensions supercede any scaled dimension. Overall setting out is to Architect's details and this drawing therefore should be read in conjunction with their information.
3. All waterproofing, drainage, levels and finishes by others.
4. All temporary works by others.
5. Fire protection to Architect's details.
6. All dimensions are in mm unless noted otherwise.
7. All levels are in m unless noted otherwise.
8. All RWP's and SVP's to be confirmed by Architect.

Drainage Notes

1. A CCTV drainage survey is required to assess the existing drainage network and whether existing connections can be re-used.
2. A proposed landscape plan is required for external drainage.

Rev	Comments	Date	Chk'd
P02	Issued For Planning	24/02/20	NG
P01	Issued For Planning	17/10/19	NG

Status
Stage 2 - Concept Design

Lyons O'Neill Structural Engineers
5 Maidstone Mews
72-76 Borough High Street
London
SE1 1GN
+44 (20) 7223 7222
info@lyonsoneill.co.uk
lyonsoneill.co.uk

Project
Northumberland Terrace
Phase 3

LON Project No. - **19068**

Subject
Preliminary Site Drainage Layout

Scale @ A1
1:200

By: DB
Checked: NG

Drawing No.: 19068-LON-ZZ-00-DR-C-8000
Rev: P02
Issue Date: 24/02/20