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13 Netherhall Gardens
NW3 5RN

Drainage Report

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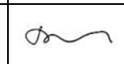
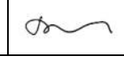
		Remarks:	Issued for planning				
Revision:	P1	Prepared by:	T.Kenning BSurv	Checked by:	P Chance BEng (Hons) CEng MICE	Approved by:	P Chance BEng (Hons) CEng MICE
Date:	24.04.20	Signature:		Signature:		Signature:	
Revision:	P2	Prepared by:	T.Kenning BSurv	Checked by:		Approved by:	
Date:	19.08.21	Signature:		Signature:		Signature:	

Contents

Appendices

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One

Executive Summary

This Drainage Report has been produced for the proposed redevelopment at 13 Netherhall Gardens, London, NW3 5RN located within the London Borough of Camden.

The development site comprises of an area of approximately 0.038 hectares.

The proposed works involve underpinning the existing building and creating a lower ground floor towards the front of the building and forming a new single storey basement and terrace towards the rear.

According to Thames Water sewer records a combined sewer is present within Netherhall Gardens.

The CCTV drainage survey identified that the overall site benefits from a 150mm diameter connection to the combined sewer in Netherhall Gardens.

SuDS in the form of permeable paving is proposed in the rear lower terrace area. Due to the nature of the redevelopment works and various site constraints no other SuDS are feasible.

Introduction

Elliott Wood Partnership Ltd have been appointed to provide below ground drainage consultancy services for the proposed redevelopment at 13 Netherhall Gardens, London, NW3 5RN located within the London Borough of Camden.

This report has been prepared in accordance with Camden's Local Area Requirements for Planning Applications (2018) Section 4: Reports and Assessments and Camden Local Plan policy CC3.

Two

Existing Site Conditions

2.1 Site Location

The development is located on the west side of Netherhall Gardens, London, NW3 5RN in the London Borough of Camden, centred on OS grid reference 526348E; 184988N. The development site area is approximately 380m^2 (0.038 hectares). Please refer to the site location plan presented in Figure 1.

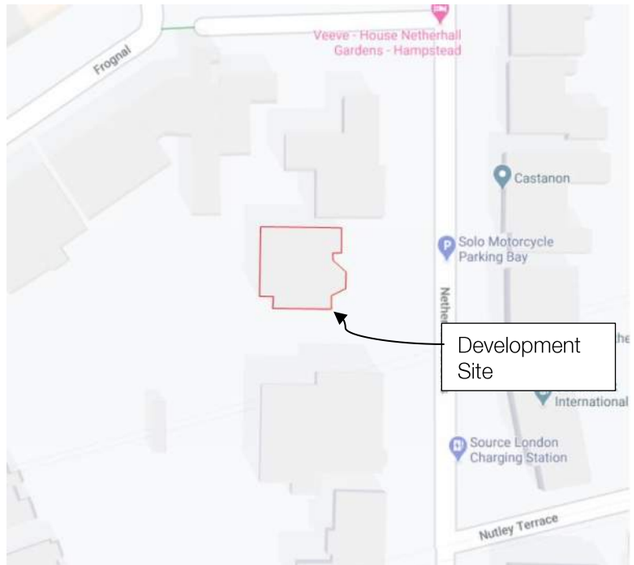

Figure 1: Development Site

2.2 Existing Building

The existing building is a detached five storey building which is entered at ground level at the front and a lower ground floor level towards the rear.

2.3 Topography

A topographical survey of the overall site has been undertaken by AES and this is presented in **Appendix A**. The topography of the overall site varies significantly, ranging in level from around 72.0m AOD in the south east corner to around 68.8m AOD in the north western corner of the site.

Three

Underlying Geology

3.1 Site Geology

A site investigation has been completed by GEA in October 2018 consisting of a desk study, two boreholes and 11 trial pits. The investigation indicated that beneath the moderate thickness of made ground the underlying ground is London Clay to the full depth of the investigations at 30.0m

Four

Flood Risk

The flood risk sources being considered as part of this report are as follows:

- Rivers and Sea
- Groundwater
- Surface Water flooding/Overland flow
- Infrastructure failure/sewer flooding
- Flooding water artificial waterbodies

4.1 Tidal / Fluvial Flooding

Based on data from GOV.uk flood maps, the site is located in Flood Zone 1 and is therefore considered to be at very low risk of flooding.

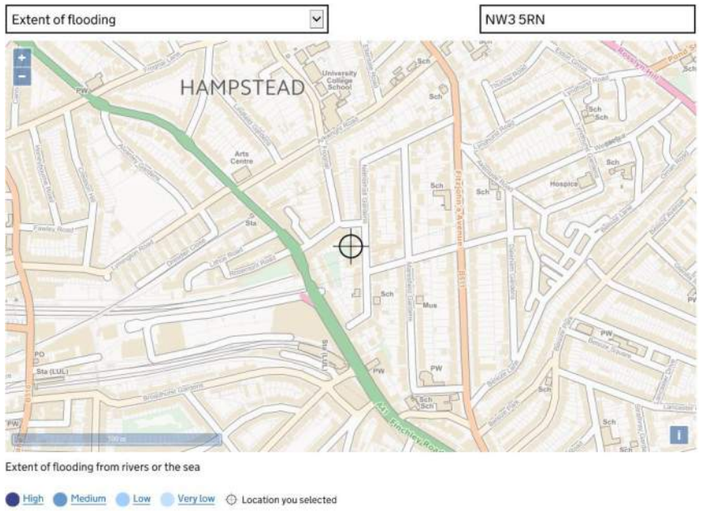

Figure 2: Planning flood map showing site is located within Flood Zone 1 (GOV.UK Flood Maps)

4.2 Groundwater Flooding

Groundwater flooding is affected by long periods of increased rainfall causing raising of the groundwater table. The London Borough of Camden SFRA states "Groundwater flooding usually occurs in low lying areas underlain by permeable rock and aquifers that allow groundwater to rise to the surface through the permeable subsoil following long periods of wet weather".

Groundwater was not encountered during the boring operations carried out in the site investigation by GEA in October 2018. Subsequent groundwater monitoring has shown that the boreholes were dry down to 30m. Therefore, the site is unlikely to be at risk from groundwater flooding.

4.3 Surface Water Flooding / Overland Flow

Surface water flooding may occur during intense or prolonged rainfall events where there is insufficient capacity within the existing drainage infrastructure which leads to overland flows.

Based on data from GOV.UK flood maps, the site is shown to be at very low risk from surface water flooding.

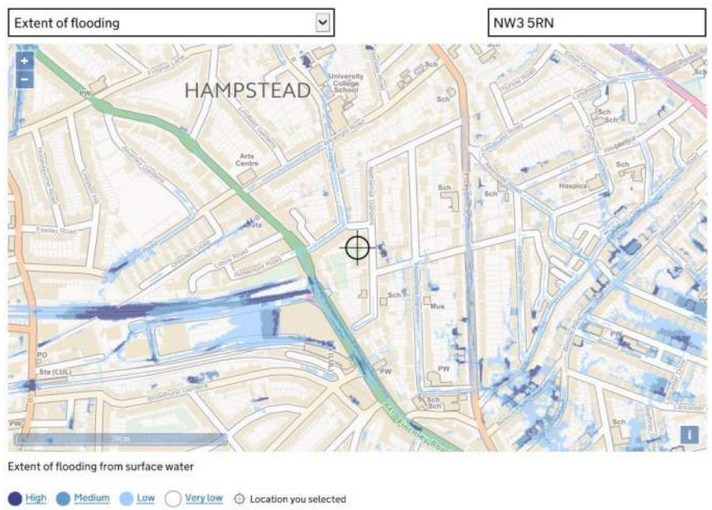

Figure 3: Planning flood map showing the site is at very low risk from surface water flooding (GOV.UK Flood Maps)

4.4 Infrastructure failure / Sewer Flooding

Sewer flooding is usually localised and short lived, it can be caused by intense rainfall events overloading the capacity of the sewer, blockages, poor maintenance or structural failure of sewers.

The London Borough of Camden SFRA DG5 Internal Sewer Flooding Map suggests that the site is located within an area where there have been no reported incidents of internal sewer flooding. As Thames Water are responsible for maintaining their sewer infrastructure, the likelihood of sewer flooding affecting the site is therefore expected to be low.

4.5 Flooding from Artificial Waterbodies

Following review of the Risk of Flooding from Reservoirs map located on the GOV.UK website, the site is not located within the flooding extent associated with reservoir flooding. The risk of flooding from reservoirs is therefore considered to be very low.

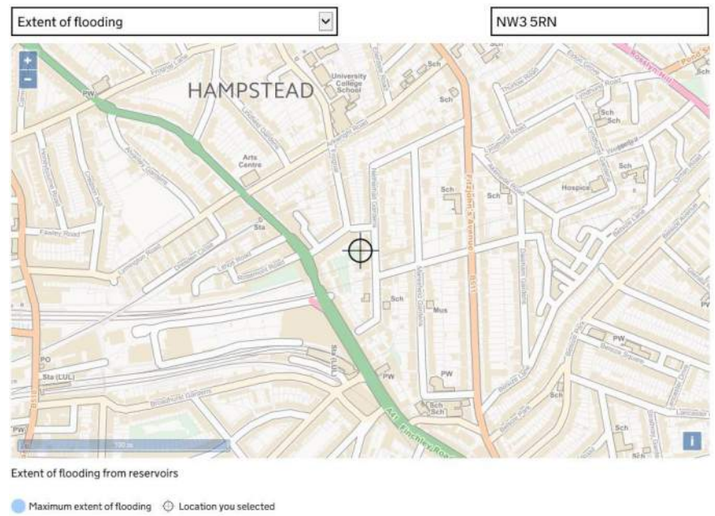

Figure 4: Planning flood map – Flood Risk from Reservoirs (GOV.UK Flood Maps)

Five
Development Proposals

5.1 Proposed Alterations

The proposed works involve underpinning the existing building creating a lower ground floor towards the front of the building and forming a new single storey basement and terrace towards the rear. It is also intended to remodel the upper levels of the building.

Figure 5: Proposed Basement Floor Layout

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Six

Existing Drainage

6.1 Thames Water Sewers

According to Thames water sewer records a 914x610 combined sewer is present within Netherhall Gardens. An extract of the Thames Water records is presented in Figure 6 and in full in **Appendix B.**

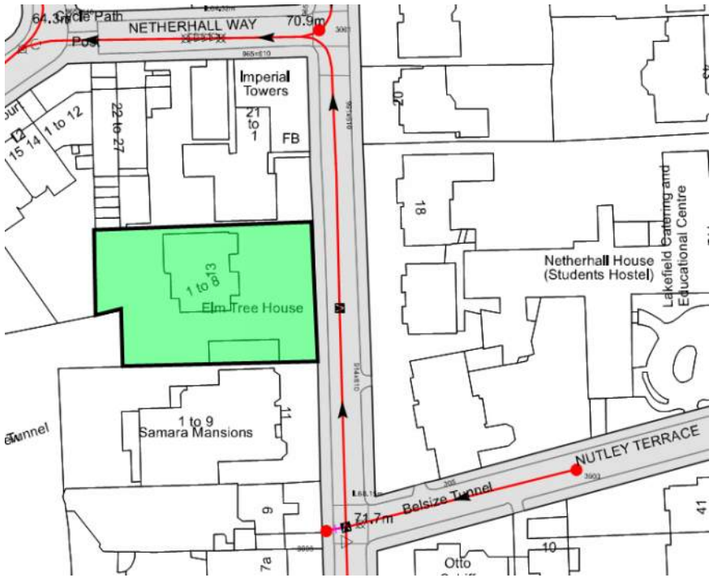

Figure 6: Thames Water Sewer Record Extract

6.2 CCTV Drainage Survey

A CCTV drainage survey was undertaken in September 2018 to prove the size, location, depth and condition of the existing site-wide private drainage and its connectivity to the Thames Water sewer.

The CCTV drainage survey proved that the overall site benefits from a 150mm diameter connection to the combined sewer in Netherhall Gardens.

Figure 7 illustrates the existing drainage arrangement on site.

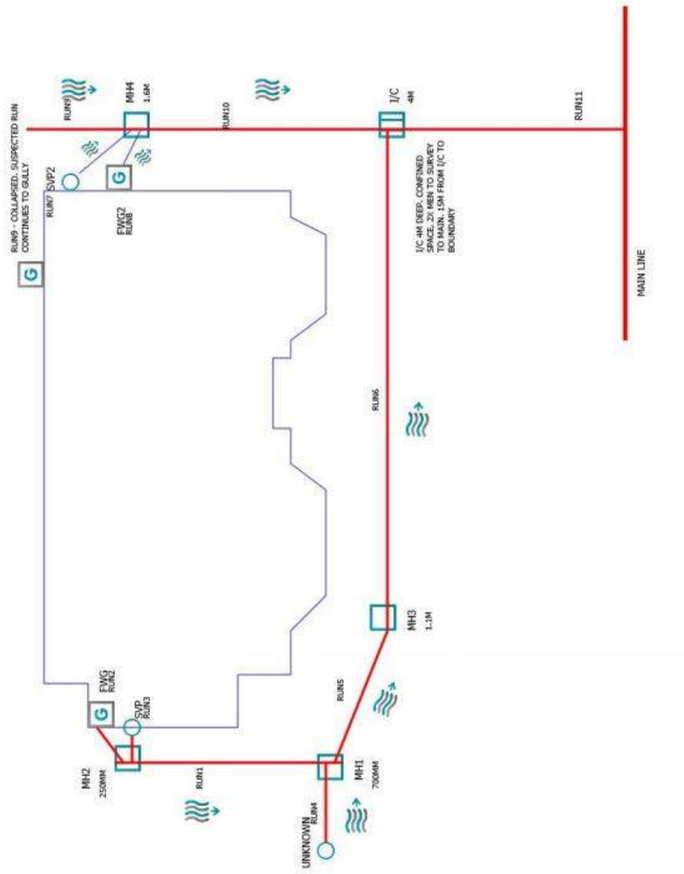

Figure 7: CCTV Drainage Survey Results Illustrating Existing Drainage Arrangement

6.3 Existing Surface Water Discharge Rate

Table 1 indicates, the existing drained area summary for the proposed redevelopment.

Table 1: Approximate Existing Drained Area Breakdown

	m^2	Hectares (ha)	% of site
Existing Building	290	0.029	76
Existing Hardstanding	40	0.004	11
Existing Soft Landscaping	50	0.005	13
Total	380	0.038	100

Using the modified rational method and the following average rainfall intensities, the existing surface water discharge rate can be calculated. The results are presented in Table 2.

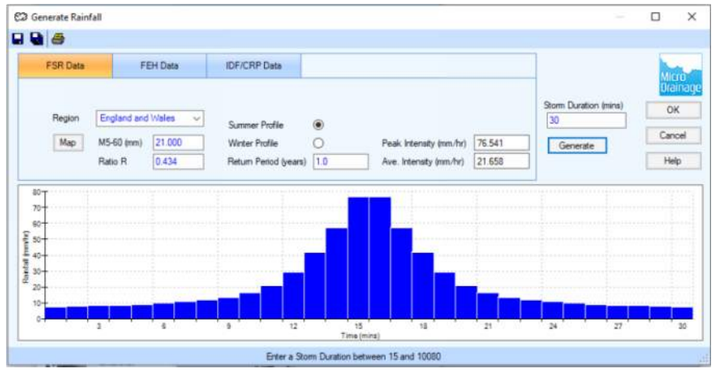

Figure 8: Rainfall intensity for the 1 in 1-year 30-minute storm event

Figure 9: Rainfall intensity for the 1 in 30-year 30-minute storm event

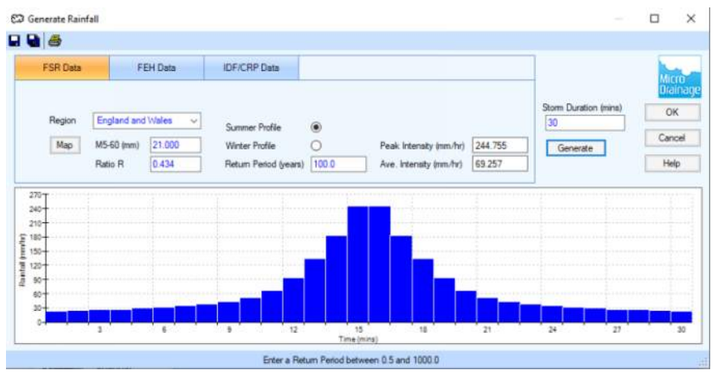

Figure 10: Rainfall intensity for the 1 in 100-year 30-minute storm event

Table 2: Existing Surface Water Run-off Rates

Return Period	Rate (l/s)
1 in 1-year event	1.9
1 in 30-year event	4.8
1 in 100-year event	6.3

Seven

Proposed Drainage

7.1 Proposed Discharge Rates and Drained Areas

The approximate drained area breakdown of the proposed development is summarised as follows:

Table 3: Approximate Proposed Drained Area Breakdown

	m^2	Hectares (ha)	% of site
Proposed Building	290	0.029	76
Proposed Hardstanding	40	0.004	11
Proposed soft landscaping (includes permeable lower terrace area)	50	0.005	13
Total	380	0.038	100

It can be seen from Table 3 that the proposed development has no change in the impermeable areas post development. This is due to the constrained nature of the site and the fact that the majority of the proposed works will be below the footprint of the existing building.

Greenfield run-off rates for the development site have been calculated using the ICP SuDS method, as indicated in Figure 11.

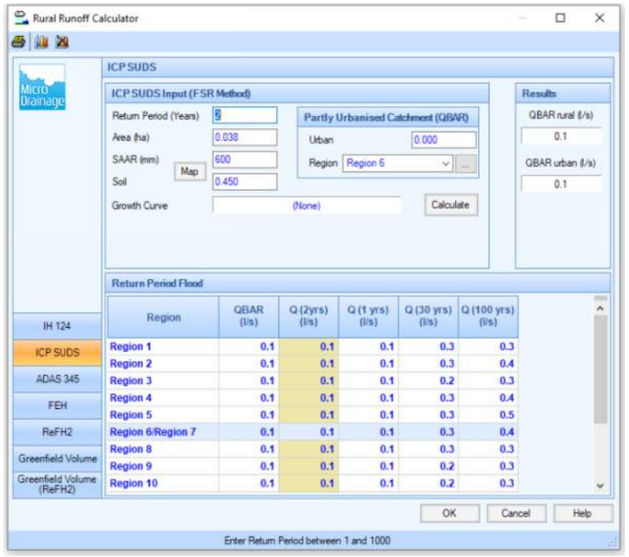

Figure 11: Micro Drainage ICP SuDS Greenfield Results

The resulting QBar rate is 0.1l/s based on a 0.038 hectare development site. This QBar rate is prohibitively low and it would not be possible to attenuate the development to this rate given the constrained nature of the site (the existing building occupies the majority of the redevelopment site). Due to these constraints and the fact that the existing building is currently positively drained by gravity, it is proposed to incorporate SuDS in the rear lower terrace only, where new external works are proposed.

As a result, the proposed surface water run-off rate for the redevelopment will remain unchanged.

7.2 SuDS Appraisal

The following drainage hierarchy has been considered when developing the surface water drainage philosophy for the proposed redevelopment.

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.

In line with this hierarchy, Table 4 details the SuDS techniques that have been considered suitable together with supporting rationale.

Table 4 – SuDS Evaluation

SUDS Technique	Y/N	Comment
Green Roofs	N	Green roofs are not considered feasible. The existing roofs are pitched and no alterations are proposed at roof level.
Rainwater reuse	N	Rainwater harvesting is not considered feasible on this development. However, it is proposed to use low flow water devices to reduce water consumption.
Infiltration devices	Y	It is proposed that the permeable surfacing for the rear basement terraces infiltrates into the underlying subsoils. However, to protect the basement from the risk of flooding, a high level overflow is proposed.
Permeable surfaces	Y	Permeable surfacing is proposed for the rear terraces at basement level.
Basins and ponds	N	The spatial configuration of the development prohibits the use of basins and ponds.
Filter strips and swales	N	The spatial configuration of the development prohibits the use of filter strips and swales.
Filter drains	N	The spatial configuration and the topography of the development prohibits the use of filter drains.
Tanked systems	N	The spatial configuration of the development prohibits the use of tanked systems.

Drawing numbered 2180456 EWP 00 B2 SK C 0800 presented in **Appendix C** illustrates the proposed Surface Water Drainage Strategy – Basement Level.

Due to the nature of the redevelopment works and various site constraints the only feasible SuDS options are to incorporate permeable paving in the rear terrace area at Basement level.

Eight

Maintenance Requirements

All SuDS will be maintained by the property owner for the lifetime of the development in accordance with the SUDS Manual as summarised below.

Permeable Surfaces

Maintenance	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

8.1 Drainage pipes, manholes & silt traps

Inspect manholes & silt traps for build-up of silt and general debris (minimum of 6 monthly or to suit site requirements). If silt/debris is building up then clean with jetting lorry / gully sucker and inspect pipe – repeat cleaning if required.

NOTE: Manhole covers can be heavy and suitable lifting equipment / procedures should be used. Where possible, personnel should not enter manholes to carry out maintenance.

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Appendices

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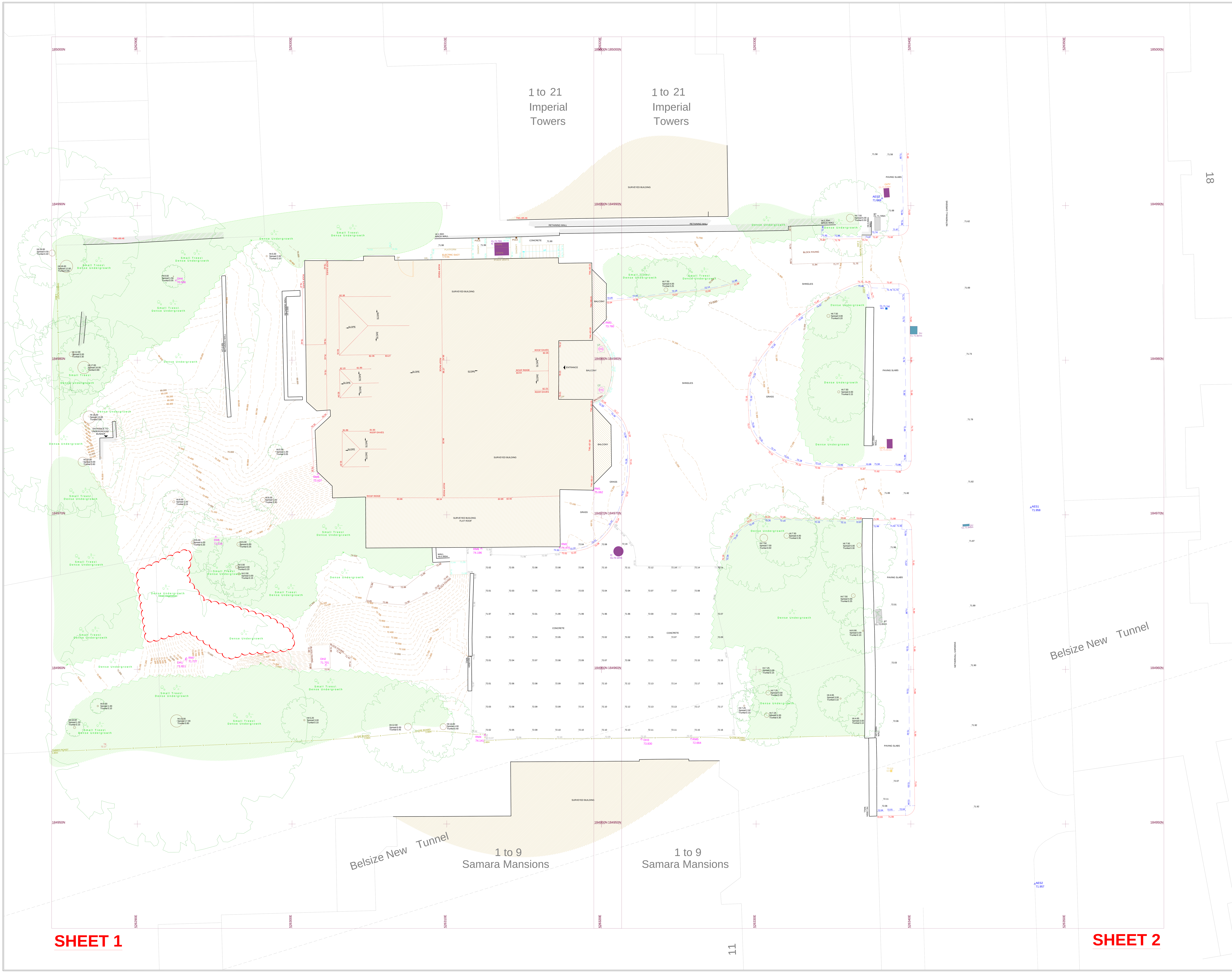
A Topographical Survey



Topographical Surveys

Trees are drawn to scale showing the average canopy spread.

Descriptions and heights should be used as a guide only.

Detail, services and features may not have been surveyed if obstructed or not reasonably visible at the time of the survey.

The contractor must check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work. Any errors or discrepancies must be notified to Apex Engineering Services immediately.

The accuracy of the digital data is commensurate with the RICS standards All dimensions are in meters unless otherwise stated.

The survey control listed is only to be used for topographical surveys at the stated scale. All control must be checked and verified prior to use. A true OSGB36 coordinate has been established near to the site center via a transformation using the OSTN15 & OSGM15 transformation models. The survey has been correlated to this point and a further one or more OSGB36 points established to create a true O.S. bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.

The indicated contour lines are with a spacing of 1m and 0.10m for intermediate contour lines.

The OS Map has been underlayed for reference and colored in gray. Licence number 100022432 and valid for 12 months from the date below.

This survey was carried out on 02.04.2018, 12.04.2018 and 26.04.218 using a Leica Totalstation 1200 Series and a Leica GNSS/GPS.

Do not scale from this drawing.

Legend:

- Balcony
- Block Paving
- Concrete Edge (CE)
- Electric Duct
- Fence (FE)
- Kerb (Top-Back)
- Kerb (Bottom-Front)
- ROOF RIDGE — Roof Ridge
- Steps (STP)
- Surveyed Building (lines)
- Wall (WL)
- Vegetation
- Column
- Kerb Cheese
- Tree
- Surveyed Building
- BT — BT Cover
- BOL — Bollard
- CATV — CATV
- GU — Gully (GU)
- GV — Gas Valve (GV)
- IC — Inspection Cover (IC)
- Vegetation
- WV — Water Valve (WV)
- Water Valve (WV)
- AES1 71.906 — Survey Control - PK Nail
- DH1 71.811 — Survey Control - Reflective Target

Survey Control Stations				
Point ID	Easting	Northing	Height	Description
AES1	526347.756	184970.474	71.906	PK Nail
AES2	526348.010	184946.126	71.957	PK Nail
AES3	526338.141	184990.473	71.669	PK Nail
DH1	526293.136	184960.678	71.811	Refl. Target
DH2	526302.193	184960.345	71.701	Refl. Target
DH3	526322.600	184955.549	73.830	Refl. Target
DH4	526292.507	184985.217	70.506	Refl. Target
DH5	526277.649	184957.751	70.247	Refl. Target
DH6	526295.082	184968.633	71.516	Refl. Target
RM1	526319.481	184971.633	75.062	Refl. Target
RM2	526317.322	184967.928	74.470	Refl. Target
RM3	526320.141	184982.466	73.760	Refl. Target
RM4	526312.469	184955.813	74.141	Refl. Target
RM5	526325.809	184955.567	72.664	Refl. Target
RM6	526312.250	184967.877	74.196	Refl. Target
RM7	526293.165	184960.774	71.727	Refl. Target
RM8	526301.694	184972.717	73.107	Refl. Target
DT1	526320.599	184975.929	74.280	Refl. Target
DT2	526317.301	184988.188	73.504	Refl. Target
DT3	526314.592	184987.943	73.945	Refl. Target
DT4	526317.376	184977.542	73.249	Refl. Target

REV	DATE	DESCRIPTION
0	18.04.2018	Original issue
1	27.04.2018	Trees added

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CLIENT
re-creo Architecture

PROJECT
13 Netherhall Gardens NW3 5RN

TITLE
Topographical Survey

SCALE	DATE	SURVEYED	DRAWN	QA REF
1:50@A0	27.04.2018	RM/DH/DT	T.A.	YB2704

Level datum	O.D.N. (Datum Newlyn)
Grid orientation	O.S. GB36 (15)
Job number	11845

Drawing No. *11845-TOPO-001* — Rev. *1*

Comments

This plan should only be used for its original purpose. Apex Engineering Services accepts no responsibility for this plan if supplied to any party other than the original client.

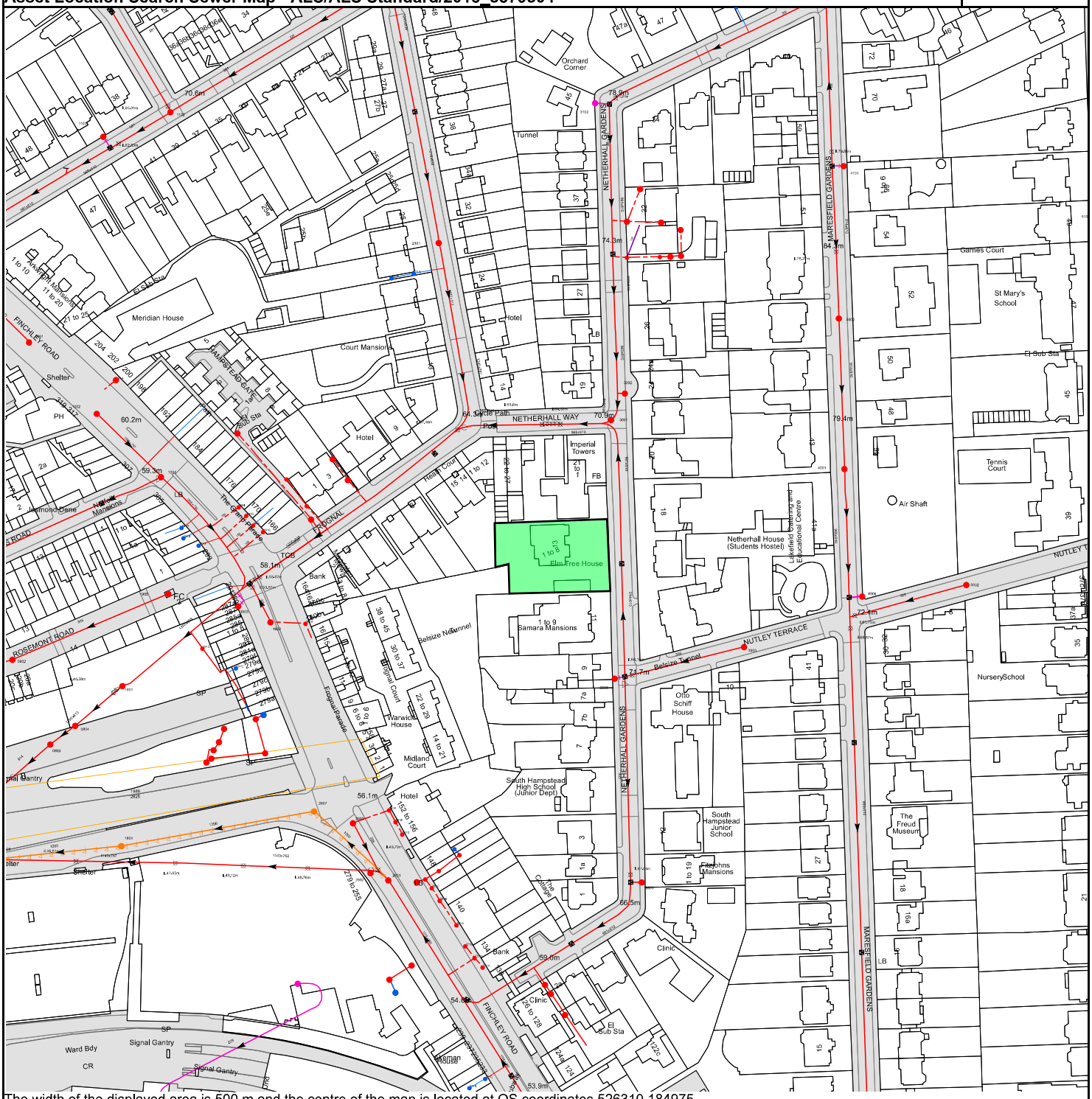
All dimensions should be checked on site prior to design and construction.

Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

DO NOT SCALE

B Thames Water Records

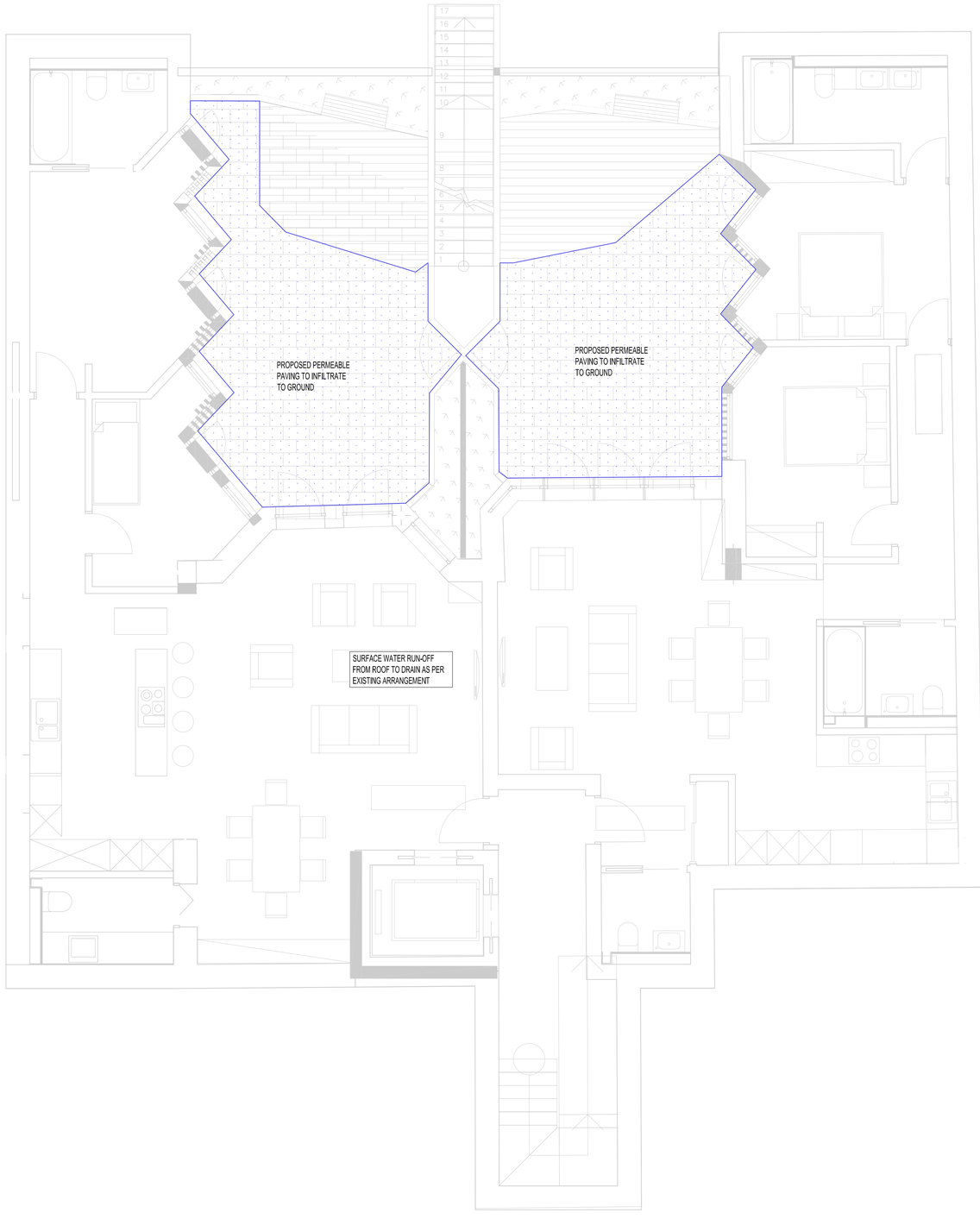
Asset Location Search Sewer Map - ALS/ALS Standard/2018_3879304



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 526310,184975

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

C Drainage Drawing



This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

Do not scale from this drawing.

LEGEND

- FOUL WATER MANHOLE
- SURFACE WATER MANHOLE
- PROPOSED FOUL WATER
- PROPOSED SURFACE WATER
- PROPOSED FOUL WATER PACKAGED PUMPING STATION
- PROPOSED FOUL WATER RISING MAIN
- PROPOSED THRESHOLD DRAIN WITH BRICK SLOT UPSTAND
- FOUL DROP POINT
- SVP SOIL VENT PIPE
- RWP RAIN WATER PIPE
- PROPOSED PERMEABLE PAVING

NOT FOR CONSTRUCTION

rev	date	by	chk	description
P2	19.08.21	TKe		Updated to suit latest layout.
P1	17.04.20	TKe		Issued for information

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Project

13 Netherhall Gardens,
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NW3 5RN

Drawing title

Proposed Surface Water Drainage Strategy - Basement Level

Scale (s)	Date	Drawn
1:50@ A1; 1:100@ A3	April 2020	TKe

Drawing status	Status	Revision
Preliminary	S2	P2

Project no.	Originator	Zone	Level	Type	Role	drg no.
2180456	EWP	00	B2	SK	C	0800

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