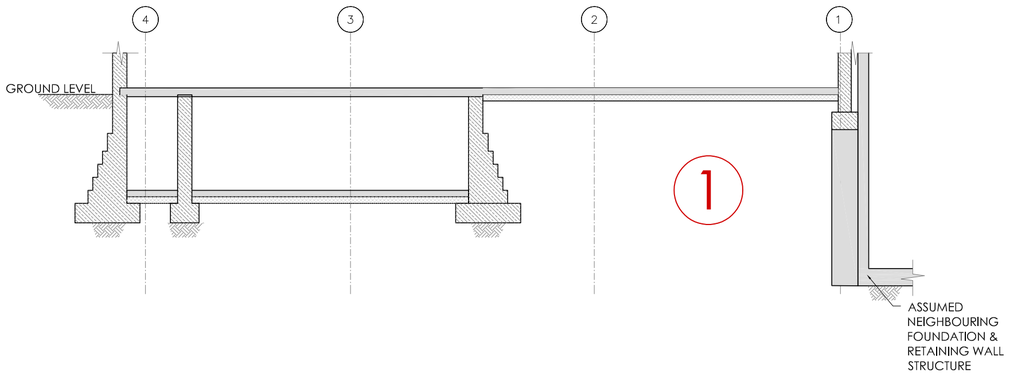
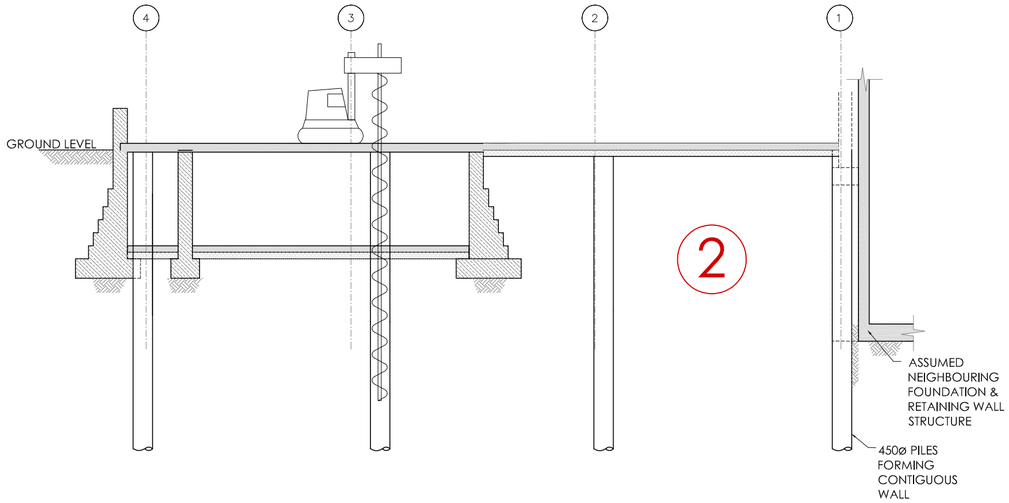


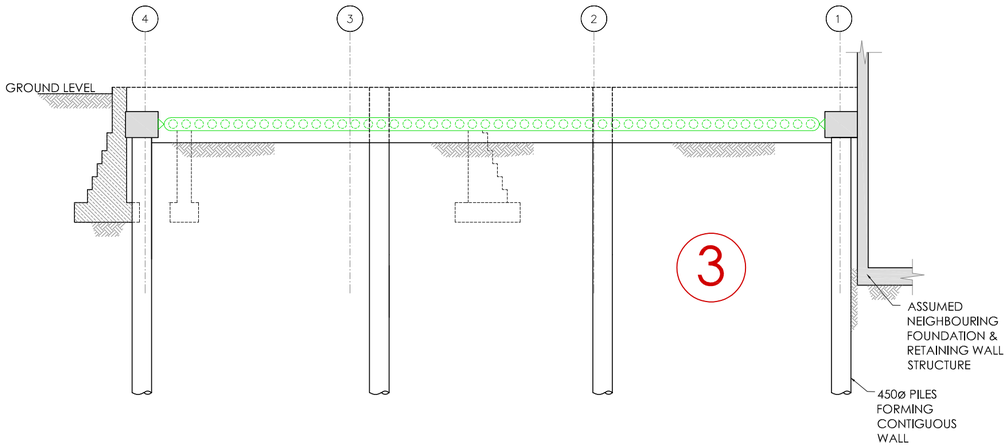


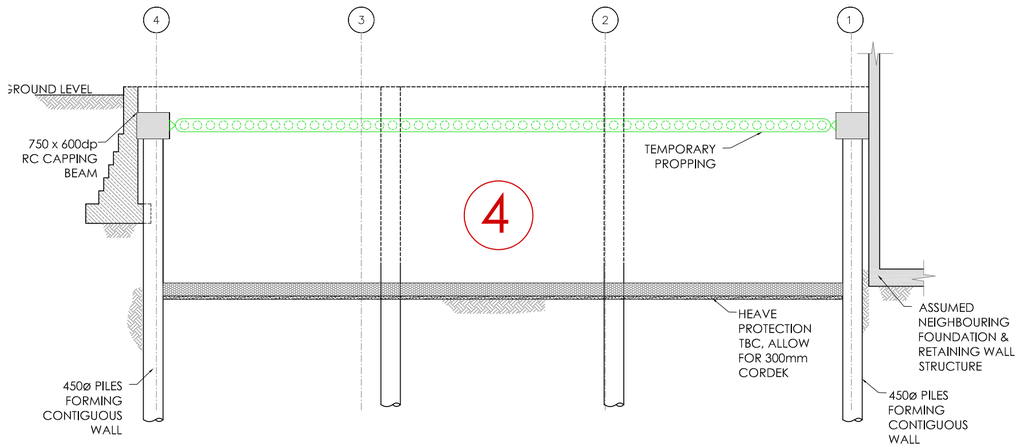
NOTES

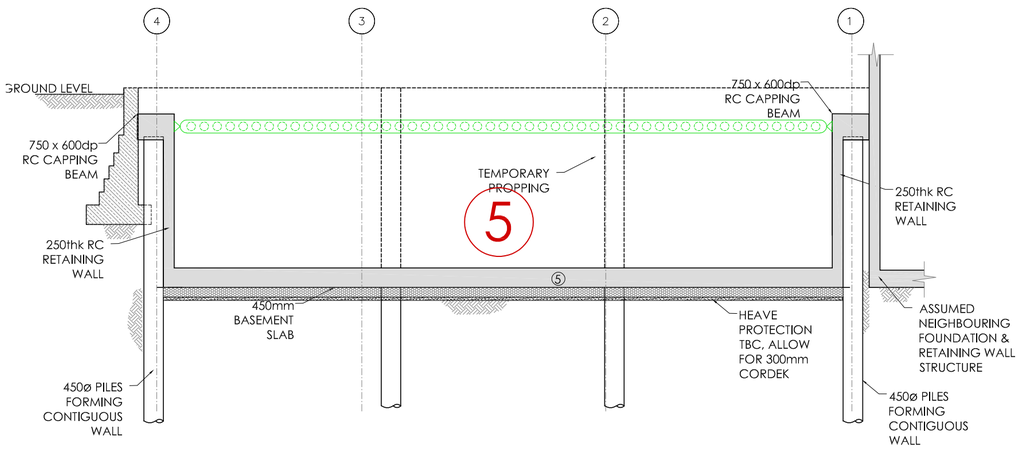
1. REFER TO ARCHITECTS DRAWINGS & SPECIFICATIONS FOR ALL WATERPROOFING, DPC, DPM, INSULATION, GAS MEMBRANE, VENTILATION, FLOOR BUILD UP FINISHES, CLADDING, FIRE PROTECTION, DOORS, WINDOWS, , LIGHTING, FINAL BWIC'S POSITIONS, NON LOAD BEARING WALLS, LANDSCAPING AND FINAL SETTING OUT / LEVELS. CCL HAVE NO DESIGN RESPONSIBILITY NOR LIABILITIES IN RESPECT OF THESE ELEMENTS.

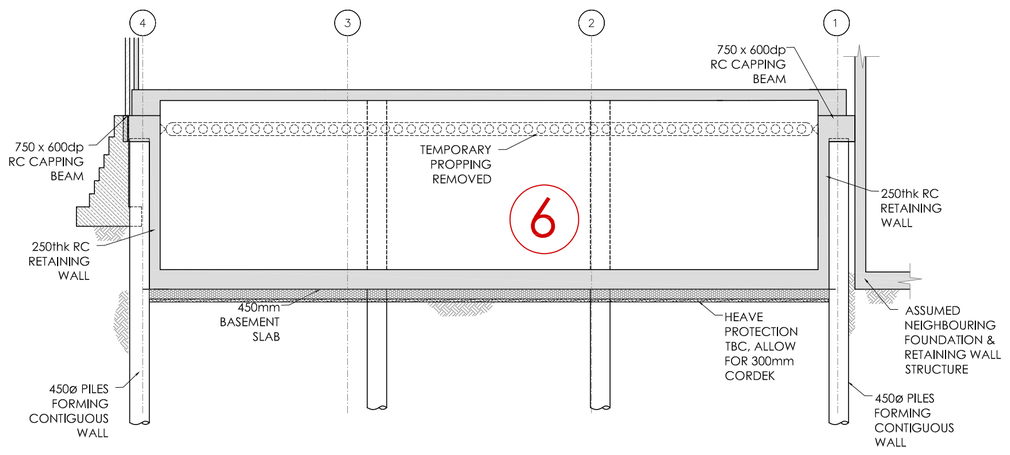
2. CDP - CONTRACTOR DESIGN PORTIONS FOR STRUCTURAL ELEMENTS -
   DELETERIOUS MATERIAL (e.g ASBESTOS)
   TEMPORARY WORKS
   (eg: shoring, shuttering, scaffolding, demolition, enabling works, temporary supports to main structure etc.)
   SPECIALIST STRUCTURAL ELEMENTS/ SECONDARY / PROPRIETARY SUPPORT SYSTEMS AND ANY COLD FORMED STEEL SYSTEMS
   (eg. precast and pre-stressed concrete elements, all non RC stair flights, landings, stringers, post & balustrade. Windposts, lintels, masonry support systems, curtain walling, cladding/ guide rails, glazing panels & purlins, MEP plant support systems)
   ALL STEEL-STEEL CONNECTIONS (based on CCL loads)
   CCL HAVE NO DESIGN RESPONSIBILITY NOR LIABILITIES IN RESPECT OF THESE ELEMENTS)

3. NEW COLUMNS, INNER BLOCK WALLS & UP TO BASEMENT RETAINING WALL OMITTED FOR CLARITY.









OUTLINE OF BASEMENT EXCAVATION & CONSTRUCTION SEQUENCE

(1)- MOBILISE AND SET UP ON SITE. DEMOLISH EXISTING SUPERSTRUCTURE AND FOUNDATIONS. BREAK OUT HOLES IN EXISTING GROUND FLOOR SLAB TO FACILITATE CFA PILING WORKS.

(2)- INSTALL PERIMETER PILES TO FORM CONTIGUOUS WALL. INSTALL CENTRAL PILES FOR BASEMENT SLAB SUPPORT.

(3)- EXCAVATE GROUND PARTIALLY AND INSTALL RC CAPPING BEAMS ALONG PERIMETER. THIS WILL ALLOW INSTALLATION OF TEMPORARY PROPPING TO SPECIALISTS DESIGN.

(4)- EXCAVATE GROUND DOWN TO BASEMENT SLAB FORMATION LEVEL AND BREAK OUT AND CUT CENTRAL PILES TO CUT OFF LEVEL. DEMOLISH EXISTING BASEMENT STRUCTURE AND INSTALL HEAVE PROTECTION.

(5)- CAST BASEMENT SLAB AND RETAINING WALL. TIE NEW RETAINING STRUCTURE BACK TO CONTIGUOUS PILED WALL/CAPPING BEAMS.

(6)- CAST GROUND FLOOR SLAB TO PERMANENTLY PROP RETAINING STRUCTURE THEREBY ALLOWING REMOVAL OF TEMPORARY PROPS.

Rev	Date	Description	By	Check	App.
P1	06.06.19	PRELIMINARY			

Client	DEMAR BVI LTD
Project	115-119 CAMDEN HIGH ST
Office	LONDON - 020 3077 0970
Title	SECTION B-B - BASEMENT CONSTRUCTION SEQUENCE
Scale @ A2	1:100
Status	PRELIMINARY

clancy consulting
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Originator	Job Number	Discipline	Building/Zone
CCL	28791		
Type	**Level**	**Drawing No.**	**Revision**
SKE		201	P1

Date of Print = Jun 06 2019. File Name = CCL-28791-009-Section A-A.dwg

Appendix D

Structural Calculations

RETAINING WALL ANALYSIS

In accordance with EN1997-1:2004 incorporating Corrigendum dated February 2009 and the UK National Annex incorporating Corrigendum No.1

Tedds calculation version 2.9.09

Retaining wall details

Stem type	Propped cantilever
Stem height	h_{stem} = **3600** mm
Prop height	h_{prop} = **3100** mm
Stem thickness	t_{stem} = **250** mm
Angle to rear face of stem	α = **90** deg
Stem density	γ_{stem} = **25** kN/m^3
Toe length	l_{toe} = **1000** mm
Base thickness	t_{base} = **450** mm
Base density	γ_{base} = **25** kN/m^3
Height of retained soil	h_{ret} = **3600** mm
Angle of soil surface	β = **0** deg
Depth of cover	d_{cover} = **0** mm
Height of water	h_{water} = **3000** mm
Water density	γ_w = **9.8** kN/m^3

Retained soil properties

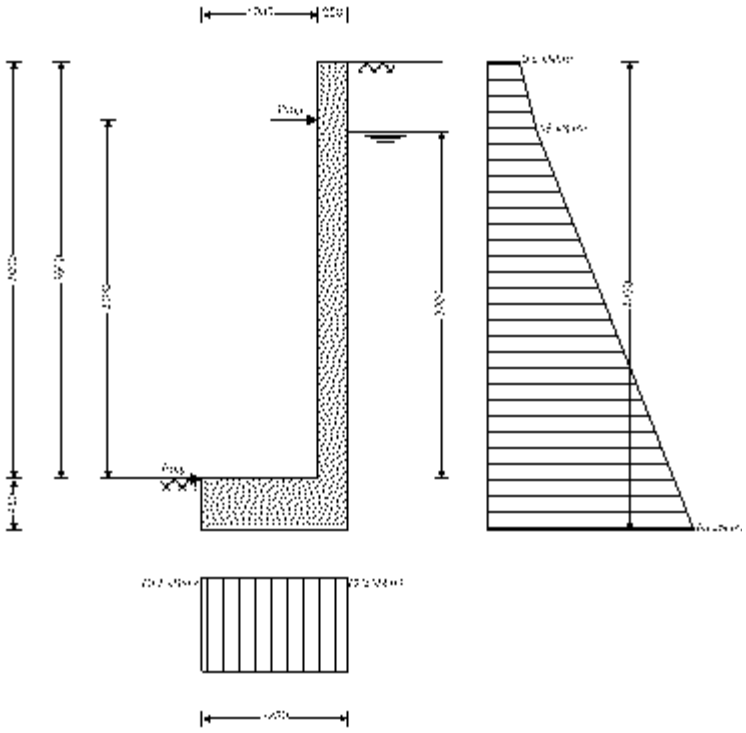
Soil type	Stiff clay
Moist density	γ_{mr} = **19** kN/m^3
Saturated density	γ_{sr} = **19** kN/m^3
Characteristic effective shear resistance angle	$\phi'_{r.k}$ = **18** deg
Characteristic wall friction angle	$\delta_{r.k}$ = **9** deg

Base soil properties

Soil type	Stiff clay
Soil density	γ_b = **19** kN/m^3
Characteristic effective shear resistance angle	$\phi'_{b.k}$ = **18** deg
Characteristic wall friction angle	$\delta_{b.k}$ = **9** deg
Characteristic base friction angle	$\delta_{bb.k}$ = **12** deg
Presumed bearing capacity	$P_{bearing}$ = **100** kN/m^2

Loading details

Permanent surcharge load	$Surcharge_G$ = **10** kN/m^2
Variable surcharge load	$Surcharge_Q$ = **10** kN/m^2



General arrangement

Calculate retaining wall geometry

Base length	$l_{base} = l_{toe} + t_{stem} =$ **1250** mm
Saturated soil height	$h_{sat} = h_{water} + d_{cover} =$ **3000** mm
Moist soil height	$h_{moist} = h_{ret} - h_{water} =$ **600** mm
Length of surcharge load	$l_{sur} = l_{heel} =$ **0** mm
- Distance to vertical component	$x_{sur\_v} = l_{base} - l_{heel} / 2 =$ **1250** mm
Effective height of wall	$h_{eff} = h_{base} + d_{cover} + h_{ret} =$ **4050** mm
- Distance to horizontal component	$x_{sur\_h} = h_{eff} / 2 =$ **2025** mm
Area of wall stem	$A_{stem} = h_{stem} \times t_{stem} =$ **0.9** m^2
- Distance to vertical component	$x_{stem} = l_{toe} + t_{stem} / 2 =$ **1125** mm
Area of wall base	$A_{base} = l_{base} \times t_{base} =$ **0.563** m^2
- Distance to vertical component	$x_{base} = l_{base} / 2 =$ **625** mm

Using Coulomb theory

Active pressure coefficient	$K_A = \sin(\alpha + \phi'_{r.k})^2 / (\sin(\alpha)^2 \times \sin(\alpha - \delta_{r.k}) \times [1 + \sqrt{[\sin(\phi'_{r.k} + \delta_{r.k}) \times \sin(\phi'_{r.k} - \beta) / (\sin(\alpha - \delta_{r.k}) \times \sin(\alpha + \beta))]}]^2) =$ **0.483**
Passive pressure coefficient	$K_P = \sin(90 - \phi'_{b.k})^2 / (\sin(90 + \delta_{b.k}) \times [1 - \sqrt{[\sin(\phi'_{b.k} + \delta_{b.k}) \times \sin(\phi'_{b.k}) / (\sin(90 + \delta_{b.k}))]}]^2) =$ **2.359**

Bearing pressure check

Vertical forces on wall

Wall stem	$F_{stem} = A_{stem} \times \gamma_{stem} =$ **22.5** kN/m
Wall base	$F_{base} = A_{base} \times \gamma_{base} =$ **14.1** kN/m

Total	$F_{total\_v} = F_{stem} + F_{base} + F_{water\_v} =$ **36.6** kN/m

Horizontal forces on wall

Surcharge load	$F_{sur\_h} = K_A \times \cos(\delta_{r.k}) \times (Surcharge_G + Surcharge_Q) \times h_{eff} =$ **38.6** kN/m
Saturated retained soil	$F_{sat\_h} = K_A \times \cos(\delta_{r.k}) \times (\gamma_{sr} - \gamma_w) \times (h_{sat} + h_{base})^2 / 2 =$ **26.1** kN/m
Water	$F_{water\_h} = \gamma_w \times (h_{water} + d_{cover} + h_{base})^2 / 2 =$ **58.4** kN/m
Moist retained soil	$F_{moist\_h} = K_A \times \cos(\delta_{r.k}) \times \gamma_{mr} \times ((h_{eff} - h_{sat} - h_{base})^2 / 2 + (h_{eff} - h_{sat} - h_{base}) \times (h_{sat} + h_{base})) =$ **20.4** kN/m
Base soil	$F_{pass\_h} = -K_P \times \cos(\delta_{b.k}) \times \gamma_b \times (d_{cover} + h_{base})^2 / 2 =$ **-4.5** kN/m
Total	$F_{total\_h} = F_{sur\_h} + F_{sat\_h} + F_{water\_h} + F_{moist\_h} + F_{pass\_h} =$ **139** kN/m

Moments on wall

Wall stem	$M_{stem} = F_{stem} \times x_{stem} =$ **25.3** kNm/m
Wall base	$M_{base} = F_{base} \times x_{base} =$ **8.8** kNm/m
Surcharge load	$M_{sur} = -F_{sur\_h} \times x_{sur\_h} =$ **-78.3** kNm/m
Saturated retained soil	$M_{sat} = -F_{sat\_h} \times x_{sat\_h} =$ **-30** kNm/m
Water	$M_{water} = -F_{water\_h} \times x_{water\_h} =$ **-67.1** kNm/m
Moist retained soil	$M_{moist} = -F_{moist\_h} \times x_{moist\_h} =$ **-38.3** kNm/m
Total	$M_{total} = M_{stem} + M_{base} + M_{sur} + M_{sat} + M_{water} + M_{moist} =$ **-179.6** kNm/m

Check bearing pressure

Propping force to stem	$F_{prop\_stem} = (F_{total\_v} \times l_{base} / 2 - M_{total}) / (h_{prop} + t_{base}) =$ **57** kN/m
Propping force to base	$F_{prop\_base} = F_{total\_h} - F_{prop\_stem} =$ **82** kN/m
Moment from propping force	$M_{prop} = F_{prop\_stem} \times (h_{prop} + t_{base}) =$ **202.5** kNm/m
Distance to reaction	$\bar{x} = (M_{total} + M_{prop}) / F_{total\_v} =$ **625** mm
Eccentricity of reaction	$e = \bar{x} - l_{base} / 2 =$ **0** mm
Loaded length of base	$l_{load} = l_{base} =$ **1250** mm
Bearing pressure at toe	$q_{toe} = F_{total\_v} / l_{base} \times (1 - 6 \times e / l_{base}) =$ **29.3** kN/m^2
Bearing pressure at heel	$q_{heel} = F_{total\_v} / l_{base} \times (1 + 6 \times e / l_{base}) =$ **29.3** kN/m^2
Factor of safety	$FoS_{bp} = P_{bearing} / \max(q_{toe}, q_{heel}) =$ **3.419**

PASS - Allowable bearing pressure exceeds maximum applied bearing pressure

RETAINING WALL DESIGN

In accordance with EN1992-1-1:2004 incorporating Corrigendum dated January 2008 and the UK National Annex incorporating National Amendment No.1

Tedds calculation version 2.9.09

Concrete details - Table 3.1 - Strength and deformation characteristics for concrete

Concrete strength class	C30/37
Characteristic compressive cylinder strength	$f_{ck} =$ **30** N/mm^2
Characteristic compressive cube strength	$f_{ck,cube} =$ **37** N/mm^2
Mean value of compressive cylinder strength	$f_{cm} = f_{ck} + 8$ N/mm^2 = **38** N/mm^2
Mean value of axial tensile strength	$f_{ctm} = 0.3$ N/mm^2 $\times (f_{ck} /$ 1 N/mm$^2)^{2/3} =$ **2.9** N/mm^2
5% fractile of axial tensile strength	$f_{ctk,0.05} = 0.7 \times f_{ctm} =$ **2.0** N/mm^2
Secant modulus of elasticity of concrete	$E_{cm} = 22$ kN/mm^2 $\times (f_{cm} /$ 10 N/mm$^2)^{0.3} =$ **32837** N/mm^2
Partial factor for concrete - Table 2.1N	$\gamma_C =$ **1.50**
Compressive strength coefficient - cl.3.1.6(1)	$\alpha_{cc} =$ **0.85**
Design compressive concrete strength - exp.3.15	$f_{cd} = \alpha_{cc} \times f_{ck} / \gamma_C =$ **17.0** N/mm^2
Maximum aggregate size	$h_{agg} =$ **20** mm

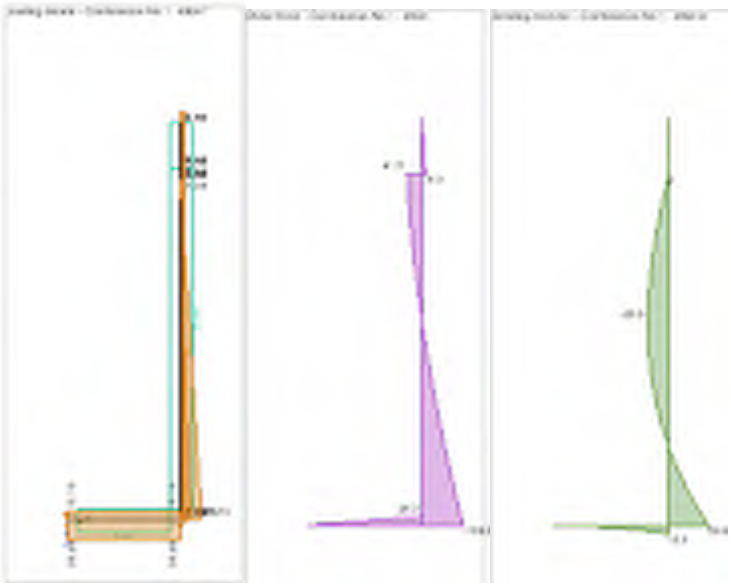
Ultimate strain - Table 3.1	ε_{cu2} = **0.0035**
Shortening strain - Table 3.1	ε_{cu3} = **0.0035**
Effective compression zone height factor	λ = **0.80**
Effective strength factor	η = **1.00**
Bending coefficient k_1	K_1 = **0.40**
Bending coefficient k_2	$K_2 = 1.00 \times (0.6 + 0.0014/\varepsilon_{cu2})$ = **1.00**
Bending coefficient k_3	K_3 =**0.40**
Bending coefficient k_4	$K_4 = 1.00 \times (0.6 + 0.0014/\varepsilon_{cu2})$ =**1.00**

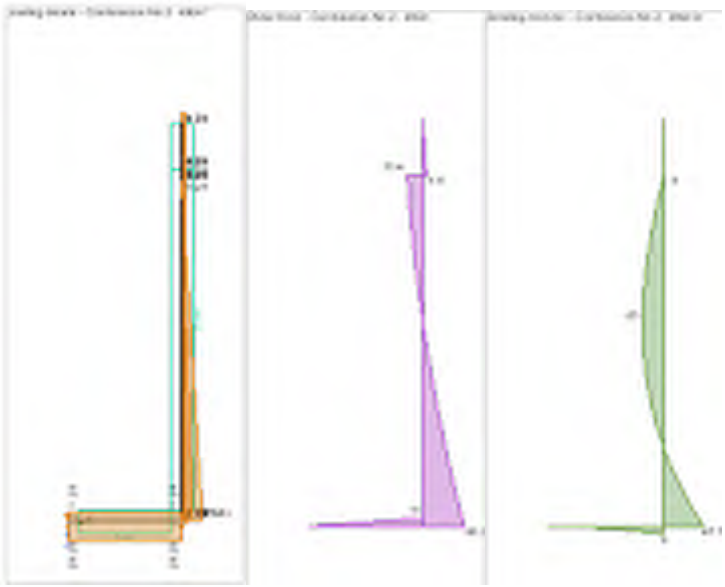
Reinforcement details

Characteristic yield strength of reinforcement	f_{yk} = **500** N/mm^2
Modulus of elasticity of reinforcement	E_s = **200000** N/mm^2
Partial factor for reinforcing steel - Table 2.1N	γ_S = **1.15**
Design yield strength of reinforcement	$f_{yd} = f_{yk} / \gamma_S$ = **435** N/mm^2

Cover to reinforcement

Front face of stem	c_{sf} = **40** mm
Rear face of stem	c_{sr} = **50** mm
Top face of base	c_{bt} = **50** mm
Bottom face of base	c_{bb} = **75** mm





Check stem design at 1787 mm

Depth of section — h = **250** mm

Rectangular section in flexure - Section 6.1

Design bending moment combination 1 — M = **28.9** kNm/m

Depth to tension reinforcement — $d = h - c_{sf} - \phi_{sx} - \phi_{sfM} / 2 =$ **194** mm

$K = M / (d^2 \times f_{ck}) =$ **0.026**

$K' = (2 \times \eta \times \alpha_{cc}/\gamma_C)\times(1 - \lambda \times (\delta - K_1)/(2 \times K_2))\times(\lambda \times (\delta - K_1)/(2 \times K_2))$

K' = **0.207**

K' > K - No compression reinforcement is required

Lever arm — $z = \min(0.5 + 0.5 \times (1 - 2 \times K / (\eta \times \alpha_{cc} / \gamma_C))^{0.5}, 0.95) \times d =$ **184** mm

Depth of neutral axis — $x = 2.5 \times (d - z) =$ **24** mm

Area of tension reinforcement required — $A_{sfM.req} = M / (f_{yd} \times z) =$ **360** mm²/m

Tension reinforcement provided — 12 dia.bars @ 200 c/c

Area of tension reinforcement provided — $A_{sfM.prov} = \pi \times \phi_{sfM}^2 / (4 \times s_{sfM}) =$ **565** mm²/m

Minimum area of reinforcement - exp.9.1N — $A_{sfM.min} = \max(0.26 \times f_{ctm} / f_{yk}, 0.0013) \times d =$ **292** mm²/m

Maximum area of reinforcement - cl.9.2.1.1(3) — $A_{sfM.max} = 0.04 \times h =$ **10000** mm²/m

$\max(A_{sfM.req}, A_{sfM.min}) / A_{sfM.prov} =$ **0.637**

PASS - Area of reinforcement provided is greater than area of reinforcement required

Library item: Rectangular single output

Deflection control - Section 7.4

Reference reinforcement ratio — $\rho_0 = \sqrt{(f_{ck} / 1\ N/mm^2)} / 1000 =$ **0.005**

Required tension reinforcement ratio — $\rho = A_{sfM.req} / d =$ **0.002**

Required compression reinforcement ratio — $\rho' = A_{sfM.2.req} / d_2 =$ **0.000**

Structural system factor - Table 7.4N — $K_b =$ **1**

Reinforcement factor - exp.7.17 — $K_s = \min(500\ N/mm^2 / (f_{yk} \times A_{sfM.req} / A_{sfM.prov}), 1.5) =$ **1.5**

Limiting span to depth ratio - exp.7.16.a — $\min(K_s \times K_b \times [11 + 1.5 \times \sqrt{(f_{ck} / 1\ N/mm^2)} \times \rho_0 / \rho + 3.2 \times \sqrt{(f_{ck} / 1\ N/mm^2)} \times (\rho_0 / \rho - 1)^{3/2}], 40 \times K_b) =$ **40**

Actual span to depth ratio — $h_{prop} / d =$ **16**

PASS - Span to depth ratio is less than deflection control limit

Crack control - Section 7.3

Limiting crack width	w_{max} = **0.3** mm
Variable load factor - EN1990 – Table A1.1	ψ_2 = **0.6**
Serviceability bending moment	M_{sls} = **19.9** kNm/m
Tensile stress in reinforcement	$\sigma_s = M_{sls} / (A_{sfM.prov} \times z)$ = **190.8** N/mm²
Load duration	Long term
Load duration factor	k_t = **0.4**
Effective area of concrete in tension	$A_{c.eff}$ = min(2.5 × (h - d), (h - x) / 3, h / 2)
	$A_{c.eff}$ = **75250** mm²/m
Mean value of concrete tensile strength	$f_{ct.eff} = f_{ctm}$ = **2.9** N/mm²
Reinforcement ratio	$\rho_{p.eff} = A_{sfM.prov} / A_{c.eff}$ = **0.008**
Modular ratio	$\alpha_e = E_s / E_{cm}$ = **6.091**
Bond property coefficient	k_1 = **0.8**
Strain distribution coefficient	k_2 = **0.5**
	k_3 = **3.4**
	k_4 = **0.425**
Maximum crack spacing - exp.7.11	$s_{r.max} = k_3 \times c_{sf} + k_1 \times k_2 \times k_4 \times \phi_{sfM} / \rho_{p.eff}$ = **407** mm
Maximum crack width - exp.7.8	$w_k = s_{r.max} \times \max(\sigma_s - k_t \times (f_{ct.eff} / \rho_{p.eff}) \times (1 + \alpha_e \times \rho_{p.eff}), 0.6 \times \sigma_s) / E_s$
	w_k = **0.233** mm
	w_k / w_{max} = **0.777**
	PASS - Maximum crack width is less than limiting crack width

Check stem design at base of stem

Depth of section	h = **250** mm

Rectangular section in flexure - Section 6.1

Design bending moment combination 1	M = **59.9** kNm/m
Depth to tension reinforcement	$d = h - c_{sr} - \phi_{sr} / 2$ = **192** mm
	$K = M / (d^2 \times f_{ck})$ = **0.054**
	$K' = (2 \times \eta \times \alpha_{cc}/\gamma_c) \times (1 - \lambda \times (\delta - K_1)/(2 \times K_2)) \times (\lambda \times (\delta - K_1)/(2 \times K_2))$
	K' = **0.207**
	K' > K - No compression reinforcement is required
Lever arm	$z = \min(0.5 + 0.5 \times (1 - 2 \times K / (\eta \times \alpha_{cc} / \gamma_c))^{0.5}, 0.95) \times d$ = **182** mm
Depth of neutral axis	$x = 2.5 \times (d - z)$ = **24** mm
Area of tension reinforcement required	$A_{sr.req} = M / (f_{yd} \times z)$ = **756** mm²/m
Tension reinforcement provided	16 dia.bars @ 150 c/c
Area of tension reinforcement provided	$A_{sr.prov} = \pi \times \phi_{sr}^2 / (4 \times s_{sr})$ = **1340** mm²/m
Minimum area of reinforcement - exp.9.1N	$A_{sr.min} = \max(0.26 \times f_{ctm} / f_{yk}, 0.0013) \times d$ = **289** mm²/m
Maximum area of reinforcement - cl.9.2.1.1(3)	$A_{sr.max} = 0.04 \times h$ = **10000** mm²/m
	$\max(A_{sr.req}, A_{sr.min}) / A_{sr.prov}$ = **0.564**

PASS - Area of reinforcement provided is greater than area of reinforcement required

Library item: Rectangular single output

Deflection control - Section 7.4

Reference reinforcement ratio	$\rho_0 = \sqrt{(f_{ck} / 1\ N/mm^2)} / 1000$ = **0.005**
Required tension reinforcement ratio	$\rho = A_{sr.req} / d$ = **0.004**
Required compression reinforcement ratio	$\rho' = A_{sr.2.req} / d_2$ = **0.000**
Structural system factor - Table 7.4N	K_b = **1**
Reinforcement factor - exp.7.17	$K_s = \min(500\ N/mm^2 / (f_{yk} \times A_{sr.req} / A_{sr.prov}), 1.5)$ = **1.5**

Limiting span to depth ratio - exp.7.16.a	$\min(K_s \times K_b \times [11 + 1.5 \times \sqrt{(f_{ck} / 1\ N/mm^2)} \times \rho_0 / \rho + 3.2 \times \sqrt{(f_{ck} / 1\ N/mm^2)} \times (\rho_0 / \rho - 1)^{3/2}], 40 \times K_b) =$ **40**
Actual span to depth ratio	$h_{prop} / d =$ **16.1**
	PASS - Span to depth ratio is less than deflection control limit
Crack control - Section 7.3	
Limiting crack width	$w_{max} =$ **0.3** mm
Variable load factor - EN1990 – Table A1.1	$\psi_2 =$ **0.6**
Serviceability bending moment	$M_{sls} =$ **41.6** kNm/m
Tensile stress in reinforcement	$\sigma_s = M_{sls} / (A_{sr.prov} \times z) =$ **170.3** N/mm^2
Load duration	Long term
Load duration factor	$k_t =$ **0.4**
Effective area of concrete in tension	$A_{c.eff} = \min(2.5 \times (h - d), (h - x) / 3, h / 2)$
	$A_{c.eff} =$ **75277** mm^2/m
Mean value of concrete tensile strength	$f_{ct.eff} = f_{ctm} =$ **2.9** N/mm^2
Reinforcement ratio	$\rho_{p.eff} = A_{sr.prov} / A_{c.eff} =$ **0.018**
Modular ratio	$\alpha_e = E_s / E_{cm} =$ **6.091**
Bond property coefficient	$k_1 =$ **0.8**
Strain distribution coefficient	$k_2 =$ **0.5**
	$k_3 =$ **3.4**
	$k_4 =$ **0.425**
Maximum crack spacing - exp.7.11	$s_{r.max} = k_3 \times c_{sr} + k_1 \times k_2 \times k_4 \times \phi_{sr} / \rho_{p.eff} =$ **323** mm
Maximum crack width - exp.7.8	$w_k = s_{r.max} \times \max(\sigma_s - k_t \times (f_{ct.eff} / \rho_{p.eff}) \times (1 + \alpha_e \times \rho_{p.eff}), 0.6 \times \sigma_s) / E_s$
	$w_k =$ **0.165** mm
	$w_k / w_{max} =$ **0.55**
	PASS - Maximum crack width is less than limiting crack width
Rectangular section in shear - Section 6.2	
Design shear force	V = **109.6** kN/m
	$C_{Rd,c} = 0.18 / \gamma_C =$ **0.120**
	$k = \min(1 + \sqrt{(200\ mm / d)}, 2) =$ **2.000**
Longitudinal reinforcement ratio	$\rho_l = \min(A_{sr.prov} / d, 0.02) =$ **0.007**
	$v_{min} = 0.035\ N^{1/2}/mm \times k^{3/2} \times f_{ck}^{0.5} =$ **0.542** N/mm^2
Design shear resistance - exp.6.2a & 6.2b	$V_{Rd.c} = \max(C_{Rd.c} \times k \times (100\ N^2/mm^4 \times \rho_l \times f_{ck})^{1/3}, v_{min}) \times d$
	$V_{Rd.c} =$ **127** kN/m
	$V / V_{Rd.c} =$ **0.863**
	PASS - Design shear resistance exceeds design shear force
Check stem design at prop	
Depth of section	h = **250** mm
Rectangular section in flexure - Section 6.1	
Design bending moment combination 1	M = **2** kNm/m
Depth to tension reinforcement	$d = h - c_{sr} - \phi_{sr1} / 2 =$ **194** mm
	$K = M / (d^2 \times f_{ck}) =$ **0.002**
	$K' = (2 \times \eta \times \alpha_{cc}/\gamma_C) \times (1 - \lambda \times (\delta - K_1)/(2 \times K_2)) \times (\lambda \times (\delta - K_1)/(2 \times K_2))$
	K' = **0.207**
	K' > K - No compression reinforcement is required
Lever arm	$z = \min(0.5 + 0.5 \times (1 - 2 \times K / (\eta \times \alpha_{cc} / \gamma_C))^{0.5}, 0.95) \times d =$ **184** mm

Depth of neutral axis	$x = 2.5 \times (d - z) =$ **24** mm
Area of tension reinforcement required	$A_{sr1.req} = M / (f_{yd} \times z) =$ **24** mm²/m
Tension reinforcement provided	12 dia.bars @ 200 c/c
Area of tension reinforcement provided	$A_{sr1.prov} = \pi \times \phi_{sr1}^2 / (4 \times s_{sr1}) =$ **565** mm²/m
Minimum area of reinforcement - exp.9.1N	$A_{sr1.min} = \max(0.26 \times f_{ctm} / f_{yk}, 0.0013) \times d =$ **292** mm²/m
Maximum area of reinforcement - cl.9.2.1.1(3)	$A_{sr1.max} = 0.04 \times h =$ **10000** mm²/m
	$\max(A_{sr1.req}, A_{sr1.min}) / A_{sr1.prov} =$ **0.517**

PASS - Area of reinforcement provided is greater than area of reinforcement required

Library item: Rectangular single output

Deflection control - Section 7.4

Reference reinforcement ratio	$\rho_0 = \sqrt{(f_{ck} / 1\ N/mm^2)} / 1000 =$ **0.005**
Required tension reinforcement ratio	$\rho = A_{sr1.req} / d =$ **0.000**
Required compression reinforcement ratio	$\rho' = A_{sr1.2.req} / d_2 =$ **0.000**
Structural system factor - Table 7.4N	$K_b =$ **0.4**
Reinforcement factor - exp.7.17	$K_s = \min(500\ N/mm^2 / (f_{yk} \times A_{sr1.req} / A_{sr1.prov}), 1.5) =$ **1.5**
Limiting span to depth ratio - exp.7.16.a	$\min(K_s \times K_b \times [11 + 1.5 \times \sqrt{(f_{ck} / 1\ N/mm^2)} \times \rho_0 / \rho + 3.2 \times \sqrt{(f_{ck} / 1\ N/mm^2)} \times (\rho_0 / \rho - 1)^{3/2}], 40 \times K_b) =$ **16**
Actual span to depth ratio	$(h_{stem} - h_{prop}) / d =$ **2.6**

PASS - Span to depth ratio is less than deflection control limit

Crack control - Section 7.3

Limiting crack width	$w_{max} =$ **0.3** mm
Variable load factor - EN1990 – Table A1.1	$\psi_2 =$ **0.6**
Serviceability bending moment	$M_{sls} =$ **1.1** kNm/m
Tensile stress in reinforcement	$\sigma_s = M_{sls} / (A_{sr1.prov} \times z) =$ **10.9** N/mm²
Load duration	Long term
Load duration factor	$k_t =$ **0.4**
Effective area of concrete in tension	$A_{c.eff} = \min(2.5 \times (h - d), (h - x) / 3, h / 2)$
	$A_{c.eff} =$ **75250** mm²/m
Mean value of concrete tensile strength	$f_{ct.eff} = f_{ctm} =$ **2.9** N/mm²
Reinforcement ratio	$\rho_{p.eff} = A_{sr1.prov} / A_{c.eff} =$ **0.008**
Modular ratio	$\alpha_e = E_s / E_{cm} =$ **6.091**
Bond property coefficient	$k_1 =$ **0.8**
Strain distribution coefficient	$k_2 =$ **0.5**
	$k_3 =$ **3.4**
	$k_4 =$ **0.425**
Maximum crack spacing - exp.7.11	$s_{r.max} = k_3 \times c_{sr} + k_1 \times k_2 \times k_4 \times \phi_{sr1} / \rho_{p.eff} =$ **441** mm
Maximum crack width - exp.7.8	$w_k = s_{r.max} \times \max(\sigma_s - k_t \times (f_{ct.eff} / \rho_{p.eff}) \times (1 + \alpha_e \times \rho_{p.eff}), 0.6 \times \sigma_s) / E_s$
	$w_k =$ **0.014** mm
	$w_k / w_{max} =$ **0.048**

PASS - Maximum crack width is less than limiting crack width

Rectangular section in shear - Section 6.2

Design shear force	$V =$ **41.5** kN/m
	$C_{Rd,c} = 0.18 / \gamma_C =$ **0.120**
	$k = \min(1 + \sqrt{(200\ mm / d)}, 2) =$ **2.000**
Longitudinal reinforcement ratio	$\rho_l = \min(A_{sr1.prov} / d, 0.02) =$ **0.003**
	$v_{min} = 0.035\ N^{1/2}/mm \times k^{3/2} \times f_{ck}^{0.5} =$ **0.542** N/mm²

Design shear resistance - exp.6.2a & 6.2b	$V_{Rd.c} = \max(C_{Rd.c} \times k \times (100\ N^2/mm^4 \times \rho_l \times f_{ck})^{1/3}, v_{min}) \times d$
	$V_{Rd.c}$ = **105.2** kN/m
	$V / V_{Rd.c}$ = **0.395**
	PASS - Design shear resistance exceeds design shear force

Horizontal reinforcement parallel to face of stem - Section 9.6

Minimum area of reinforcement – cl.9.6.3(1)	$A_{sx.req} = \max(0.25 \times A_{sr.prov}, 0.001 \times t_{stem})$ = **335** mm²/m
Maximum spacing of reinforcement – cl.9.6.3(2)	s_{sx_max} = **400** mm
Transverse reinforcement provided	10 dia.bars @ 200 c/c
Area of transverse reinforcement provided	$A_{sx.prov} = \pi \times \phi_{sx}^2 / (4 \times s_{sx})$ = **393** mm²/m
	PASS - Area of reinforcement provided is greater than area of reinforcement required

Check base design at toe

Depth of section	h = **450** mm

Rectangular section in flexure - Section 6.1

Design bending moment combination 1	M = **12.1** kNm/m
Depth to tension reinforcement	$d = h - c_{bb} - \phi_{bb} / 2$ = **369** mm
	$K = M / (d^2 \times f_{ck})$ = **0.003**
	$K' = (2 \times \eta \times \alpha_{cc}/\gamma_C) \times (1 - \lambda \times (\delta - K_1)/(2 \times K_2)) \times (\lambda \times (\delta - K_1)/(2 \times K_2))$
	K' = **0.207**
	K' > K - No compression reinforcement is required
Lever arm	$z = \min(0.5 + 0.5 \times (1 - 2 \times K / (\eta \times \alpha_{cc} / \gamma_C))^{0.5}, 0.95) \times d$ = **351** mm
Depth of neutral axis	$x = 2.5 \times (d - z)$ = **46** mm
Area of tension reinforcement required	$A_{bb.req} = M / (f_{yd} \times z)$ = **80** mm²/m
Tension reinforcement provided	12 dia.bars @ 200 c/c
Area of tension reinforcement provided	$A_{bb.prov} = \pi \times \phi_{bb}^2 / (4 \times s_{bb})$ = **565** mm²/m
Minimum area of reinforcement - exp.9.1N	$A_{bb.min} = \max(0.26 \times f_{ctm} / f_{yk}, 0.0013) \times d$ = **556** mm²/m
Maximum area of reinforcement - cl.9.2.1.1(3)	$A_{bb.max} = 0.04 \times h$ = **18000** mm²/m
	$\max(A_{bb.req}, A_{bb.min}) / A_{bb.prov}$ = **0.983**
	PASS - Area of reinforcement provided is greater than area of reinforcement required

Library item: Rectangular single output

Crack control - Section 7.3

Limiting crack width	w_{max} = **0.3** mm
Variable load factor - EN1990 – Table A1.1	ψ_2 = **0.6**
Serviceability bending moment	M_{sls} = **9** kNm/m
Tensile stress in reinforcement	$\sigma_s = M_{sls} / (A_{bb.prov} \times z)$ = **45.4** N/mm²
Load duration	Long term
Load duration factor	k_t = **0.4**
Effective area of concrete in tension	$A_{c.eff} = \min(2.5 \times (h - d), (h - x) / 3, h / 2)$
	$A_{c.eff}$ = **134625** mm²/m
Mean value of concrete tensile strength	$f_{ct.eff} = f_{ctm}$ = **2.9** N/mm²
Reinforcement ratio	$\rho_{p.eff} = A_{bb.prov} / A_{c.eff}$ = **0.004**
Modular ratio	$\alpha_e = E_s / E_{cm}$ = **6.091**
Bond property coefficient	k_1 = **0.8**
Strain distribution coefficient	k_2 = **0.5**
	k_3 = **3.4**
	k_4 = **0.425**
Maximum crack spacing - exp.7.11	$s_{r.max} = k_3 \times c_{bb} + k_1 \times k_2 \times k_4 \times \phi_{bb} / \rho_{p.eff}$ = **741** mm

Maximum crack width - exp.7.8

$w_k = s_{r.max} \times \max(\sigma_s - k_t \times (f_{ct.eff} / \rho_{p.eff}) \times (1 + \alpha_e \times \rho_{p.eff}), 0.6 \times \sigma_s) / E_s$

w_k = **0.101** mm

w_k / w_{max} = **0.336**

PASS - Maximum crack width is less than limiting crack width

Rectangular section in shear - Section 6.2

Design shear force

V = **24.3** kN/m

$C_{Rd,c} = 0.18 / \gamma_C$ = **0.120**

$k = \min(1 + \sqrt{}(200 \text{ mm} / d), 2)$ = **1.736**

Longitudinal reinforcement ratio

$\rho_l = \min(A_{bb.prov} / d, 0.02)$ = **0.002**

$v_{min} = 0.035 \text{ N}^{1/2}/\text{mm} \times k^{3/2} \times f_{ck}^{0.5}$ = **0.439** N/mm²

Design shear resistance - exp.6.2a & 6.2b

$V_{Rd.c} = \max(C_{Rd.c} \times k \times (100 \text{ N}^2/\text{mm}^4 \times \rho_l \times f_{ck})^{1/3}, v_{min}) \times d$

$V_{Rd.c}$ = **161.8** kN/m

$V / V_{Rd.c}$ = **0.150**

PASS - Design shear resistance exceeds design shear force

Secondary transverse reinforcement to base - Section 9.3

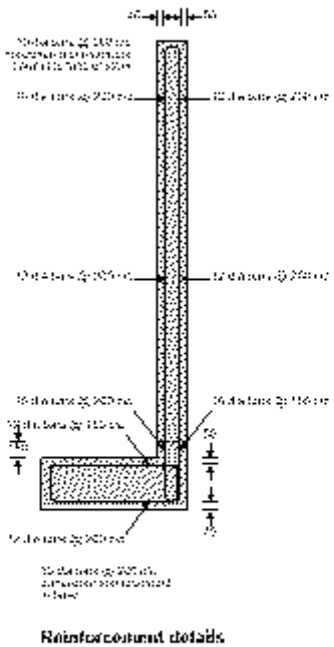
Minimum area of reinforcement – cl.9.3.1.1(2) $A_{bx.req} = 0.2 \times A_{bt.prov}$ = **151** mm²/m

Maximum spacing of reinforcement – cl.9.3.1.1(3) s_{bx_max} = **450** mm

Transverse reinforcement provided 10 dia.bars @ 200 c/c

Area of transverse reinforcement provided $A_{bx.prov} = \pi \times \phi_{bx}^2 / (4 \times s_{bx})$ = **393** mm²/m

PASS - Area of reinforcement provided is greater than area of reinforcement required



Reinforcement details

Clancy Consulting Ltd
7th Floor, Northumberland House,
303 - 306 High Holborn,
London, WC1V 7JZ.

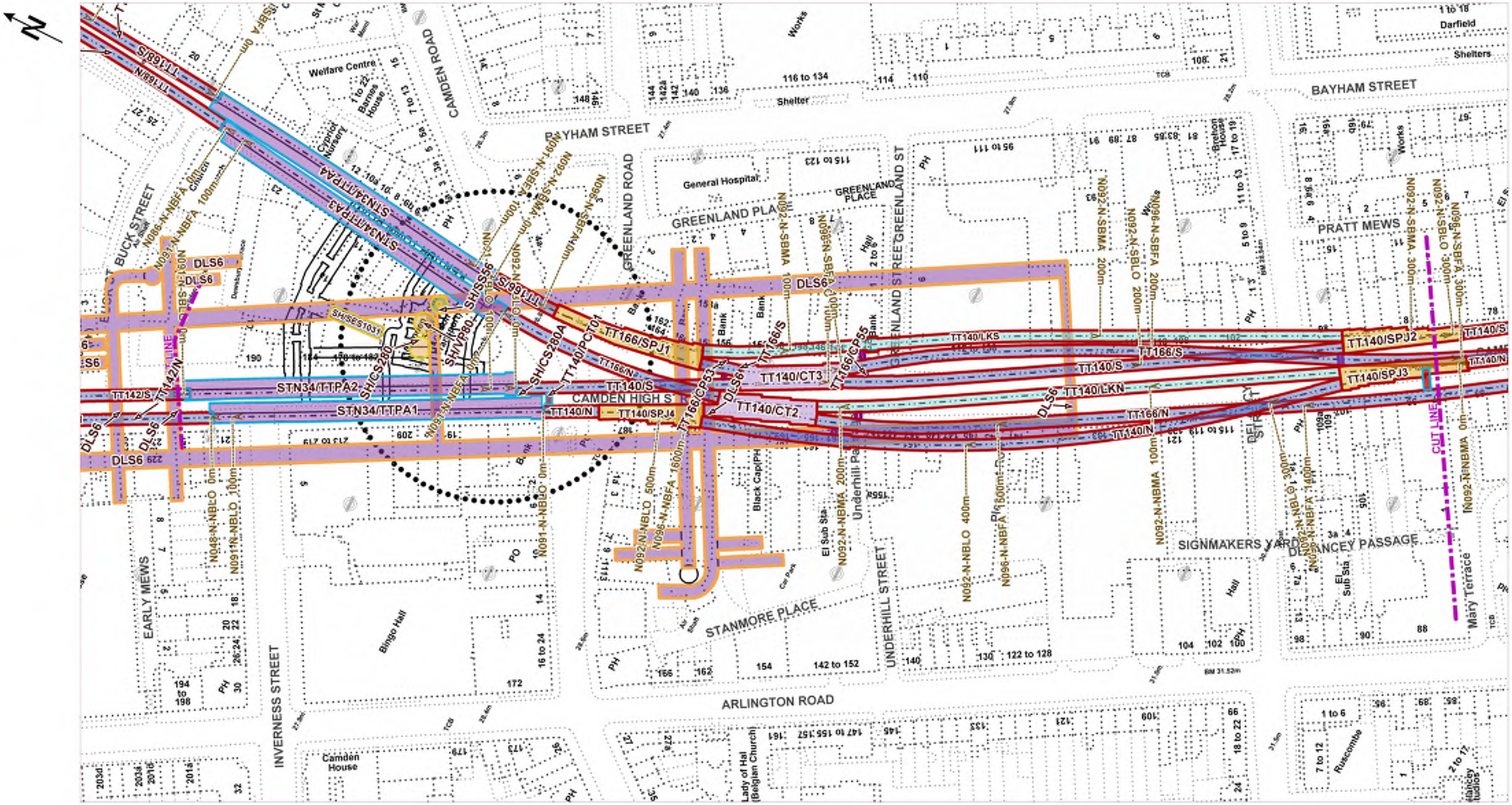
Project				Job no.	
HUB by Premier Inn - Camden, London				2/8791	
Calcs for				Start page no./Revision	
Typical Retaining Wall				11	
Calcs by	Calcs date	Checked by	Checked date	Approved by	Approved date
TU	31/05/2019				

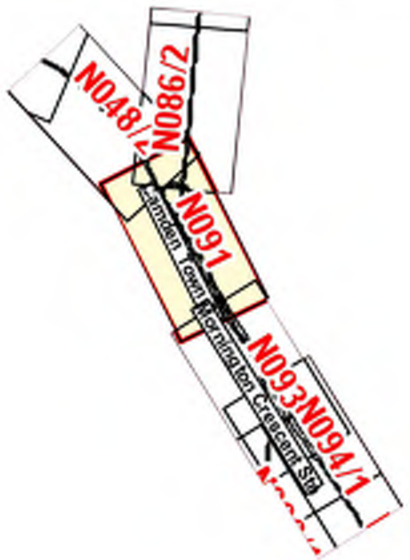
Appendix E

TfL Existing Tunnel Information

To Kentish Town / Chalk Farm

To Mornington Crescent / Euston





OVERVIEW MAP

0.00 0.05 0.10 0.15 0.20 0.25

Kilometers

N123-N-SLO 110m 100m Track Markers

Tube Lines
15 Westferry Circus
Canary Wharf
E14 4HD

Tube Lines

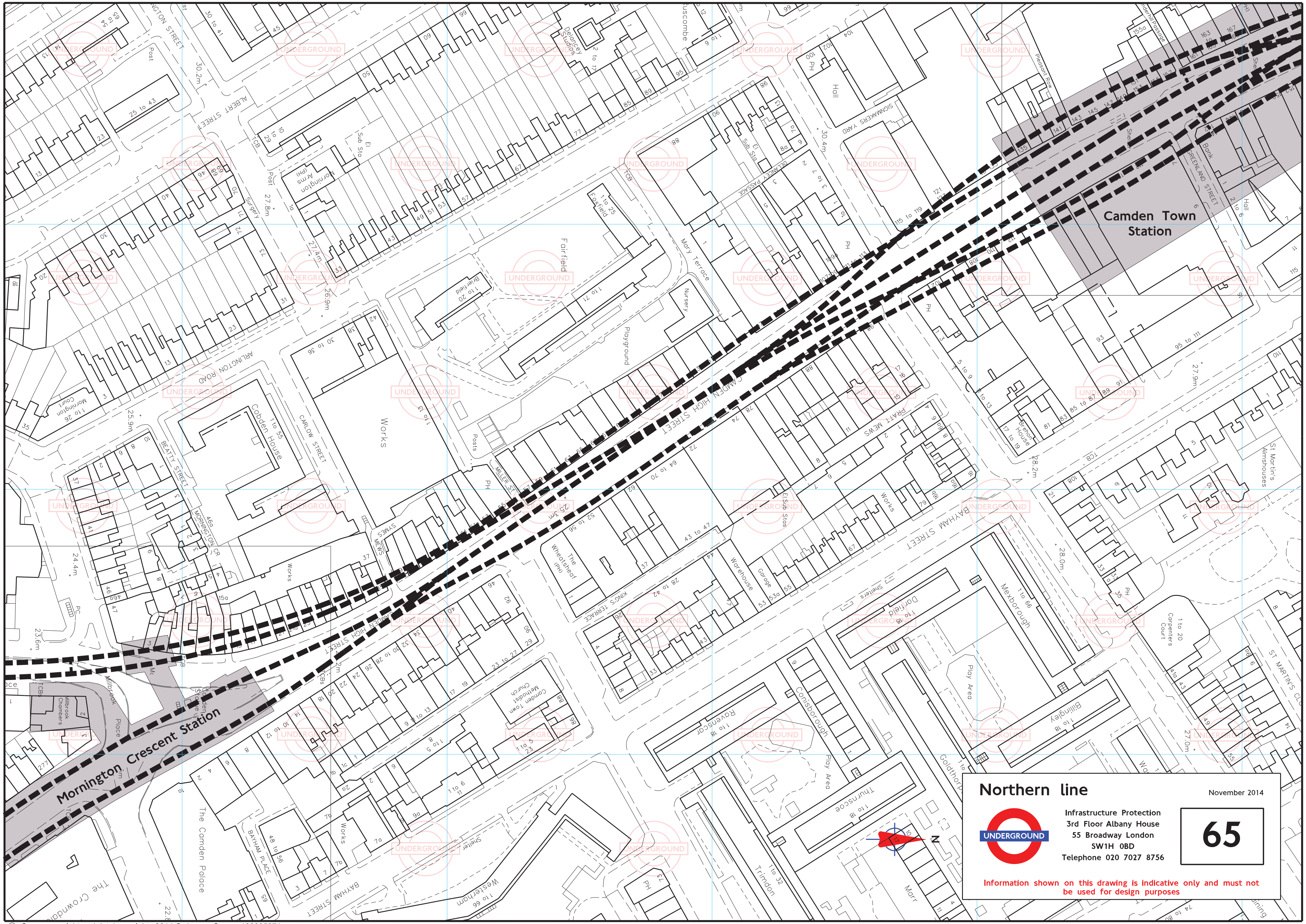
CIVILS TUNNEL ASSET LOCATION PLAN

Camden Town Stn

N091

PRODUCED 11/11/2010

SCALE 1:1250



Northern line

November 2014

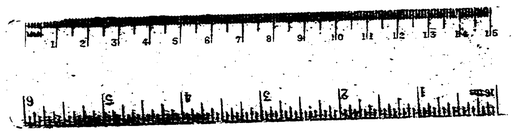
Infrastructure Protection
3rd Floor Albany House
55 Broadway London
SW1H 0BD
Telephone 020 7027 8756

UNDERGROUND

65

Information shown on this drawing is indicative only and must not be used for design purposes

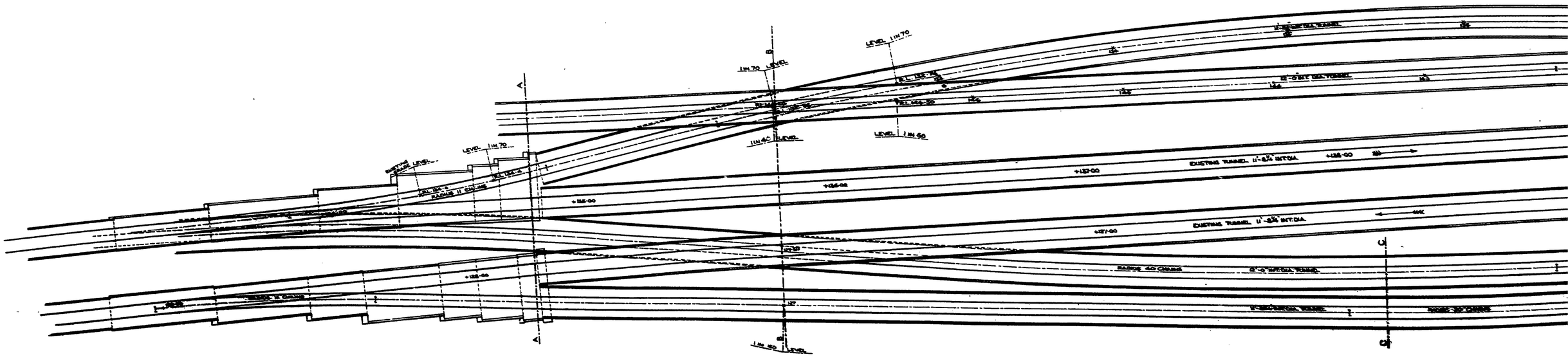
Scale 1:1250 at A3 size



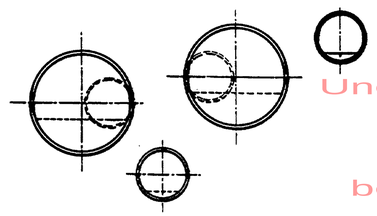
L.E.R. EXTENSION FROM CAMDEN TO

Step Plate Junctions & Crossover Tunnels between Mornington

Scale 20 to 1".

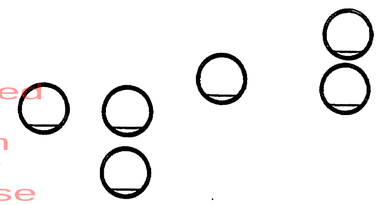


N/092 12/002 FRAME 1



ORDNANCE DATUM

CROSS SECTION AA



ORDNANCE DATUM

CROSS SECTION BB

ORDNANCE DATUM

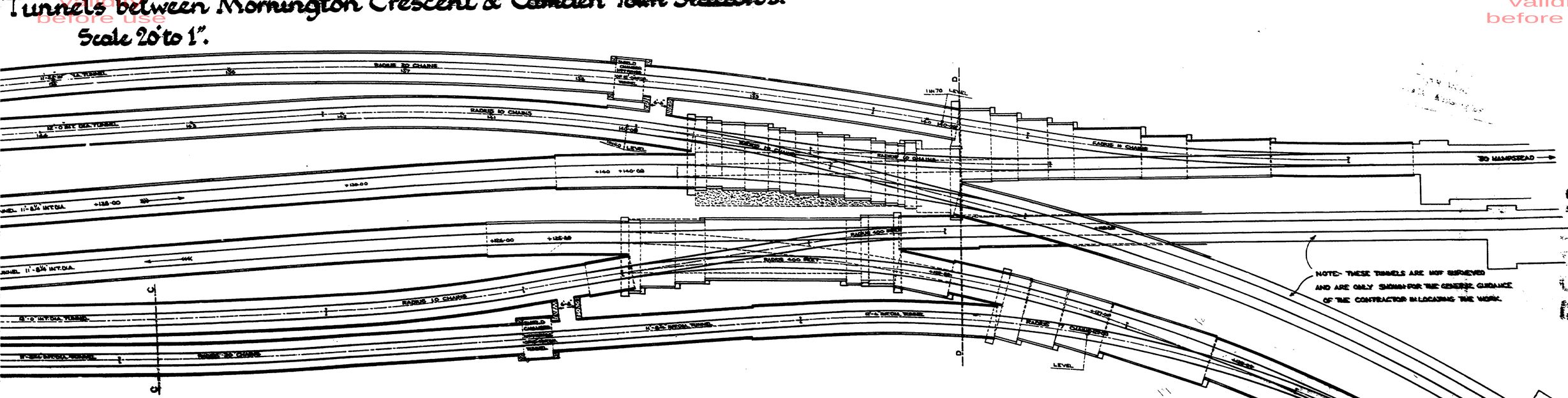
CROSS SECTION CC

N FROM CAMDEN TOWN TO EUSTON.

Tunnels between Mornington Crescent & Camden Town Stations.

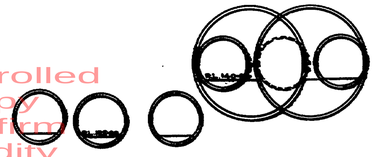
Scale 20 to 1".

DRAWING No E3643



ORDNANCE DATUM

CROSS SECTION CC



ORDNANCE DATUM

CROSS SECTION DD

COPIED FROM DALRYMPLE-HAY'S DRAWING No 2. SHEET No 1.

N/092 17/002 FRAME 2

Kensington

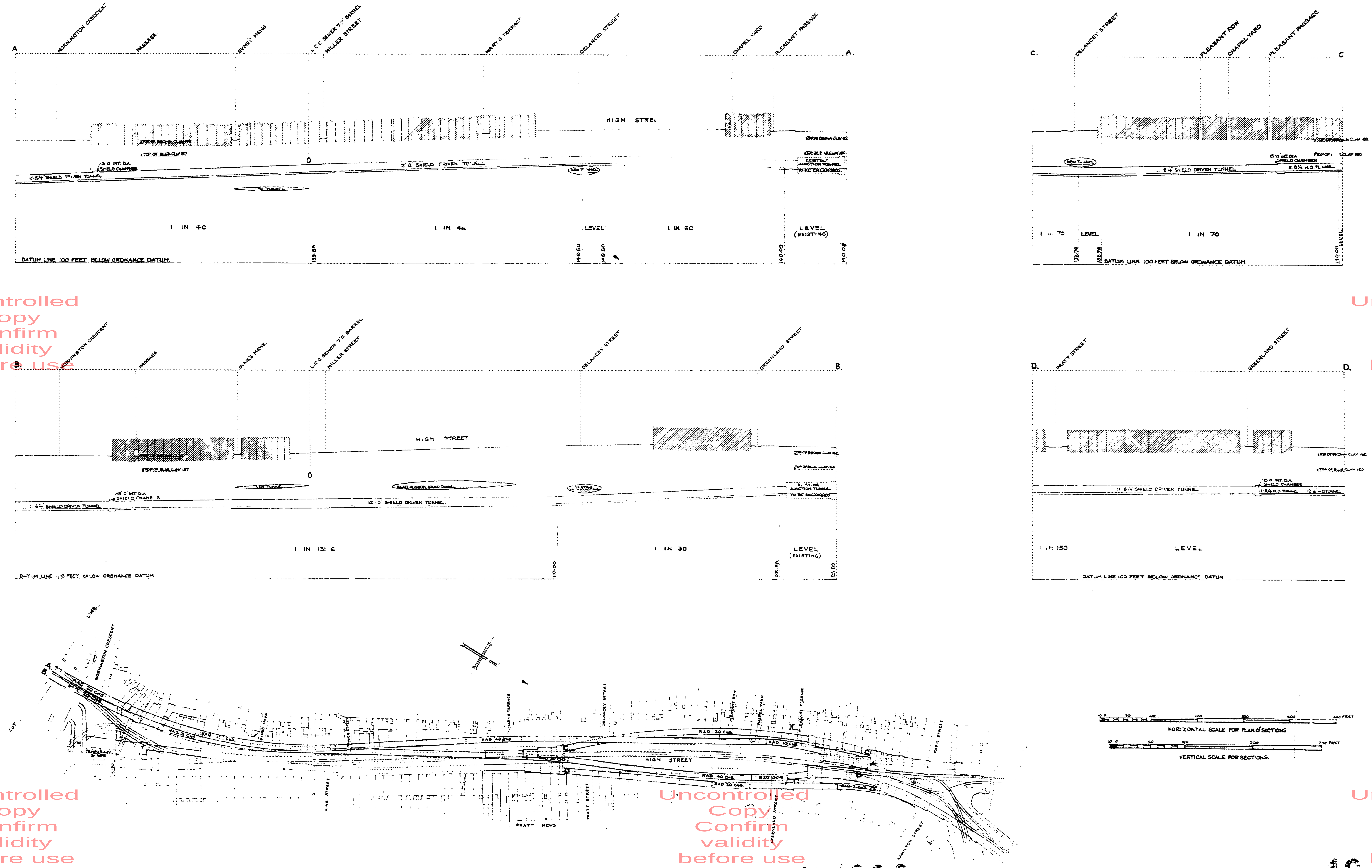
UNDERGROUND

OFFICE OF THE CIVIL ENGINEER
(Chief Engineers Dept)

Drawn by ..... Checked by .....

Drawing No E3643 Date 22-4-30

L.E.R. EXTENSION FROM CAMDEN TOWN TO EUSTON.



N/096

12/005

MICROBOX

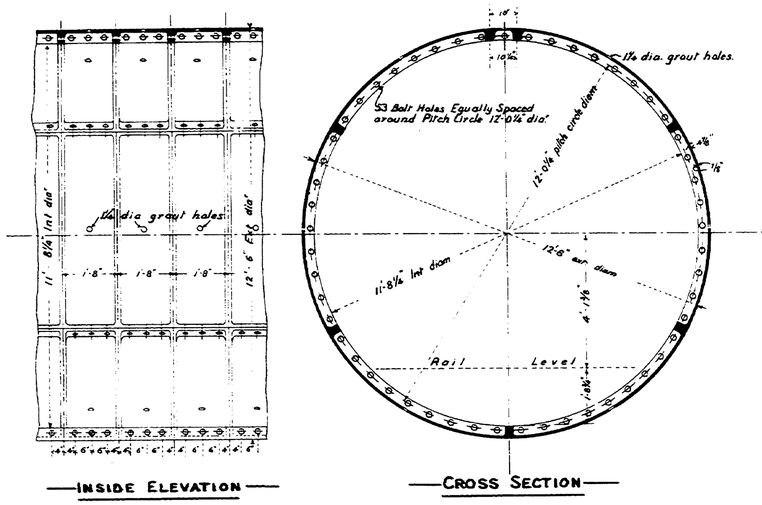
LONDON ELECTRIC RAILWAY

EXTENSION FROM CAMDEN TOWN TO EUSTON.

11'-8¼", 12'-0" & 12'-6" INT. DIA.ᴿˢ C.I. TUNNELS

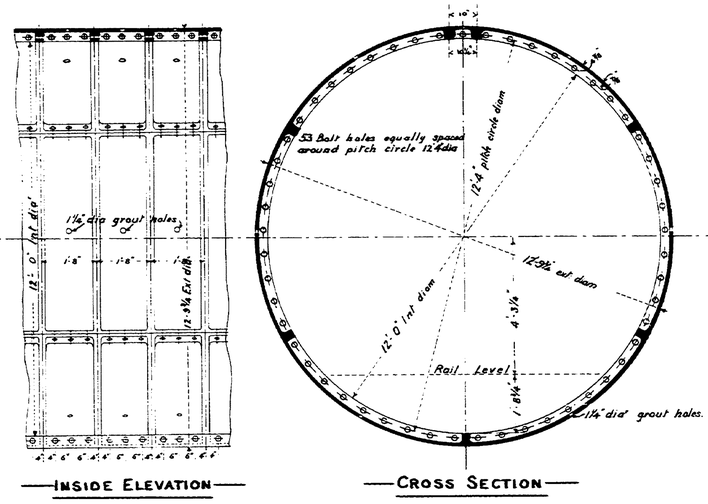
Scale ½" to 1 foot.

Grout Holes in Segments of 12'-6" Int dia tunnel where in water bearing strata to be tapped and filled with 1¼" dia screw plugs.



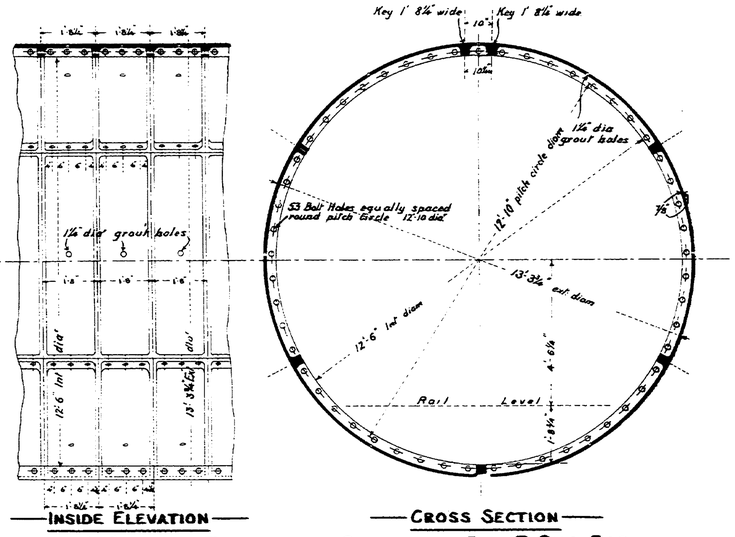
INSIDE ELEVATION — CROSS SECTION

11' 8¼" INT. DIAᴿˢ TUNNEL FOR STRAIGHT & CURVES OF NOT LESS THAN 20 CHS. RAD.



INSIDE ELEVATION — CROSS SECTION

12'-0" INT. DIA. TUNNEL FOR CURVES OF 10 CHS & UNDER 20 CHS. RAD.



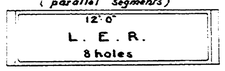
INSIDE ELEVATION — CROSS SECTION

12'-6" INT. DIA. TUNNEL FOR CURVES OF 5 TO 7 CHS. RAD.

NOTE— For Straight Tunnel all Plates 1'-8" wide parallel.

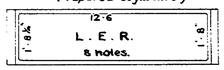
For curves of over 7 chains radius all Plates 1'-8" wide parallel

Diagram of lettering on Ordinary Iron. (parallel segments)



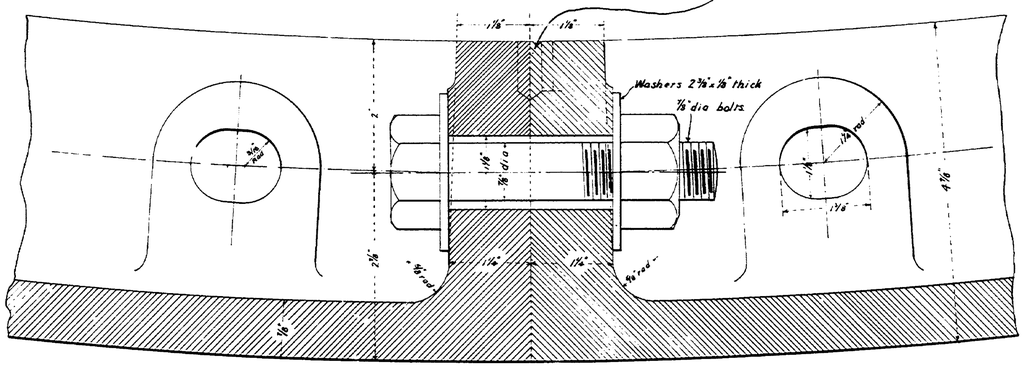
Note:- All Ordinary Segments to have cast on the inside of the skin.
(1) internal diameter of tunnel
(2) whether 8 or 9 holes.
(3) L. E. R.
as indicated on the diagram above.
The above also applies to 12'-6" and 11'-8¼" Tunnels.

Diagram of lettering on Special Iron (tapered segments)



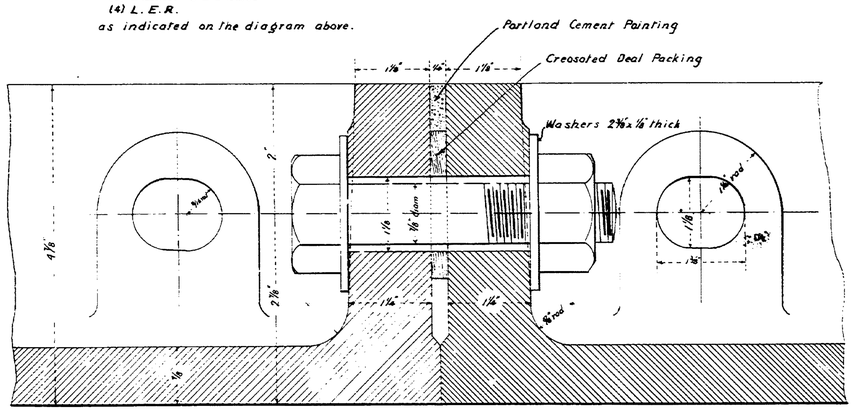
Note:- All tapered Segments to have cast on the inside of the skin
(1) Width at each end.
(2) Internal diameter of tunnel.
(3) Whether 8 or 9 holes
(4) L. E. R.
as indicated on the diagram above.

NOTE:- THIS GROOVE TO BE PROVIDED ONLY FOR THE 12'-6" INT DIA. TUNNEL WHERE IN WATER BEARING STRATA.



LONGITUDINAL JOINT

Full Size



CIRCUMFERENTIAL JOINT.

Full Size.

Appendix F

Flood Risk Assessment and SUDS Strategy

SuDS Report
June 2019
Clancy Consulting

115 - 119 CAMDEN HIGH STREET

Flood Risk Assessment & SUDS Strategy

115-119
Camden High Street,
Camden,
NW1 7JR

4th June 2019

Ref: 2/8791

Prepared on Behalf of:

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W1T 3BL

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FLOOD RISK ASSESSMENT & SUDS Strategy
115-119 Camden High Street, Camden, NW1 7JR

Report Reference: 2/8791

Revision Rev C

Prepared for: Demar Holdings (BVI) Ltd

Prepared by: Clancy Consulting Limited
19 Upper King Street
Norwich
NR3 1RB

Revision List

A	Draft Issued for Comment	17.05.2019
B	Revised Issue	28.05.2019
C	Revised Issue	31.05.2019
D	Revised Issue	04.06.2019

Prepared by: **Russ Blakeburn**
Civil Engineering Technician
for and on behalf of CLANCY CONSULTING LTD

Approved by: **Greg Scott B.Eng.(Hons), C.Eng., M.I.Struct.E**
Director
for and on behalf of CLANCY CONSULTING LTD

CAVEAT

TABLE OF CONTENTS

TABLE OF FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 General

1.1.1 This report has been prepared on instructions received from Demar Holdings (BVI) Ltd.

1.1.2 This report supports a planning application for the demolition of the existing building at 115-119 Camden High Street, Camden, London, NW1 7JR, which is then to be developed into a new part 4 and a part 5 storey development.

1.1.3 This report sets out the results of a flood risk assessment required by the Local Planning Authority in support of the planning application for this development. The assessment has been carried out in accordance with the general principals set out in National Planning Policy Framework and Technical Guidance to the National Planning Policy Framework published in March 2012.

1.1.4 This report is prepared solely for the benefit of the Client. This report may not be assigned without prior written permission from Clancy Consulting.

1.2 Background Information

1.2.1 In 2001 the Department for Transport Local Government Regions (DTLR) published Planning Policy Guidance Note 25 (PPG25), which explains how flood risk should be taken into consideration during the planning and development process.

PPG25 has now been replaced by Planning Policy Statement 25: Development and Flood Risk published in March 2010. This latest Policy Statement has been introduced to place more emphasis on the increased flood risk from climate change.

PPS25 specifies a sequential test which local planning authorities should apply to all future proposed development sites. An exception test may also be applied to provide a method of managing flood risk while still allowing necessary development to occur.

1.2.2 In Feb 2019, the Government released a revised National Planning Policy Framework (NPPF) aiming to make the planning system less complex and more accessible, to protect the environment and promote sustainable growth.

The original NPPF (2012) accompanied with the Technical Guidance published in March 2012 superseded PPS25 although the principles set out in the publication remain similar in terms of the flood risk aspect.

The flood risk Practice Guide was published on-line in March 2014.

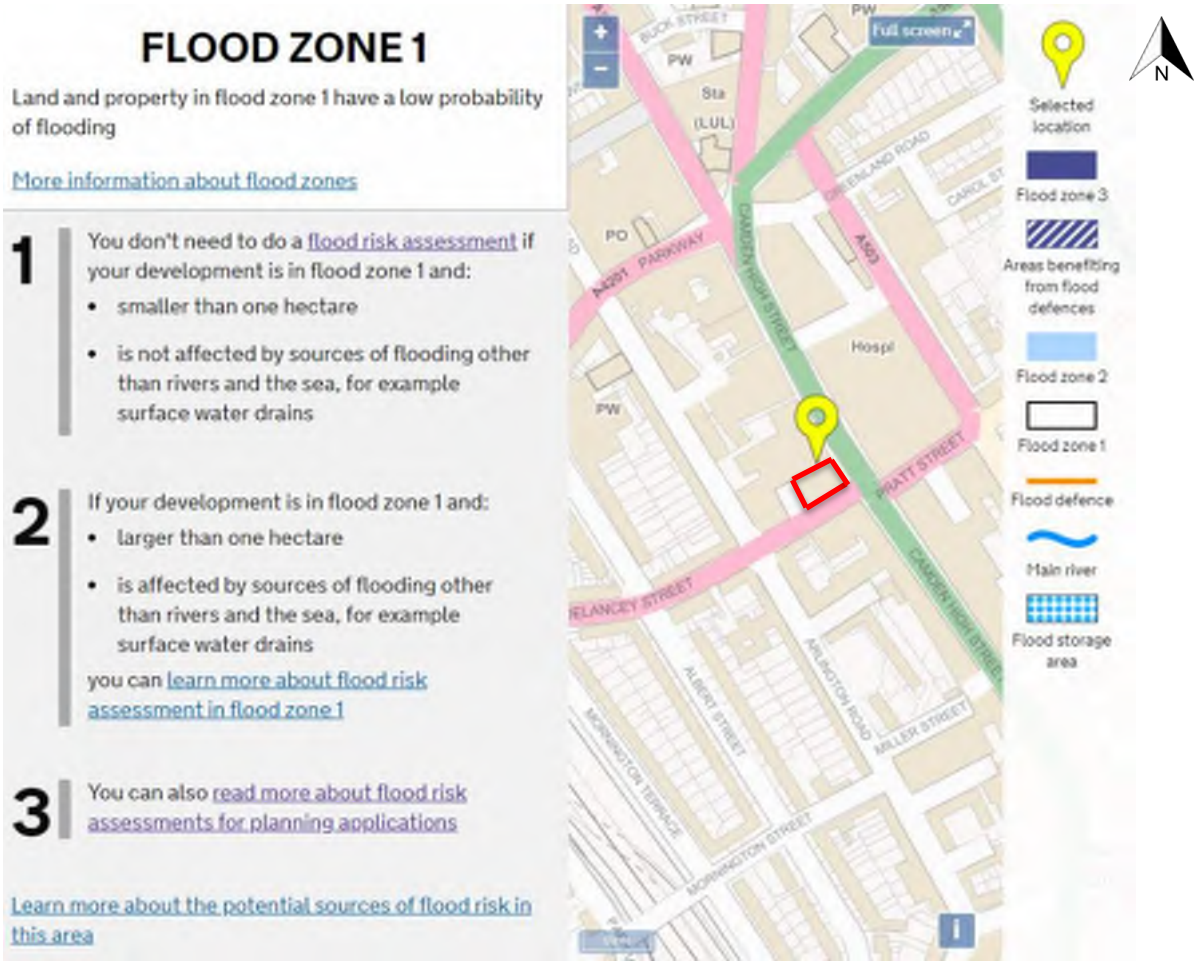
1.2.3 The following zones define the levels of flood risk:
Zone 1: Low Probability.
This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year. (<0.1%)
Zone 2: Medium Probability
This zone comprises land assessed as having between 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1000 annual

probability of sea flooding (0.5% - 0.1%) in any year.

Zone 3a: High Probability
This zone comprises land assessed as having between 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
Zone 3b: Functional Flood Plain
This zone comprises land where water has to flow or be stored in times of flood. Strategic Flood Risk Assessments should identify this zone.

1.2.4 As part of its general obligations under the Water Resources Act 1991, The Environment Agency has carried out surveys of its existing defences against flooding and has published a series of nationwide 'Indicative Floodplain Maps' based upon information from historic flood events and basic hydraulic modelling. In general terms, these maps give a good indication of the areas likely to be affected by flooding. More recently, the Environment Agency have published the 'Flood Map' on their website which is based on improved hydraulic modelling and detailed local data. The map indicates Zones 2 and 3 with Flood Zone 1 being all the land falling outside the Zones 2 and 3.

1.2.5 The EA Flood Map for the area of the proposed development indicates that the development lies in an area of flood risk **zone 1.**



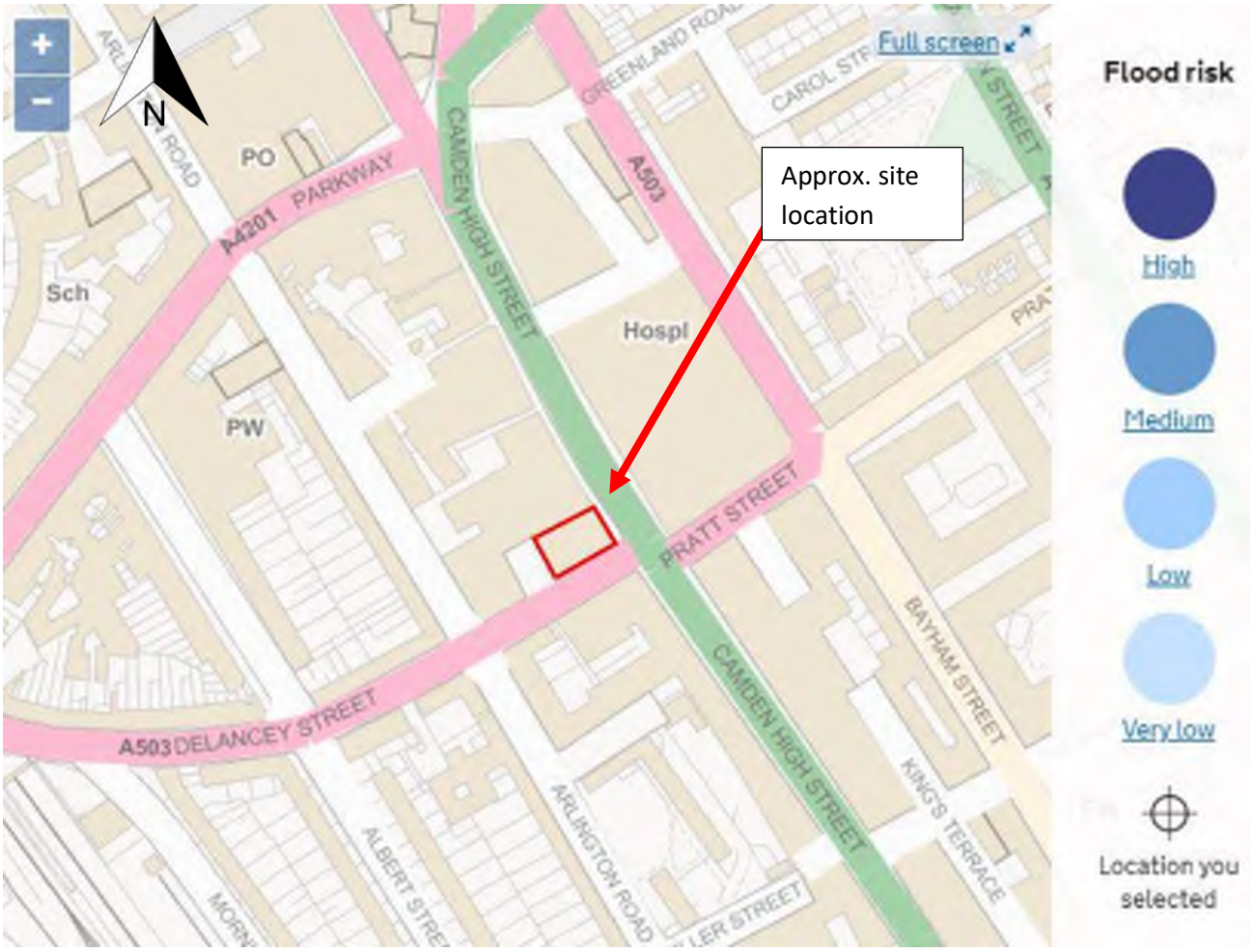


Figure 1 - River Flooding Map (Environment Agency)

2.0 STRUCTURE OF THE REPORT

2.1 Reference has been made to The London Borough of Camden Flood Risk Management Strategy.

2.2 This strategy states that flood risk in The London Borough of Camden will increase in the future, influenced by climate change and increasing pressures on development and housing needs, therefore, the Local Flood Risk Management Strategy seeks to identify opportunities to mitigate risks in more affordable ways and where multiple benefits can be delivered.

The London Strategic Flood Framework, produced in 2012 by the London Resilience partnership, forms part of the GLA's London strategic Emergency plan suite of documents for emergency planning. It relates to flooding which would have impacts across the capital, whether one large event at a specific location or several smaller floods in different areas.

Through the GLA's London programme, the borough of Camden produced their Final Strategic Flood Risk Assessment in June 2014, which identifies areas of significant flood risk across the borough at a high screening exercise level. Based upon historical flooding data it enabled the prediction of the impacts future flooding could cause, taking climate change and major development opportunities into account.

2.3 Sources of information

- Flood maps from the Environment Agency published on line
- Data supplied by the Environment Agency under the Freedom of Information Act
- Camden Council – Surface Water Management Plan Drain London (not available directly from website)
- London Borough of Camden SFRA July 2014 Final Report
- British Geological Survey
- Thames Water

3.0 SITE DESCRIPTION

3.1 Location

3.1.1 The site is located as detailed as below.

OS X (Eastings)	528958
OS Y (Northings)	183682
Nearest Post Code	NW1 7JS
Lat (WGS84)	N51:32:14 (51.537318)
Long (WGS84)	W0:08:31 (-0.142013)
LR	TQ289836 / TQ2895883682
mX	-15808
mY	6683416

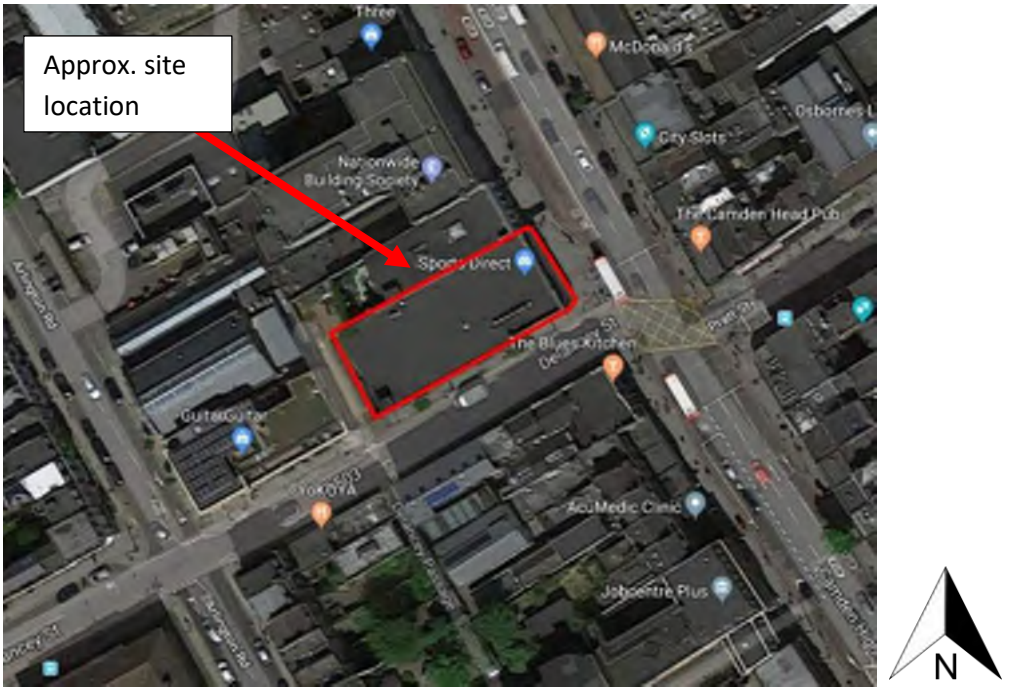


Figure 2 - Site Location Plan (Google Maps)

3.1.2 The overall site is approximately 826m² (including Signmakers Yard at the rear) and comprises of an existing 2 storey retail unit.

3.1.3 The whole area would be classed impermeable.

3.1.4 Based on the topographical data obtained from Morris and Company, the front of the property on Camden High Street is at approximately 28.80m AOD. Asset plans from Thames Water show that ground level at the rear of the property where Delancey Street meets Signmakers Yard is at 30.40m AOD a rise of 1.6m.

3.2 Development Proposals

3.2.1 It is proposed to redevelop the site for a Hub Hotel, 3 residential units and a retail unit.

3.2.2 It is proposed to demolish the existing building and replace it with a new part 4 and part 5-storey development which encompasses an 80 bed Hub, a single retail unit and 3 residential units. Along with this, a part basement will also be incorporated into the design. Full details are available in Appendix B.

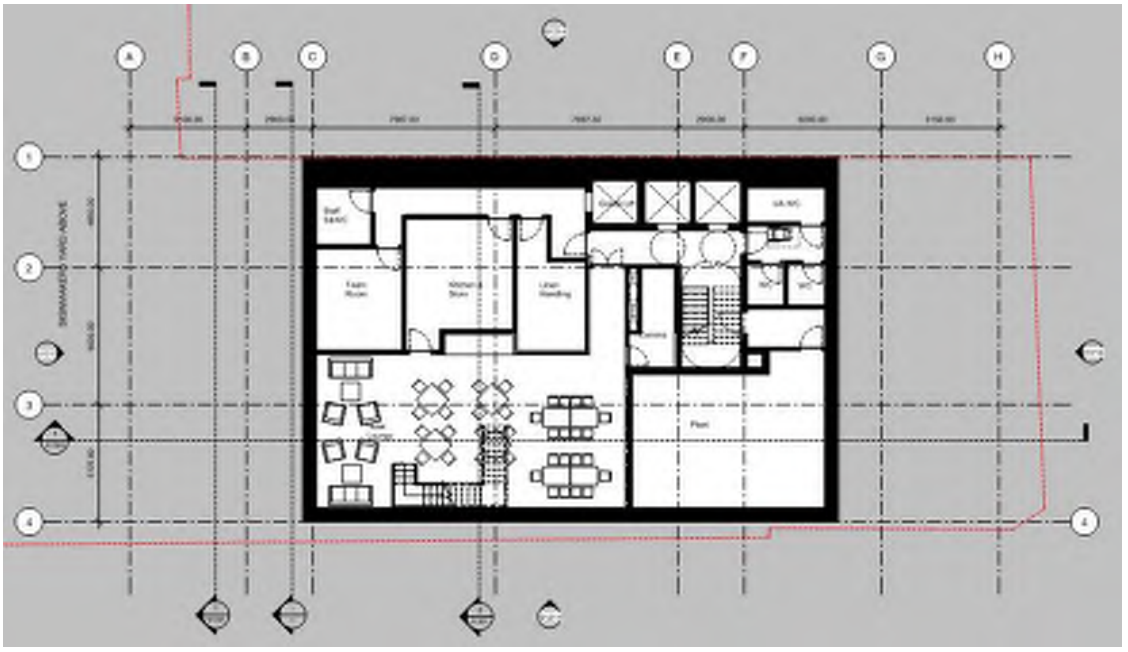


Figure 3- *Proposed Basement Plan (Not to scale)*

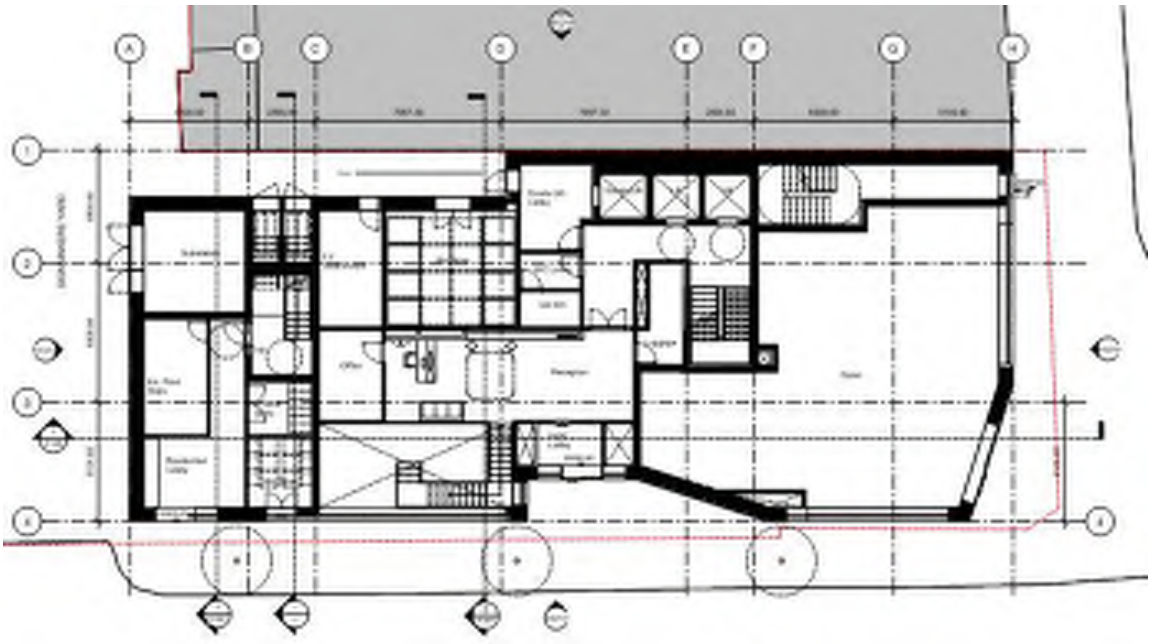


Figure 4 Proposed Ground Floor Plan (NTS)

Figure 5 Proposed First Floor Plans (NTS)

Figure 6 Proposed Second Floor Plans (NTS)

Figure 7 Proposed Third Floor Plans (NTS)

Figure 8 Proposed Fourth Floor Plans (NTS)

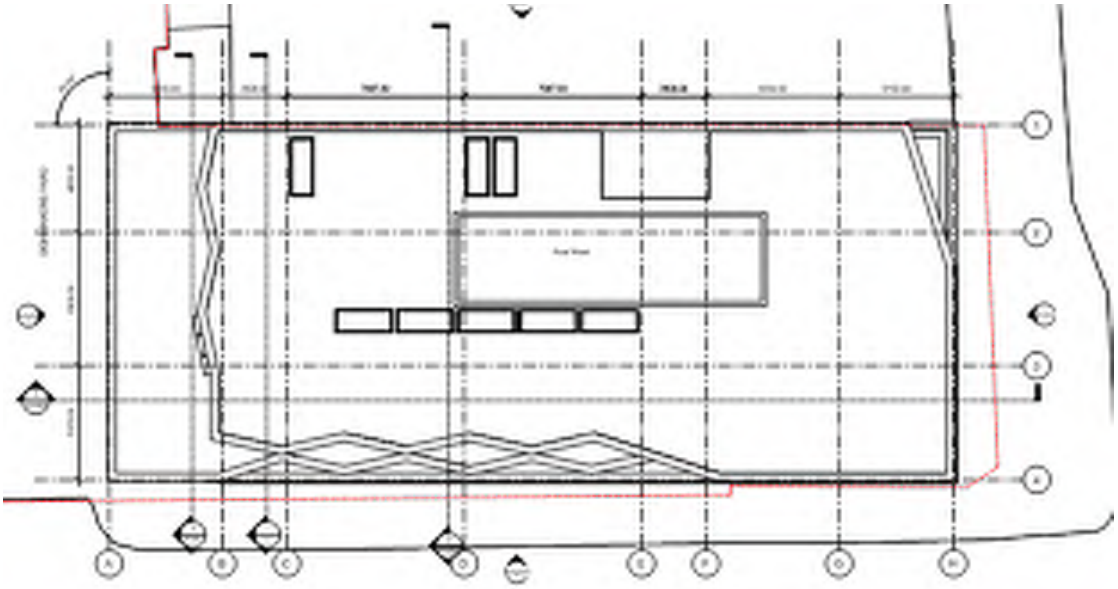


Figure 9 Proposed Roof Plans (NTS)

4.0 FLOOD POTENTIAL

4.1 Development Proposal

4.1.1 As the proposed development is for a hotel with ancillary lounge within the basement, 3 residential units and a retail unit, the NPPF classification of this development is 'more vulnerable'.

4.2 Potential for Flooding

4.2.1 The site is located within flood zone 1 in terms of flooding from the River Thames.

4.2.2 There are, therefore, four potential sources of flooding at the site which will be addressed in more detail in this report, i.e.

(i) From surface water overland flow off site.

(ii) From high groundwater levels.

(iii) From artificial sources, such as reservoirs.

(iv) From the surcharging of drains or sewers on the site.

4.3 Existing Historical Flooding Information

4.3.1 Referring to the London Borough of Camden SFRA section 4.2.7, it states that 'Historic flood records indicate that LBC, particularly to the north of Euston Road, is prone to surface water flooding. Two large surface water flooding events have occurred in LBC in 1975 and 2002 causing widespread damage'

4.4 Flood Risk Probabilities

(i) Flooding from Surface Water ±Overland flow

4.4.2 During extreme rainfall events or due to poor drainage gully maintenance there will times when gully capacity is exceeded which will lead to surface flow within the surrounding roads. The Environment Agency Flood Map below indicates that the main risk from surface water flooding would come from Camden High Street. However, this main road has what looks like a slight peak adjacent to our site, meaning surface water will naturally be directed down the road in either direction away from our site. From this map we can see that the site is **within an area of very low risk of surface water flooding.**

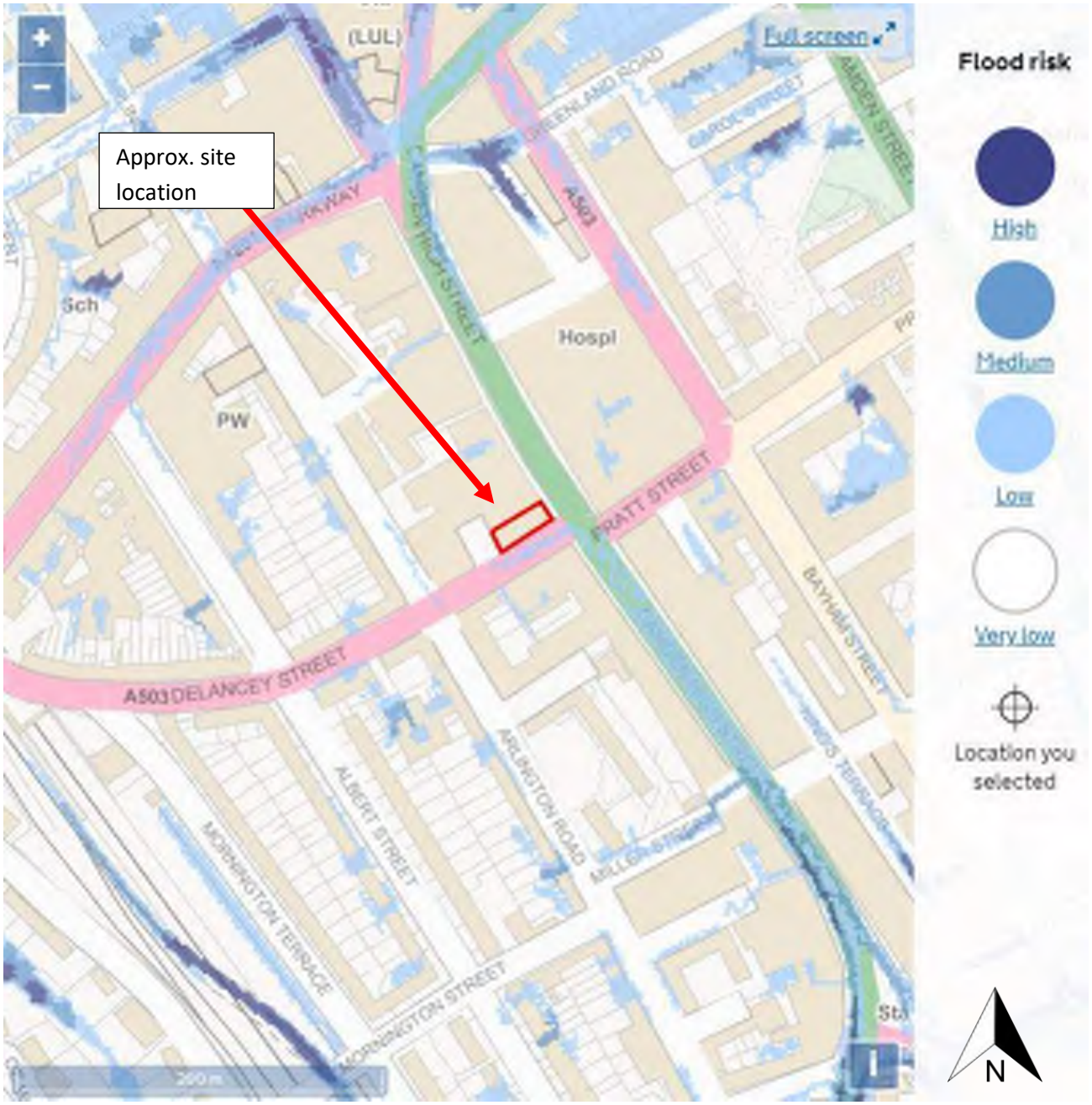


Figure 10 - Surface Water Flood Map (Environment Agency)

(ii) Flooding from Groundwater

4.4.3 The superficial geology for the area underneath the site has not been recorded. The bedrock geology is shown to be London Clay Formation which is Clay, Silt & Sand based.

4.4.4 Historic borehole logs within the area show that ground water wasn't encountered up to 20m below ground level. These boreholes were located approx. 120m South East of the site, further details are available from the BGS website.

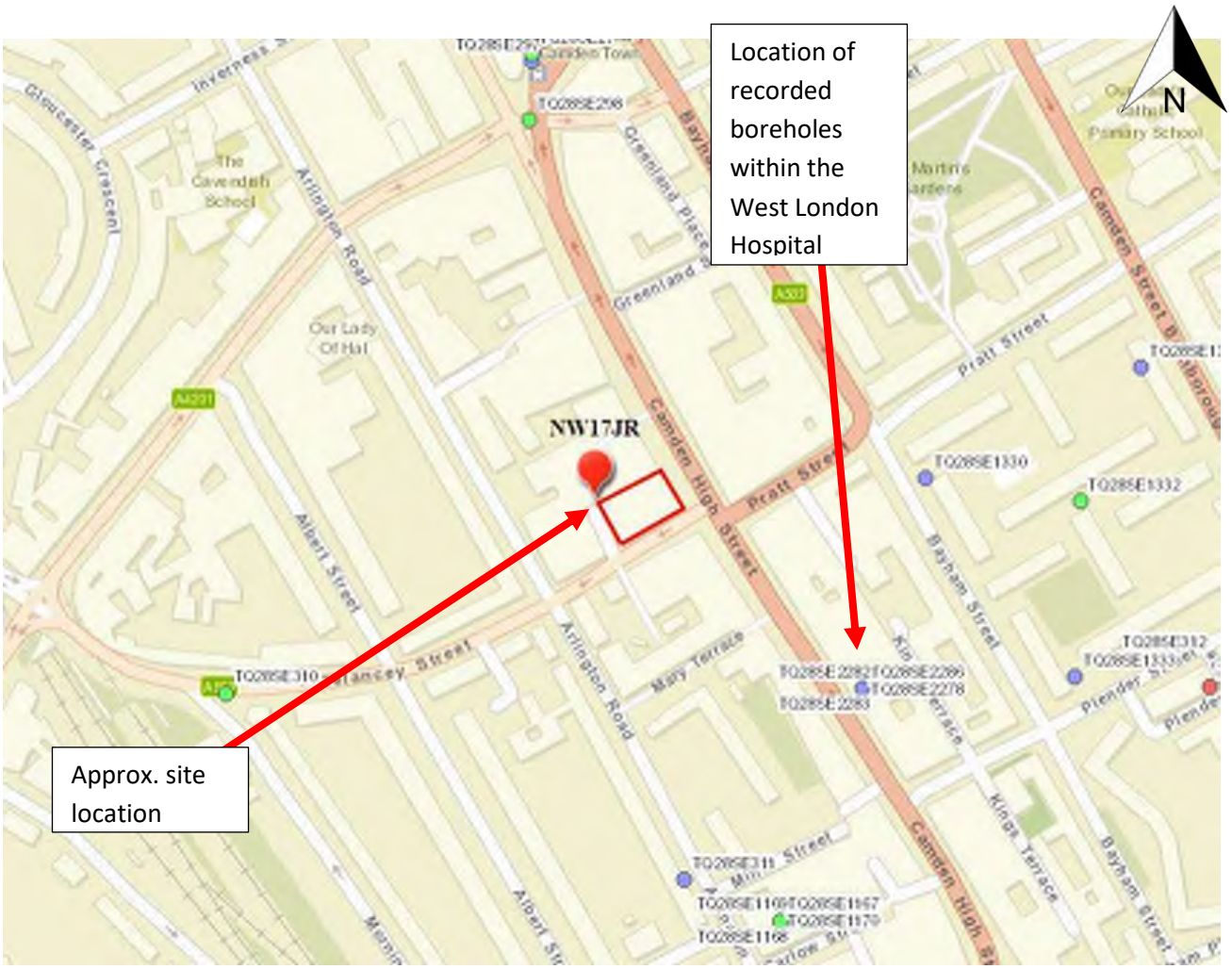


Figure 11 - *Borehole Locations (British Geological Survey)*

4.4.5 Using the BGS borehole data, we can see that the area around the site is at low risk from ground water flooding at ground level. The existing basement structure at this site could be at some risk, but there are no records of any issues with basement flooding. **The risk of flooding from ground water can be considered low for this development.**

(iii) Flooding from Artificial Sources - Reservoirs

4.4.6 Artificial sources of flooding are potentially from man-made structures and infrastructure. The Environment Agency have modelled the potential effect of flooding from failures in retaining structures containing reservoirs. The blue area on the map below indicates potential flooding.

Figure 12 - *Reservoir Flood Map (Environment Agency)*

4.4.7 It should be noted that reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs are inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the Environment Agency ensure that reservoirs are inspected regularly and essential safety work is carried out. **The risk of flooding from reservoirs at this site is very low.**

(iv) Flooding from Drainage on site.

4.4.8 Flooding could occur if the on-site drainage system becomes blocked of a rainfall event exceeds the design capacity. Details of the drainage system are discussed in Chapter 5.

5.0 DRAINAGE

5.1 Existing Drainage

5.1.1 The Thames Water drainage mapping shows that there are 2 combined trunk sewers running parallel to the site. One running Southwards down Camden High Street and another one running Eastwards down Delancey Street.

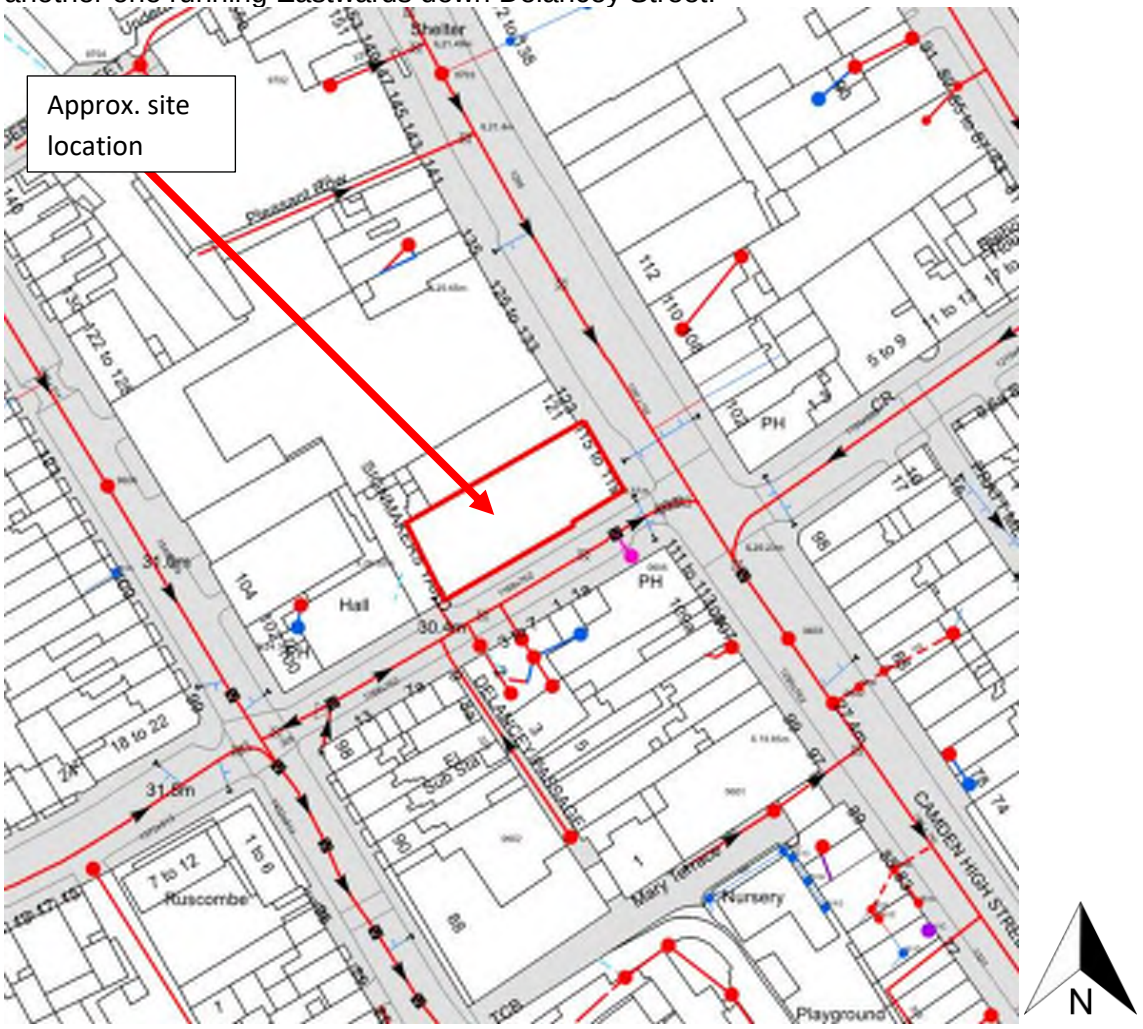


Figure 13 - *Asset Plan (Thames Water)*

5.1.2 The manhole levels for the combined trunk sewers in Camden High Street and Delancey Street are unavailable from the Thames Water asset plans obtained.

5.1.3 There is not a great deal of existing surface and foul water below ground drainage network local to the building, the closest being a small trunked surface water run going from the hall to Signmakers Yard at the rear of the development. A CCTV survey of the site is planned to gain a better understanding of the below ground drainage system, unfortunately access to the existing retail unit is currently unavailable.

5.2 Surface Water Drainage Strategy

The disposal of surface water should be considered in the following order of priority;

1. Infiltration into the subsoil via soakaways or permeable paving.
2. Discharge to a water course or the sea.

3. Discharge to a surface water sewer.

4. Discharge to a combined sewer.

If it is not possible to discharge to a soakaway, then surface water should be controlled with the use of Sustainable Drainage Systems (SuDS) and considered using the SuDS Hierarchy.

5.3 SuDS Hierarchy

	SUDS technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit
Most Sustainable	Living roofs	✓	✓	✓
	Basins and ponds - Constructed wetlands - Balancing ponds - Detention basins - Retention ponds	✓	✓	✓
	Filter strips and swales	✓	✓	✓
	Infiltration devices - soakaways - infiltration trenches and basins	✓	✓	✓
	Permeable surfaces and filter drains - gravelled areas - solid paving blocks - porous paviors	✓	✓	
Least Sustainable	Tanked systems - over-sized pipes/tanks - storms cells	✓		

5.3 Disposal Strategy for 115-119 Camden High Street

Infiltration

Infiltration for this development will not be possible due to the poor ground conditions and also due to the space constraints of buildings and the requirement to have infiltration methods a minimum 5m away for structures.

As mentioned in 4.4.5 the borehole logs have shown the ground water levels, they also indicate that the area has cohesive soils of London Clay which will limit infiltration.

Permeable Paving

As the site is located down a busy high street there is not much free space surrounding the development on which permeable paving could be utilised.

Water Couse

There are no watercourses within practical distance of the site and this would entail crossing third party land.

Combined water sewer

This is the only practical solution for the discharge of all drainage from the site. A CCTV survey of the existing site drainage is to be conducted to ascertain the existing locations of the discharge of foul and surface water into the existing combined public sewer. It is anticipated that this/these connections will be re-utilised for the proposed foul and surface water discharge.

5.4 SuDS Strategy for Camden High Street Hub Hotel

Living Roof

As this is a demolition of the old structure and development of a new one there is the possibility that a green roof could be incorporated into the design. However, the building is 5-storey and a green roof is very heavy, meaning it would be very difficult/expensive to construct one of these on this particular development.

Ponds/ Basins and Swales.

There is no space on site to provide these systems.

Blue Roof System

Whilst not providing a significant reduction in pollution, it is possible to attenuate surface water at source and discharge this at a reduced flow rate of 5 l/s compared to the existing 9.6 l/s. Whilst this is a 48% reduction it is also the lowest practical discharge rate without causing flooding for all storm events up to and including the 1 in 100 year event + 40% climate change.

To attenuate the surface water at source a Blue Roof system has been suggested. From here the majority of the rainwater will be captured at source and stored below the roof top, discharging at a maximum 4.5l/s. The Blue Roof will be designed for all storm events up to and including the 1 in 100-year event + 40% climate change.

The small areas of roof that are non-blue roof will be drained via gravity to the below ground drainage system. Calculations made estimate that the maximum flow for the 1 in 100 year event + 40% climate change would be 0.45 l/s, therefore, this would be discharged straight to the below ground drainage system.

The combined flow rate would be a maximum 5l/s and as stated above is a 48% reduction on the existing flow rate. Whilst the London plan requires a 50% reduction, a flow rate of less than 5l/s would increase the chances of blockages occurring, therefore, to avoid potential blockages a max flow rate of 5l/s will be used.

Upon confirmation of the CCTV survey and review of the proposed design, a pre-development enquiry will be made to Thames Water to confirm the discharge rates for foul and surface water.

6.0 SuDS TECHNICAL STANDARD REQUIREMENTS

6.1 Peak Flow

6.1.1 S3 For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

6.1.2 Refer to calculations in Appendix C.

The Existing 1 in 1 year run-off for the site is 9.6 l/s

The Existing 1 in 100 year run-off for the site is 30.4 l/s

Greenfield run-off rate for the site is 0.42 l/s

It is proposed to control the surface water run-off to 5 litres per second, a 48% reduction. This will provide the lowest practical control rate without significantly increasing the risk of flooding and having blockages in the system.

Storage will be provided for all storm events up to and including the 1 in 100-year event with a 40% allowance for climate change.

Based on a roof area of 521m² the calculations carried out by ABG Ltd indicate that for a critical event of 1 in 100 years with allowance for 40% climate control the storage gained within the Blue Roof would be 24.0m³ with a maximum flow restriction of 5l/s into the existing Thames water network. Please refer to Appendix C for calculations.

6.2 Volume Control

S6 Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body, the runoff volume must be discharged at a rate that does not adversely affect flood risk.

Using the Blue Roof system we can restrict the flow rate to 5 l/s, down from the existing uncontrolled rate of 9.6 l/s, this will not affect the flood risk for all events up to and including the 1 in 100 year event + 40% climate change.

6.3 Flood Risk within the Development

S7 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event.
S8 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.

S9 The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.

It is proposed to design the Blue Roof System to store surface water at source and above ground, this is due to below ground storage space being minimal.

Levels will be designed such that in the event of a more extreme rainfall event water will discharge away from buildings.

6.4 Structural Integrity

S10 Components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the design life of the development considering the requirement for reasonable levels of maintenance.
S11 The materials, including products, components, fittings or naturally occurring materials, which are specified by the designer, must be of a suitable nature and quality for their intended use.

The detailed design of the system and product selection for the storage solution will be made at the detailed design stage when all the site constraints can be considered. Care will be needed to ensure that the right product is chosen for the final loading conditions.

6.5 Designing for Maintenance considerations

S12 Pumping should only be used to facilitate drainage for those parts of the site where it is not reasonably practicable to drain water by gravity.

There are no plans to have surface water pumping, all surface water to be contained at source.

6.6 Construction

S13 The mode of construction of any communication with an existing sewer or drainage system must be such that the making of the communication would not be prejudicial to the structural integrity and functionality of the sewerage or drainage system.
S14 Damage to the drainage system resulting from associated construction activities must be minimised and must be rectified before the drainage system is completed.

A section 106 application will be required for the connection to the public sewer. Thames water will provide details of how the connection be allowed to be made to their assets.

7.0 NPPF AND LOCAL POLICY

7.1 Planning Policy Requirements

The proposal site has been classified as being within Flood Zone 1.

NPPF considers Hotel developments as “more vulnerable” in respect of flood risk.

The NPPF (Technical Guide) Table 3, Flood Risk Vulnerability and Flood Zone Compatibility matrix indicates that “more vulnerable” development proposals in Flood Zone 1 are accepted.

8.0 FLOOD MITIGATION MEASURES

8.1 Improvements will be made to the drainage system which will reduce the risk of flooding.

9.0 CONCLUSIONS AND RECOMMENDATIONS

9.1. This report gives details of the flood risk assessment, which has been carried out in relation to the proposed redevelopment of an existing retail unit on 115-119 Camden High Street, Camden, London NW1 7JR and conversion into a Hub Hotel Premier Inn.

9.2 The site is in Flood Zone 1 and therefore is within the lowest risk of flooding. Also, the EA indicate that the risk of flooding from both surface water and reservoirs is very low, and existing borehole records from the area indicate low risk of ground water flooding.

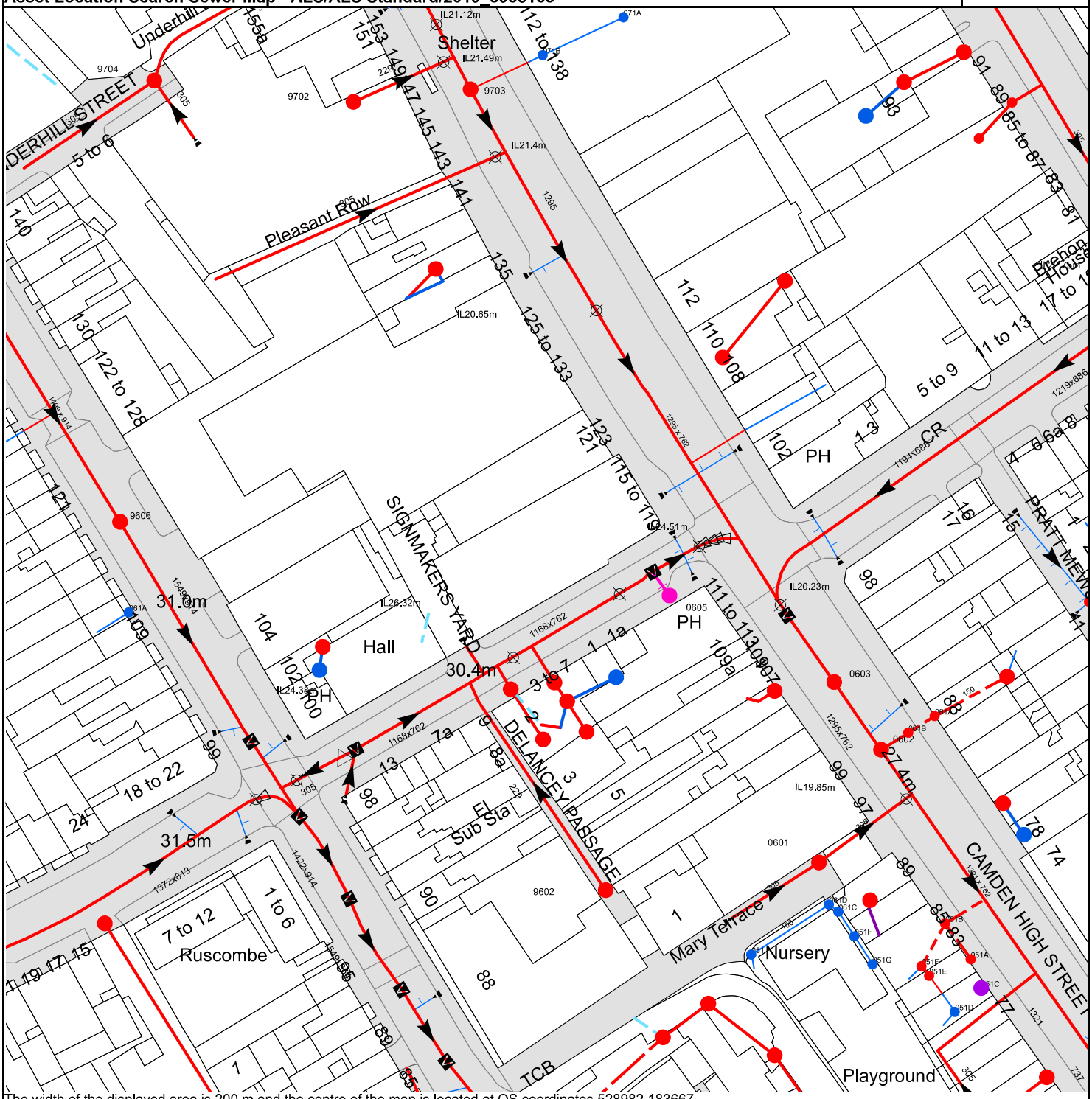
9.3 Therefore, the site can be considered to be at low risk from all forms of flooding.

9.4 The development does impact on the discharges to the drainage system. Improvements with the use of attenuation storage will reduce the potential for floods both on and off site.

APPENDIX A

Existing Drawings & Details

Asset Location Search Sewer Map - ALS/ALS Standard/2019_3938165



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 528982,183667

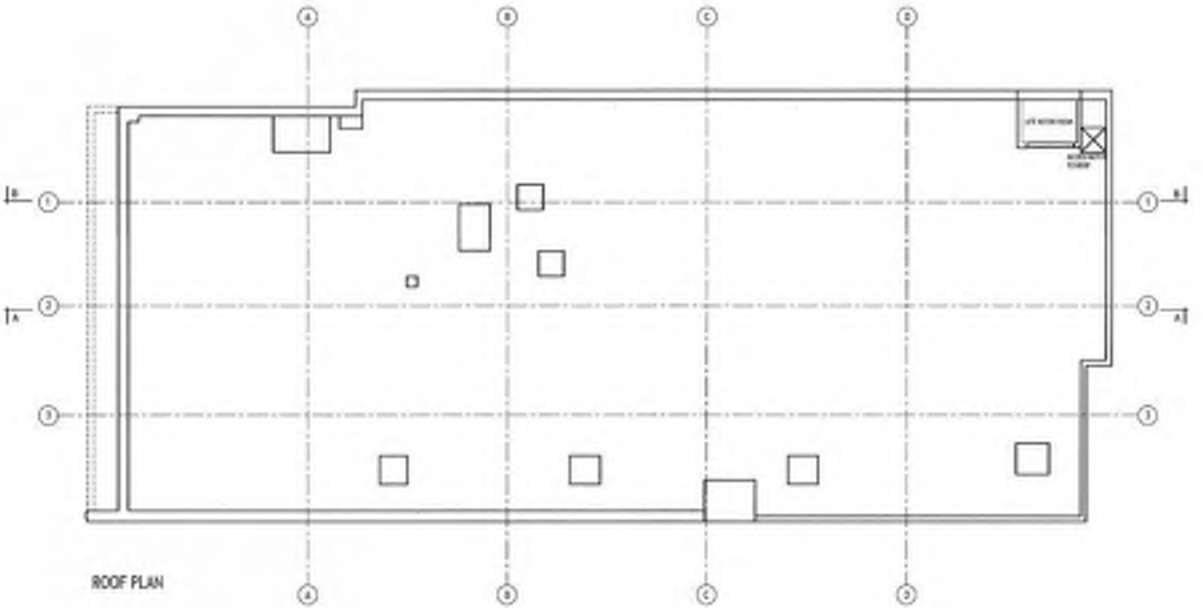
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual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

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

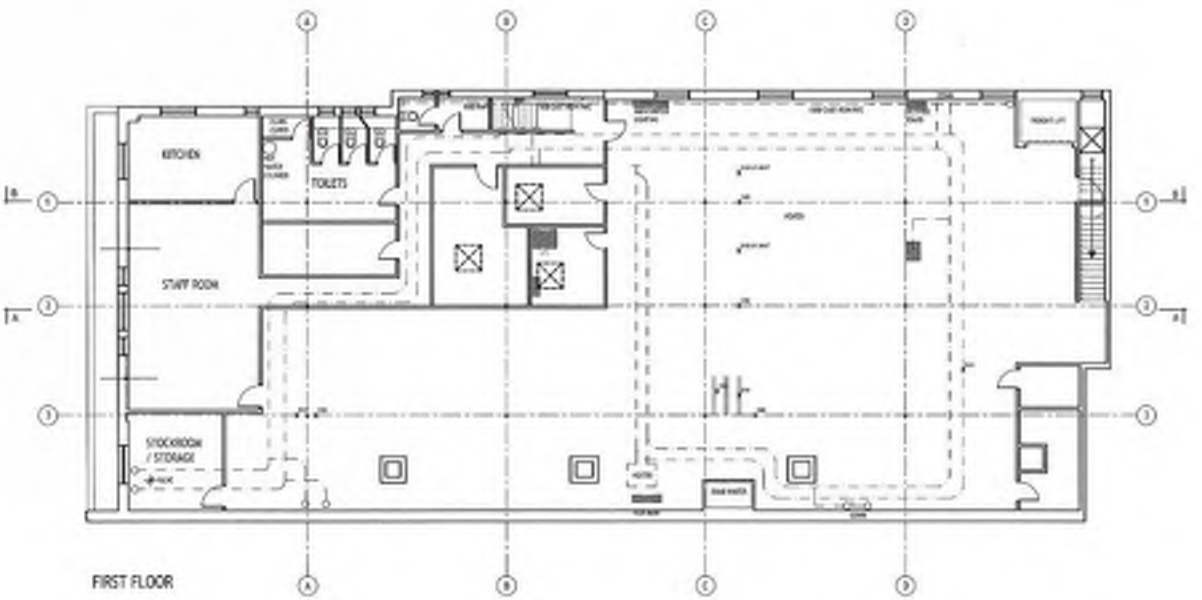
Manhole Reference	Manhole Cover Level	Manhole Invert Level
0602	n/a	n/a
07CC	n/a	n/a
061B	n/a	n/a
051E	n/a	n/a
061A	n/a	n/a
07CD	n/a	n/a
051A	n/a	n/a
07BH	n/a	n/a
051C	n/a	n/a
06EC	n/a	n/a
06FF	n/a	n/a
07BI	n/a	n/a
06EB	n/a	n/a
05DA	n/a	n/a
05FI	n/a	n/a
971A	n/a	n/a
95EB	n/a	n/a
9606	31.16	23.96
961A	n/a	n/a
9704	30.25	27.43
96DG	n/a	n/a
96DH	n/a	n/a
9702	n/a	25.67
97DA	n/a	n/a
9703	n/a	n/a
9634	29.96	28.46
971B	n/a	n/a
9633	29.89	29.03
9632	29.82	28.19
96EI	n/a	n/a
96EH	n/a	n/a
9602	29.41	n/a
96EG	n/a	n/a
05EE	n/a	n/a
0605	n/a	n/a
05EF	n/a	n/a
07BE	n/a	n/a
06HA	n/a	n/a
07AF	n/a	n/a
0601	n/a	n/a
0603	n/a	n/a
07CB	n/a	n/a
06FA	n/a	n/a
051D	n/a	n/a
051F	n/a	n/a
051G	n/a	n/a
051H	n/a	n/a
051B	n/a	n/a
061C	n/a	n/a
061D	n/a	n/a
061F	n/a	n/a
051I	n/a	n/a

TQ 58 NE/7-9

Bore-hole Ref. No.	Site of Borehole	Strata: Description	Strata: Thickness	Strata: Depth below surface	Sulphate Traction in clay per cent SO_3: Depth of Sample	Sulphate Traction in clay per cent SO_3: %	Sulphate Traction in ground water parts SO_3 per 100,000: Depth of ground water	Sulphate Traction in ground water parts SO_3 per 100,000: Parts per 100,000	Date of Bore-hole	Remarks
9.	St. Mary's Lane nr. junction with Garbut Road. TQ/58NE/7 5639 9667	Fill (clay gravel and brick rubble).	3'- 6"	3'- 6" (1.07m)	6'- 6"	0.17	No ground water encountered during boring.		7. 4.61	- Ditto -
		Firm mottled brown and grey clay with some gypsum crystals (London clay).	8'- 6"	12'- 0" (3.66m)						
10.	Boyneourt Gdns., near junction with Grosvenor Gardens. TQ/58NE/8 5649 9696	Tarmacadam	0'- 3"	0'- 3"	6'- 6"	0.02	6'- 6"	266	Ditto	- Ditto -
		Fill (gravel and brick rubble).	1'- 3"	1'- 6" (0.45m)						
		Fill (firm to stiff brown clay with brick rubble).	2'- 0"	3'- 6" (1.07m)						
11.	Front Lane near junction with Greenbanks. TQ/58NE/9 5724 8696	Topsoil	0'- 3"	0'- 3" (0.09m)	11'- 6"	0.64	13'- 0" (No ground water encountered during boring but a seepage was subsequently noted).	501	-ditto-	- Ditto -
		Fill (sandy clay, gravel and cinders).	1'- 3"	1'- 6" (0.45m)						
		Stiff mottled brown and grey clay with some gypsum crystals (London clay).	18'- 6"	20'- 0" (6.10m)						



ROOF PLAN



FIRST FLOOR

All scaled dimensions to be taken from this drawing, are dimensions to be strictly checked.

To be read in conjunction with Structural Engineers' drawing.

- Key Switch
- 240v Switched Socket High level
- Switched socket outlet
- Twin switched socket outlet
- Switchable fused spur
- Un-switchable fused spur
- Co-Axial cable Box
- BT / Fax Point
- Light switch
- Pull cord light switch
- Fire Exit sign 75mm letters
- Fire Exit sign 125mm letters
- Emergency Light
- Distribution Board
- Air Conditioning Control Panel
- Security Alarm Panel
- Security Alarm Keypad
- Fire Alarm Control Panel
- Wall Mounted Light
- Existing Partitions
- New Metal Stud Partitions
- Cat. Point
- Smoke Detector
- Heat Detector
- Relay
- Detector Sounder
- Beacon

CONTRACT DOCUMENT

The Employer

The Contractor

Witness Date

AREA SCHEDULE

Ground Floor

First Floor

Total

Revisions

No.	Note	Date

masten brennan henshaw

ARCHITECTS ENGINEERS SURVEYORS

Client:
SPORTSDIRECT.COM RETAIL Ltd

Site:
115-119 CAMDEN HIGH STREET
LONDON NW1 7JS

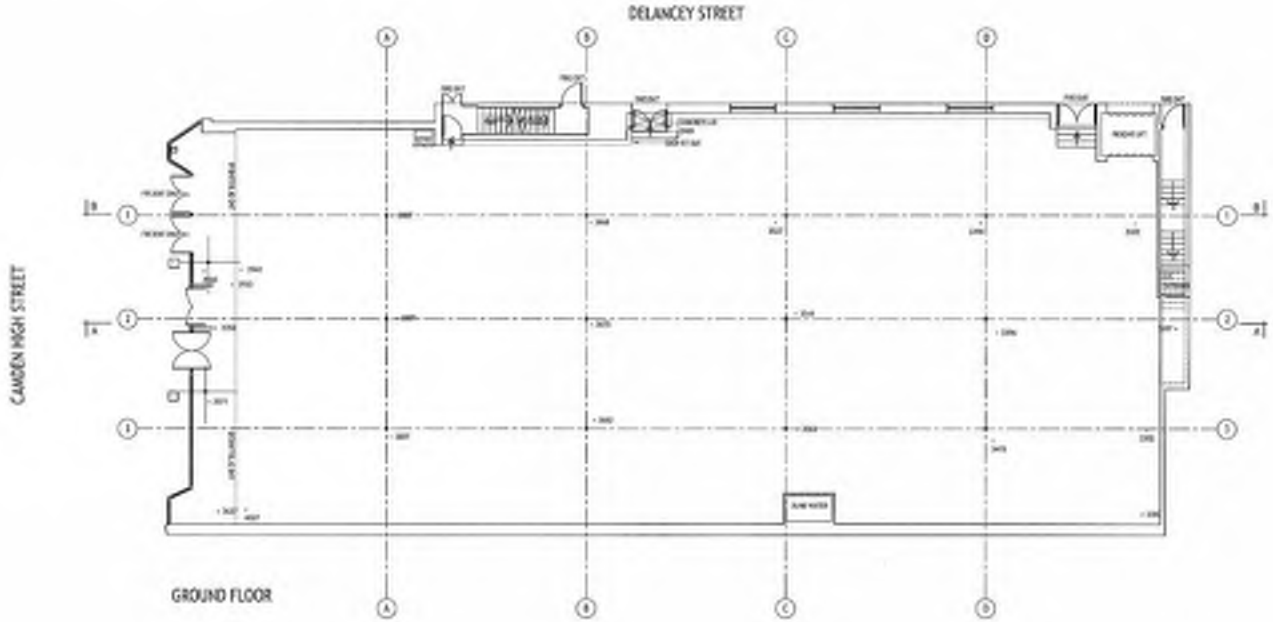
Drawing Title:
FIRST FLOOR & ROOF PLANS AS EXISTING

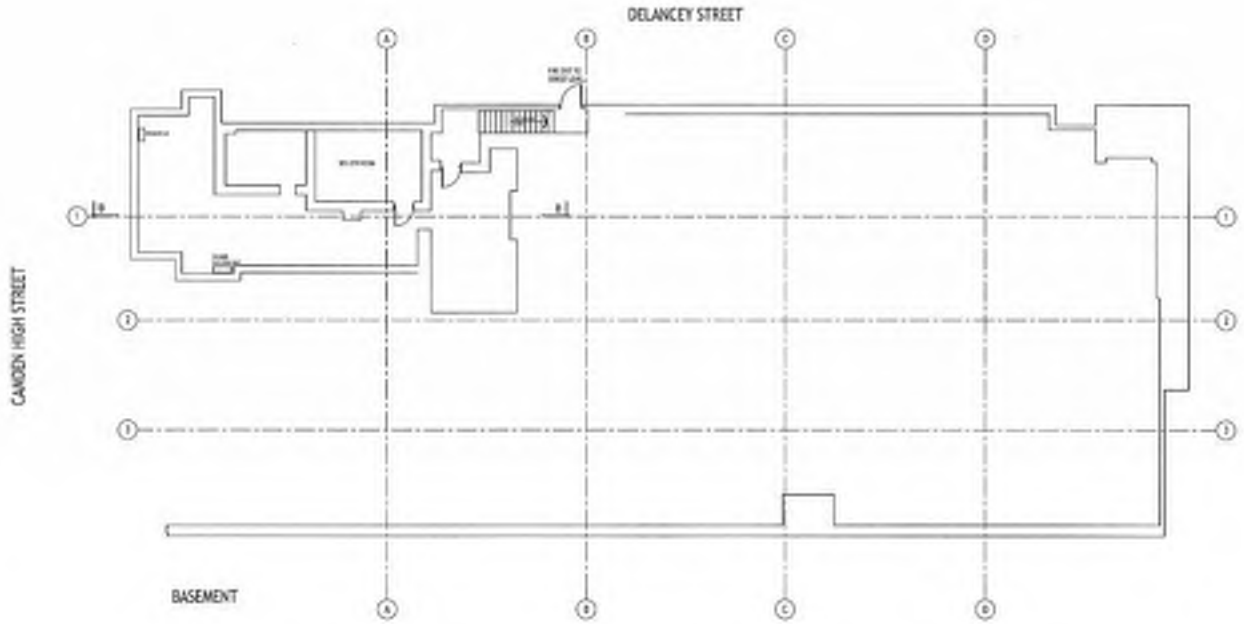
Scale: 1:100

Date: MAR 2009

Dwg. No. 6763/02

Rev.





No scaled dimensions to be taken from this drawing. All dimensions to be site checked.

To be read in conjunction with Structural Engineers drawing.

- Key Switch
- 240v Switched Socket High Level
- switched socket outlet
- Twin switched socket outlet
- Switchable fused spur
- Un-switchable fused spur
- Co-Axial cable link
- BT / Fax Point
- Light switch
- Pull cord light switch
- Fire Exit sign 75mm letters
- Fire Exit sign 125mm letters
- Emergency Light
- Distribution Board
- Air Conditioning Control Panel
- Security Alarm Panel
- Security Alarm Keypad
- Fire Alarm Control Panel
- Wall Mounted Light
- Existing Partitions
- New Metal Stud Partitions
- Call Point
- Smoke Detector
- Heat Detector
- Relay
- Detector Sounder
- Beacon

CONTRACT DOCUMENT

For Employer

For Contractor

Witness Date

AREA SCHEDULE

Ground Floor

First Floor

Total

Revisions

No.	Note	Date
5 ADDITIONAL INFORMATION ADDED		11.04.09
6 SUBDIV UPDATES		14.05.09

maslen brennan henshaw
ARCHITECTS
ENGINEERS
SURVEYORS

Client:
SPORTSDIRECT.COM
RETAIL Ltd

Site:
115-119 CAMDEN HIGH STREET
LONDON NW1 7JS

Drawing Title:
BASEMENT & GROUND
FLOOR PLANS
AS EXISTING

Scale: 1:100

Date: MAR 2009

Dwg. No. 6762/01

Rev. B

EXISTING ELEVATION A

NOTES

Do not scale this drawing.

All dimensions and levels to be checked by contractor on site prior to commencement or manufacture.

Rev	Date	By	Chk	Comment
A	11.03.19	APS	APS	Levels related to OS Datum.

Lane & Frankham

Lane & Frankham Limited
Third Floor,
Baird House,
15-17 St Cross Street,
London, EC1N 8UW
T: 020 8309 2662 M: 07966 491688
E: info@laneandfrankham.com
www.laneandfrankham.com

Client
JLL
30 Warwick Street
London. W1B 5NH

Project Title
–
115–119 Camden High Street
London NW1 7JR
–

Drawing Title
–
Existing Front Elevation
–
–

Drawn by:	Scale:	Date:
APS	1:50 @A1	10.09.2018
Designed by: APS	Checked by: APS	Approved by: –

File Ref.:

Drawing No.	Rev.
LF1759–E–01	A

NOTES

Do not scale this drawing.

All dimensions and levels to be checked by contractor on site prior to commencement or manufacture.

Rev	Date	By	Chk	Comment
A	11.03.19	APS	APS	Levels related to OS Datum.

Lane & Frankham

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E: info@laneandfrankham.com
www.laneandfrankham.com

Client
JLL
30 Warwick Street
London. W1B 5NH

Project Title
115–119 Camden High Street
London NW1 7JR

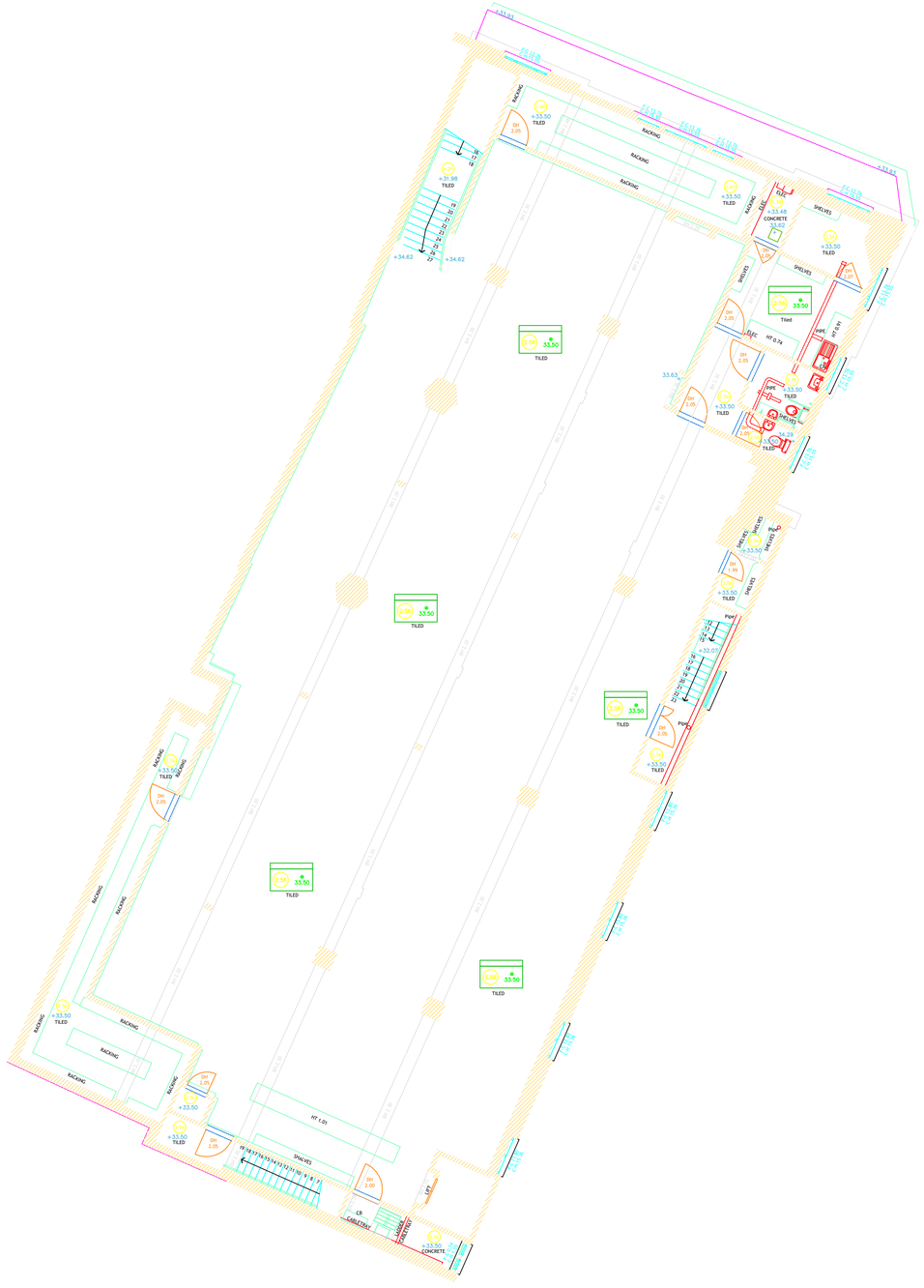
Drawing Title
–
Existing Basement Plan
–
–

Drawn by: APS	Scale: 1:100 @A1	Date: 10.09.2018
Designed by: APS	Checked by: APS	Approved by: –

File Ref.:

Drawing No. LF1759–FP–B

Rev. A



NOTES

Do not scale this drawing.

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Rev	Date	By	Chk	Comment
A	11.03.19	APS	APS	Levels related to OS Datum.

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www.laneandfrankham.com

Client
JLL
30 Warwick Street
London. W1B 5NH

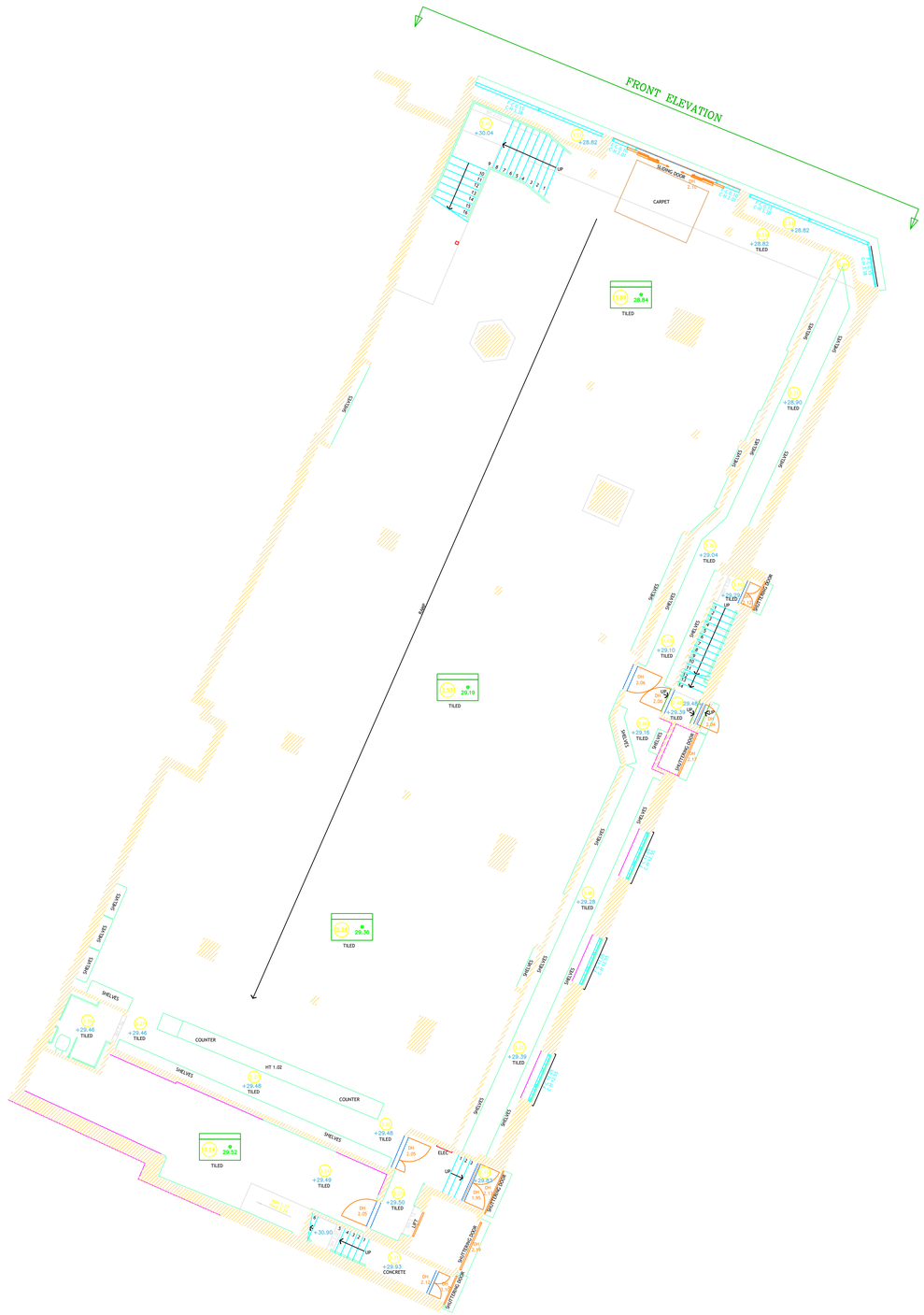
Project Title
–
115–119 Camden High Street
London NW1 7JR
–

Drawing Title
–
Existing First Floor
–
–

Drawn by:	Scale:	Date:
APS	1:100 @A1	10.09.2018
Designed by:	Checked by:	Approved by:
APS	APS	–

File Ref.:

Drawing No.	Rev.
LF1759–FP–01	A



NOTES

Do not scale this drawing.

All dimensions and levels to be checked by contractor on site prior to commencement or manufacture.

Rev	Date	By	Chk	Comment
A	11.03.19	APS	APS	Levels related to OS Datum.

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www.laneandfrankham.com

Client
JLL
30 Warwick Street
London. W1B 5NH

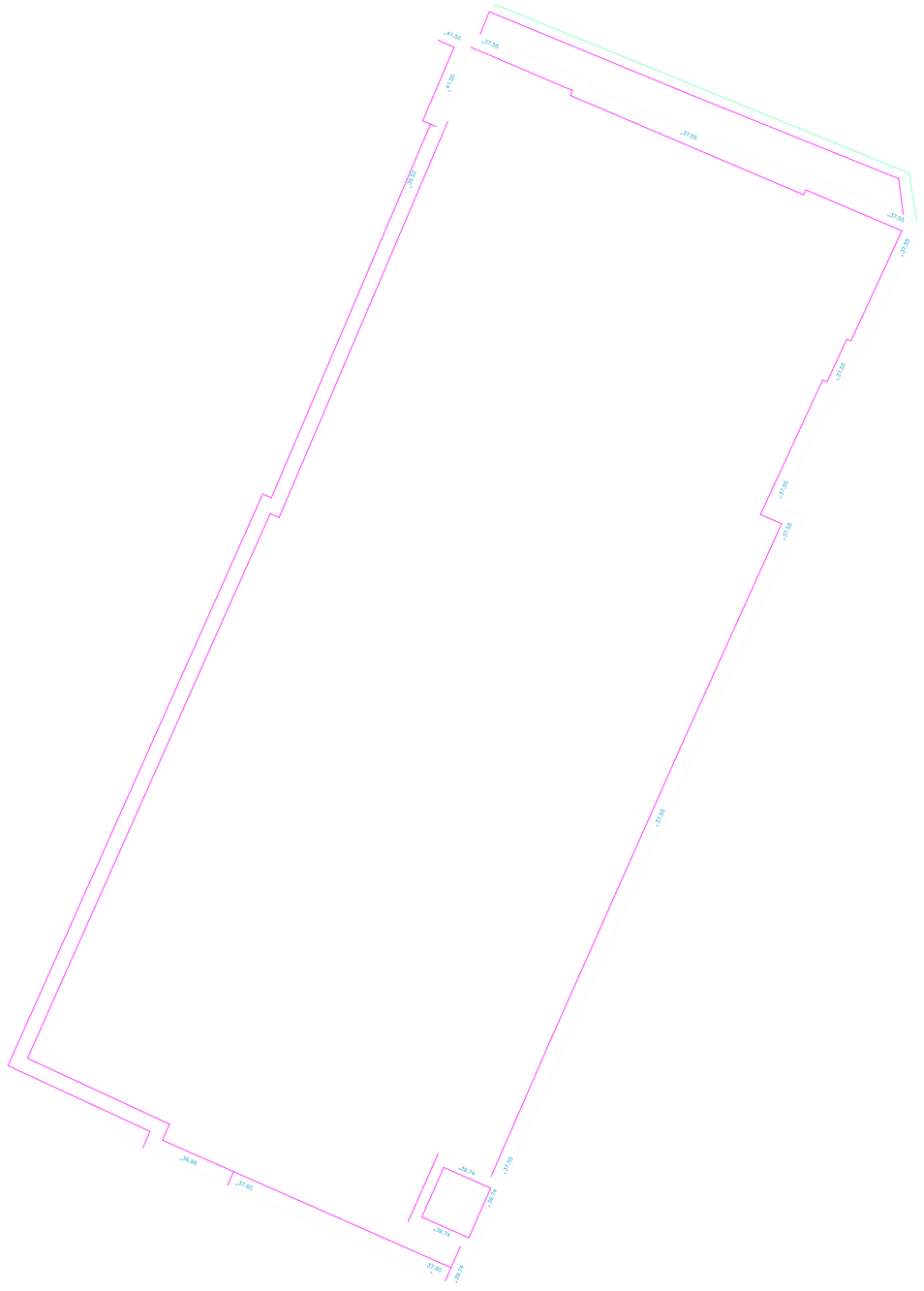
Project Title
–
115–119 Camden High Street
London NW1 7JR
–

Drawing Title
–
Existing Ground Floor
–
–

Drawn by:	Scale:	Date:
APS	1:100 @A1	10.09.2018
Designed by: APS	Checked by: APS	Approved by: –

File Ref.:

Drawing No. LF1759–FP–G | Rev. A



NOTES

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All dimensions and levels to be checked by contractor on site prior to commencement or manufacture.

Rev	Date	By	Chk	Comment
A	11.03.19	APS	APS	Levels related to OS Datum.

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www.laneandfrankham.com

Client
JLL
30 Warwick Street
London. W1B 5NH

Project Title
–
115–119 Camden High Street
London NW1 7JR
–

Drawing Title
–
Existing Outline Roof Plan
–
–

Drawn by:	Scale:	Date:
APS	1:100 @A1	10.09.2018
Designed by: APS	Checked by: APS	Approved by: –

File Ref.:

Drawing No.	Rev.
LF1759–FP–R	A

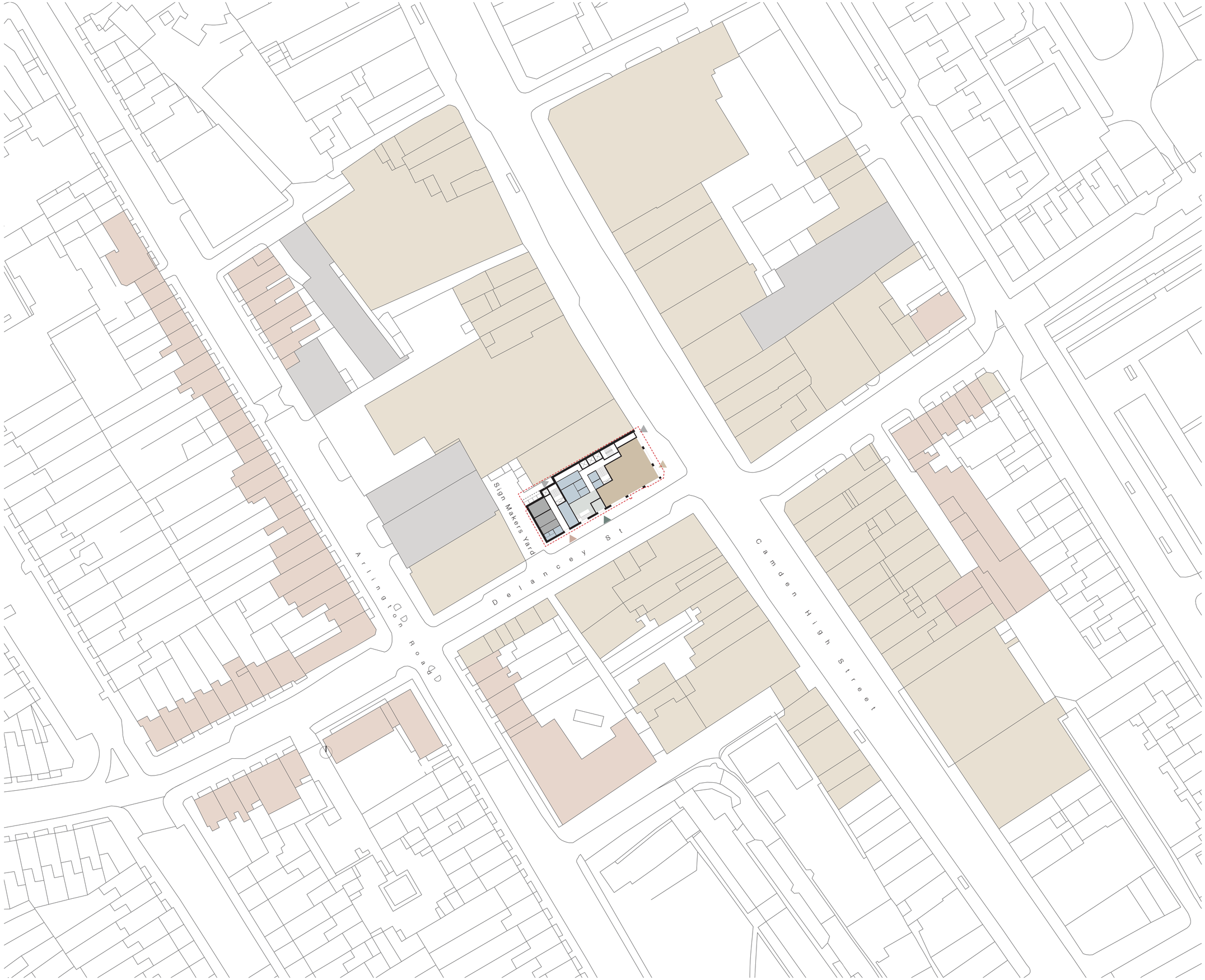
APPENDIX B

Proposed Drawings & Details

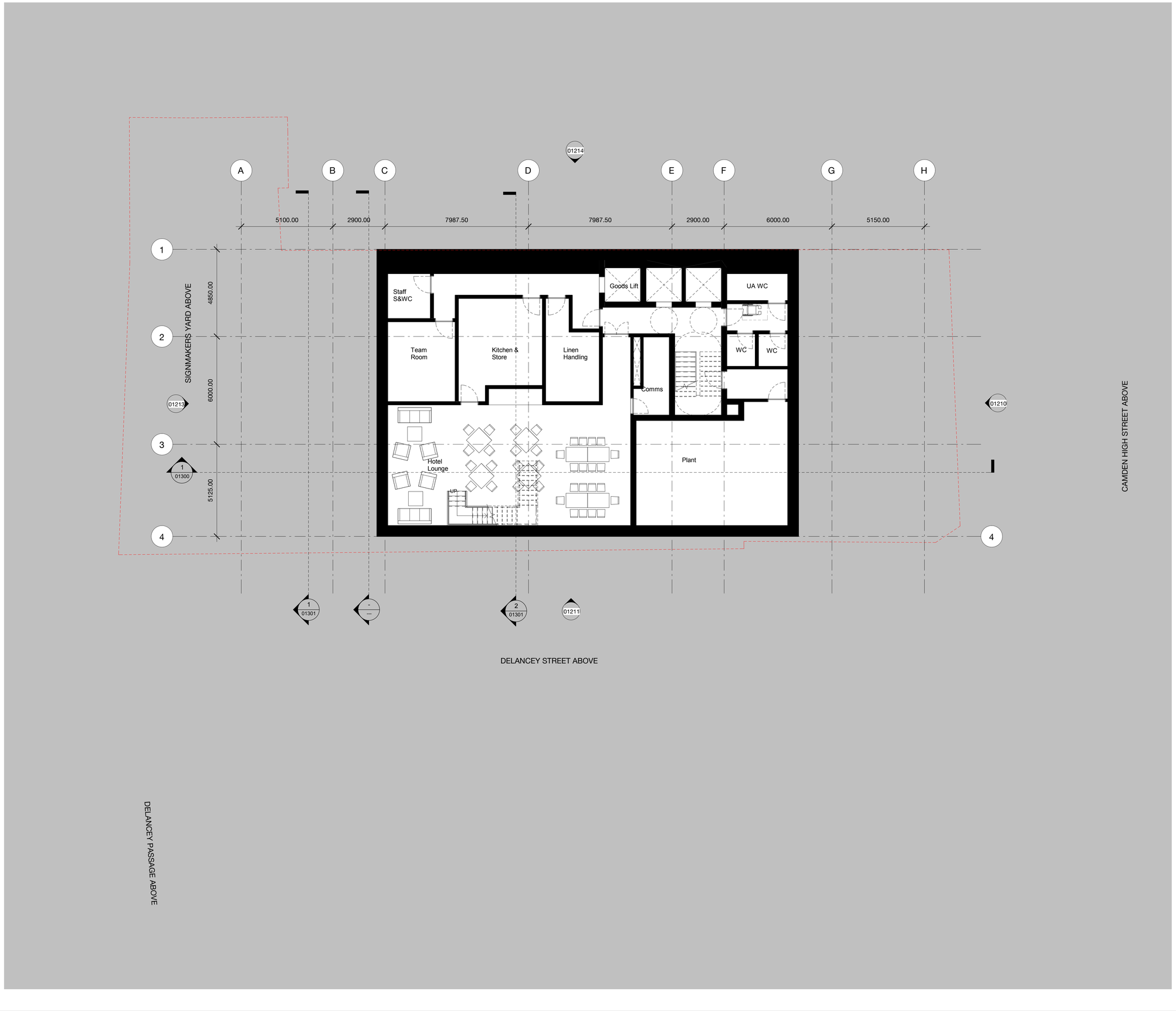
115 - 119 Camden High Street

Site plan

Site plan with uses on the ground floor level



- Existing building footprint
- Hotel entrance
- Retail entrance
- Residential entrance
- Servicing access / fire exit
- Hotel reception
- Ancillary room
- Plant room



KEY LEGEND

Site ownership boundary

NOTES:

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- Internal Layout Detailed Drawings (AXIOM)
- Structural Engineers Drawings and Specification (Clancy)
- MEP Engineers Drawings and Specification (PSH Consulting)
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- Daylight & Sunlight Report (Point2Survey)
- Access and Maintenance Report (Morris+Company)

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- Approved Inspector / Building Control
- Access Consultant

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revision	date	amendment

SCALE BAR

0 1000 2000 5000 10000 mm

MORRIS+COMPANY
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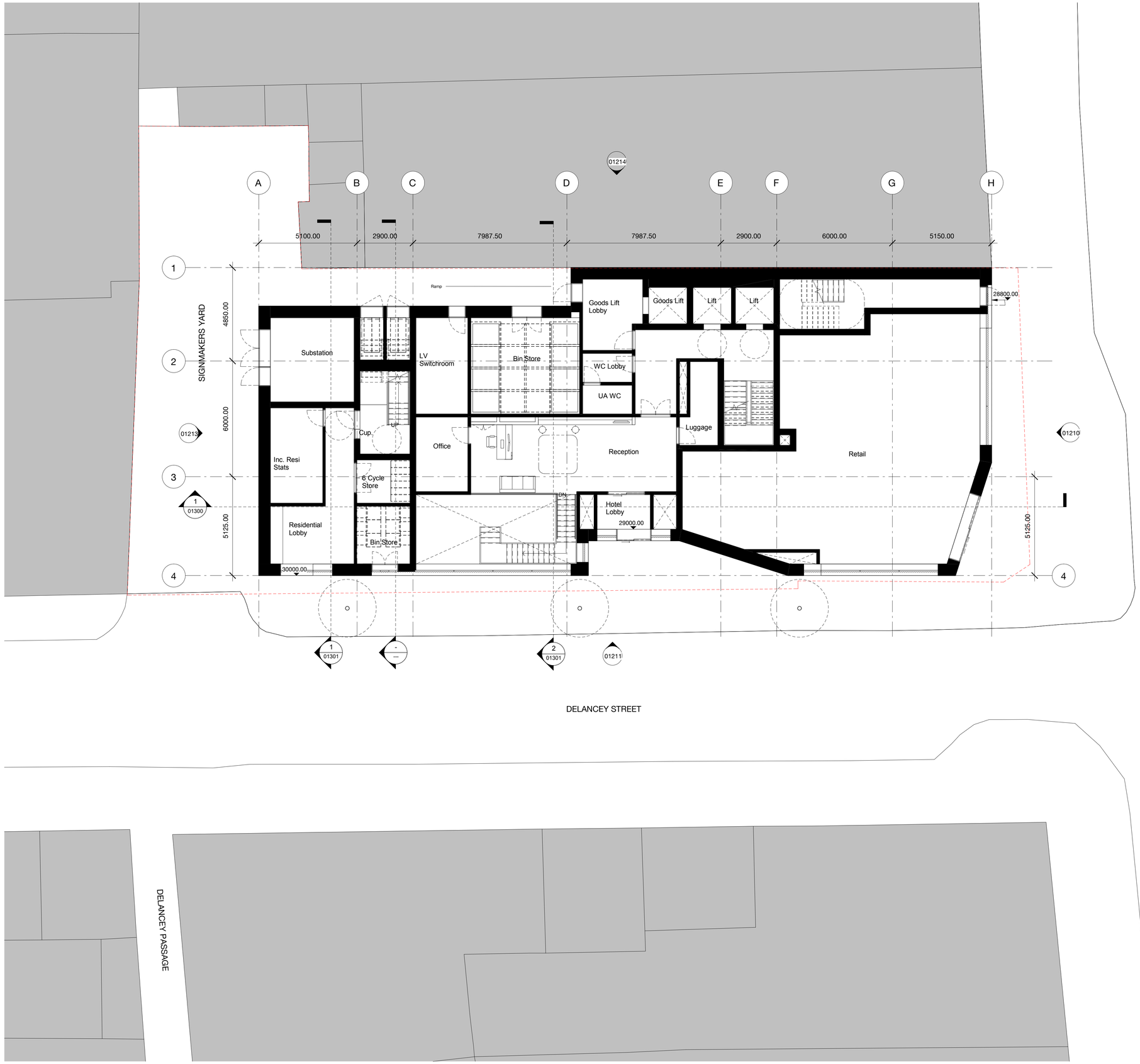
www.morrisand.company

- Do not scale from this drawing
- All dimensions to be checked on site by the Contractor
- And such dimensions to be their responsibility
- Report all drawing errors and omissions to the Architect
- All dimensions in millimeters unless noted otherwise
- If in doubt ask Contract Administrator

job title
Camden High Street Hub Hotel

drawing title / location
Proposed Basement Plan

status	Stage 2							
date	12/02/2019							
scale	1 : 100 @ A1				1:200 @ A3			
project	originator	zone	level	type	role	number	status - revision	
A277	MCO	XX	B0	DR	A	01109		



KEY LEGEND

Site ownership boundary

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revision	date	amendment

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job title
Camden High Street Hub Hotel

drawing title / location
Proposed Ground Floor Plan

status	Stage 2							
date	24/06/2016							
scale	1 : 100 @ A1				1:200 @ A3			
project	originator	zone	level	type	role	number	status - revision	
A277	MCO	XX	G0	DR	A	01110		

KEY LEGEND

Site ownership boundary

NOTES:

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revision	date	amendment

N

SCALE BAR

0 1000 2000 5000 10000 mm

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- If in doubt ask Contract Administrator

job title
Camden High Street Hub Hotel

drawing title / location
Proposed First Floor Plan

status	Stage 2							
date								
scale	1 : 100 @ A1				1:200 @ A3			
project	originator	zone	level	type	role	number	status - revision	
A277	MCO	XX	01	DR	A	01111		

KEY LEGEND

Site ownership boundary

NOTES:

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- Structural Engineers Drawings and Specification (Clancy)
- MEP Engineers Drawings and Specification (PSH Consulting)
- Acoustic Report (24 Acoustic)
- Transport & Servicing Strategy Report (RGP)
- Townscape & Heritage Report (KM Heritage)
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revision	date	amendment

N

SCALE BAR

0 1000 2000 5000 10000 mm

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- If in doubt ask Contract Administrator

job title
Camden High Street Hub Hotel

drawing title / location
Proposed Second Floor Plan

status	Stage 2							
date								
scale	1 : 100 @ A1				1:200 @ A3			
project	originator	zone	level	type	role	number	status - revision	
A277	MCO	XX	02	DR	A	01112		

KEY LEGEND

Site ownership boundary

NOTES:

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- Structural Engineers Drawings and Specification (Clancy)
- MEP Engineers Drawings and Specification (PSH Consulting)
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- Fire Engineer
- Landscape Architect
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- Access Consultant

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revision	date	amendment

N

SCALE BAR

0 1000 2000 5000 10000 mm

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job title
Camden High Street Hub Hotel

drawing title / location
Proposed Third Floor Plan

status	Stage 2							
date								
scale	1 : 100 @ A1				1:200 @ A3			
project	originator	zone	level	type	role	number	status - revision	
A277	MCO	XX	03	DR	A	01113		

KEY LEGEND

Site ownership boundary

NOTES:

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- Internal Layout Detailed Drawings (AXIOM)
- Structural Engineers Drawings and Specification (Clancy)
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- Townscape & Heritage Report (KM Heritage)
- Daylight & Sunlight Report (Point2Survey)
- Access and Maintenance Report (Morris+Company)

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revision	date	amendment

SCALE BAR

0 1000 2000 5000 10000 mm

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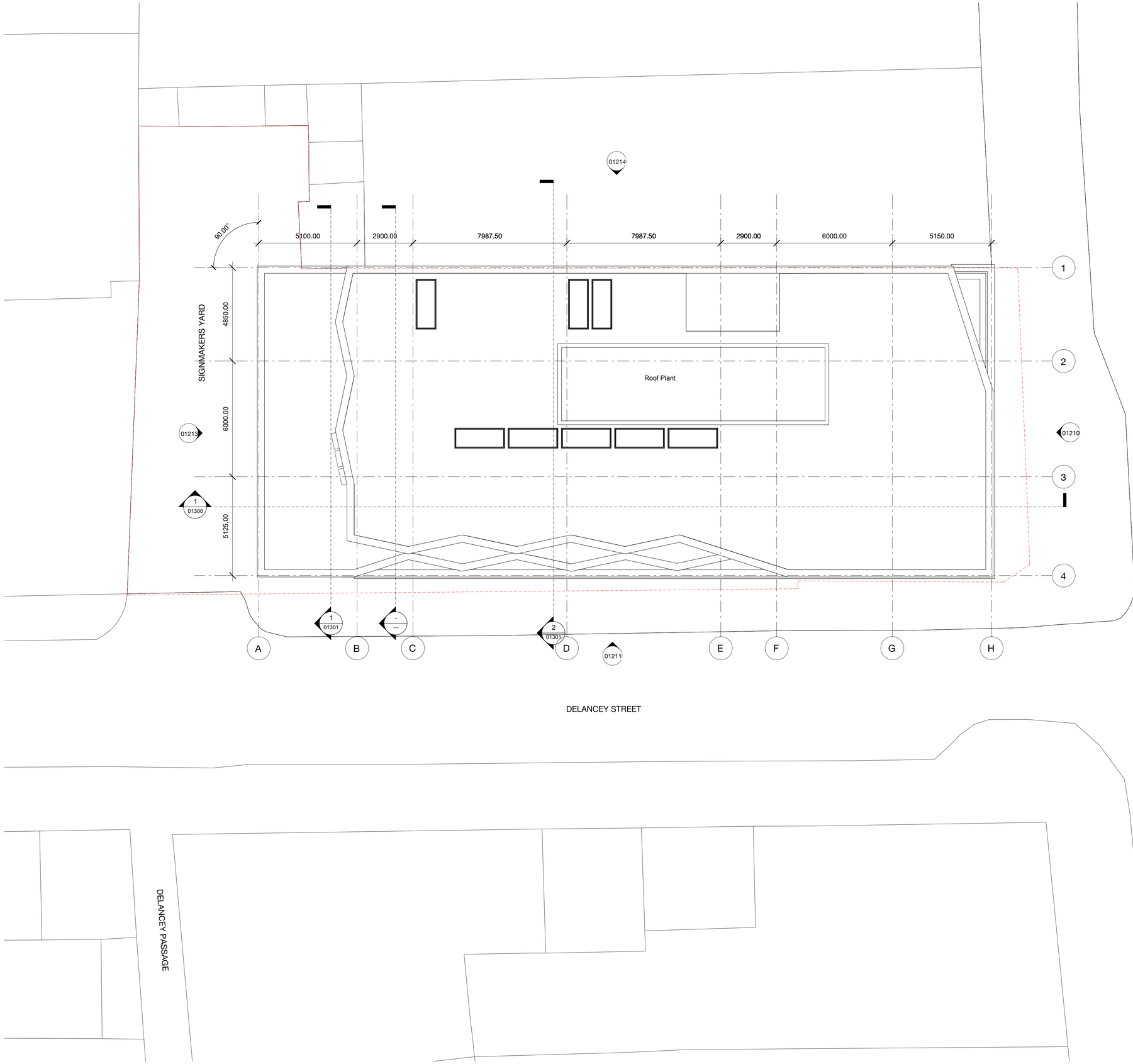
job title
Camden High Street Hub Hotel

drawing title / location
Proposed Fourth Floor Plan

status	Stage 2						
date							
scale	1 : 100 @ A1				1:200 @ A3		
project	originator	zone	level	type	role	number	status - revision
A277	MCO	XX	04	DR	A	01114	



KEY LEGEND

Site ownership boundary

NOTES:

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revision	date	amendment

N

SCALE BAR

0 1000 2000 5000 10000 mm

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job title
Camden High Street Hub Hotel

drawing title / location
Proposed Roof Plan

status	Stage 2							
date								
scale	1 : 100 @ A1				1:200 @ A3			
project	originator	zone	level	type	role	number	status - revision	
A277	MCO	XX	R0	DR	A	01115		

APPENDIX C

Proposed Drainage Scheme & Calculations

HR Wallingford
Working with water

Greenfield runoff estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	
Site name:	Camden Hub Hotel
Site location:	Camden High Street

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site coordinates

Latitude:	51.53720° N
Longitude:	0.14148° W

Reference:	
Date:	2019-05-17 11:11

Methodology	IH124

Site characteristics

Total site area (ha)	0.1

Methodology

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type

	Default	Edited
SOIL type	4	4
HOST class	---	---
SPR/SPRHOST	0.47	0.47

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 year	2.3	2.3
Growth curve factor: 100 year	3.19	3.19

Notes:

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

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

Where flow rates are less than 5.0 l/s consents are usually set at 5.0l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set in which case blockage work must be addressed by using appropriate drainage elements

(3) Is SPR/SPRHOST ≤ 0.3?

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	0.42	0.42
1 in 1 year (l/s)	0.36	0.36
1 in 30 years (l/s)	0.97	0.97
1 in 100 years (l/s)	1.35	1.35

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Project				Job no.	
Camden Hub Hotel, Camden High Street				8/2022	
Calcs for				Start page no./Revision	
1 in 1 Year 15 min Event				1	
Calcs by	Calcs date	Checked by	Checked date	Approved by	Approved date
RB	16/05/2019	LP	15/02/2019	LP	15/02/2019

DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.01

Design rainfall intensity

Location of catchment area	London
Storm duration	D = **15** min
Return period	Period = **1** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.440**
5-year return period rainfall of 60 minutes duration	M5_60min = **20.0** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **0** %
Factor Z1 (Wallingford procedure)	Z1 = **0.65**
Rainfall for 15min storm with 5 year return period	$M5\_15min_i = Z1 \times M5\_60min$ = **12.9** mm
Factor Z2 (Wallingford procedure)	Z2 = **0.62**
Rainfall for 15min storm with 1 year return period	$M1\_15min = Z2 \times M5\_15min_i$ = **8.0** mm
Design rainfall intensity	I_{max} = M1_15min / D = **31.9** mm/hr

Maximum surface water runoff

Catchment area	A_{catch} = **1080** m^2
Percentage of area that is impermeable	p = **100** %
Maximum surface water runoff	$Q_{max} = A_{catch} \times p \times I_{max}$ = **9.6** l/s

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Project				Job no.	
Camden Hub Hotel, Camden High Street				8/2022	
Calcs for				Start page no./Revision	
1 in 100 Year Storm Event				1	
Calcs by	Calcs date	Checked by	Checked date	Approved by	Approved date
RB	16/05/2019	LP	15/02/2019	LP	15/02/2019

DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.01

Design rainfall intensity

Location of catchment area	London
Storm duration	D = **15** min
Return period	Period = **100** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.440**
5-year return period rainfall of 60 minutes duration	M5_60min = **20.0** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **0** %
Factor Z1 (Wallingford procedure)	Z1 = **0.65**
Rainfall for 15min storm with 5 year return period	$M5\_15min_i = Z1 \times M5\_60min$ = **12.9** mm
Factor Z2 (Wallingford procedure)	Z2 = **1.96**
Rainfall for 15min storm with 100 year return period	$M100\_15min = Z2 \times M5\_15min_i$ = **25.3** mm
Design rainfall intensity	I_{max} = M100_15min / D = **101.2** mm/hr

Maximum surface water runoff

Catchment area	A_{catch} = **1080** m^2
Percentage of area that is impermeable	p = **100** %
Maximum surface water runoff	$Q_{max} = A_{catch} \times p \times I_{max}$ = **30.4** l/s

BLUE ROOF STORAGE AND OUTFLOW SUMMARY

PRIVATE & CONFIDENTIAL - NOT FOR DISTRIBUTION

Project Name:	115-119 Camden High Street, London, NW1 7JR - Lower Roof		
Prepared for:	Clancy Consulting		
Date:	17/05/2019		
ABG Project ID:	17338	Calculator version:	1.2
Prepared by:	Kirstin Forsythe, 01484 354844, kirstin@abgltd.com		
Notes/description:	Ballasted or paved finish. Maintenance or Pedestrian amenity access only. Warm/inverted roof construction, with zero falls.		

Blue Roof Estimate

Input Parameters - Rainfall Information (Flood Studies Report 1975)		
Return period:	100 years	*As supplied by Client*
Allowance for Climate Change:	40 %	*As supplied by Client*
Location selected for FSR data:	London (NW)	

Input Parameters - Roof Information		
Total catchment area:	65 m^2	*As supplied by Client*
Attenuation area:	65 m^2	*As supplied by Client*
Maximum allowable runoff:	0.6 l/s	*As supplied by Client*

Output - Rainfall Calculation

Duration	Time to Empty	Restricted Outflow (l/s)
15 mins	1 hour and 20 minutes	0.5
30 mins	1 hour and 30 minutes	0.6
1 hour	1 hour and 30 minutes	0.6
2 hours	1 hour and 20 minutes	0.5
4 hours	0 hours and 40 minutes	0.3
6 hours	0 hours and 10 minutes	0.2
10 hours	0 hours and 0 minutes	0.0
24 hours	0 hours and 0 minutes	0.0
48 hours	0 hours and 0 minutes	0.0

Total attenuation required: 2.9 m^3
Half empty time: 0 hours and 40 minutes.

Output - Recommended Blue Roof System	
System Name:	ABG blueroof 58mm
Description:	No.of control positions TBC by design team, and also with the structural engineer's deflection analysis.
Total attenuation capacity:	3.2 m^3
Number of Blue Roof outlets:	2

Notes:

1. This document contains an estimate which has been prepared by ABG Ltd and is illustrative only and not a detailed design.
2. Further details on the theories used in this estimate are available upon request from ABG. The values given are indicative and correspond to nominal results obtained in our laboratories and testing institutes. In line with our policy of continuous improvement the right is reserved to make changes without notice at any time.
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BLUE ROOF STORAGE AND OUTFLOW SUMMARY

PRIVATE & CONFIDENTIAL - NOT FOR DISTRIBUTION

Project Name:	115-119 Camden High Street, London, NW1 7JR - Main Roof		
Prepared for:	Clancy Consulting		
Date:	17/05/2019		
ABG Project ID:	17338	Calculator version:	1.2
Prepared by:	Kirstin Forsythe, 01484 354844, kirstin@abgltd.com		
Notes/description:	Ballasted finish. Maintenance access only. Warm/inverted roof construction, with zero falls.		

Input Parameters - Rainfall Information (Flood Studies Report 1975)

Return period:	100 years	*As supplied by Client*
Allowance for Climate Change:	40 %	*As supplied by Client*
Location selected for FSR data:	London (NW)	

Input Parameters - Roof Information

Total catchment area:	456 m^2	*As supplied by Client*
Attenuation area:	414 m^2	*As supplied by Client*
Maximum allowable runoff:	3.9 l/s	*As supplied by Client*

Output - Rainfall Calculation

Duration	Time to Empty	Restricted Outflow (l/s)
15 mins	1 hour and 30 minutes	3.3
30 mins	1 hour and 50 minutes	3.6
1 hour	1 hour and 50 minutes	3.7
2 hours	1 hour and 40 minutes	3.4
4 hours	1 hour and 0 minutes	2.4
6 hours	0 hours and 20 minutes	1.4
10 hours	0 hours and 0 minutes	0.3
24 hours	0 hours and 0 minutes	0.2
48 hours	0 hours and 0 minutes	0.1

Total attenuation required: 21.1 m^3

Half empty time: 0 hours and 40 minutes.

Output - Recommended Blue Roof System

System Name:	ABG blueroof 80mm
Description:	No.of control positions TBC by design team, and also with the structural engineer's deflection analysis.
Total attenuation capacity:	26.9 m^3
Number of Blue Roof outlets:	2

Notes:

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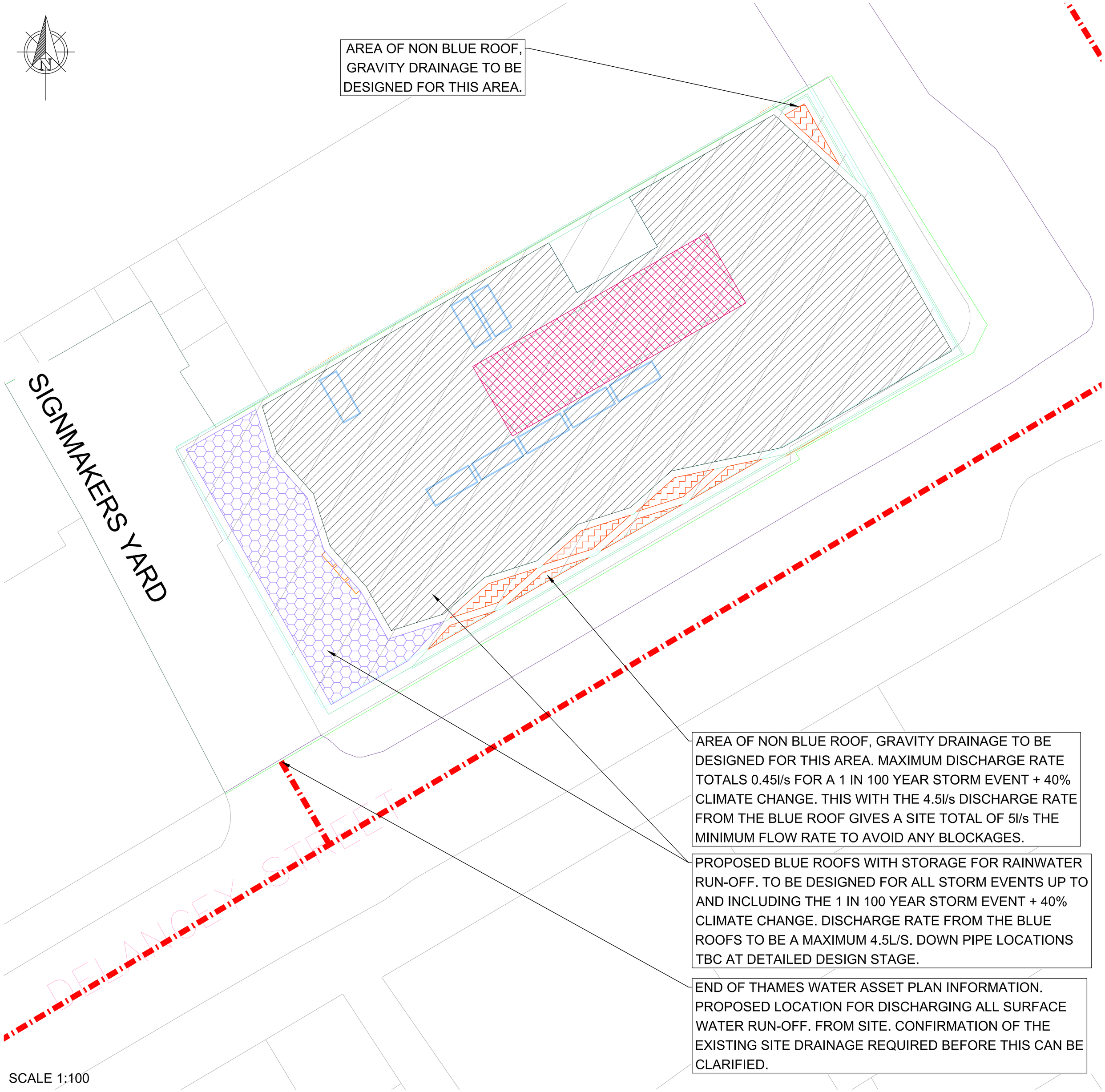

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER ENGINEER'S AND ARCHITECT'S DRAWINGS, DETAILS & SPECIFICATIONS.
2. THE ROOF DESIGN IS BASED UPON MORRIS & COMPANY'S PLAN A277-MCOXX-R0-DR-A--1115 REV A RECEIVED 15.05.2019
3. THE DESIGN SHOWN IS SUBJECT TO CONFIRMATION OF EXISTING FOUL AND SURFACE WATER DISCHARGE LOCATIONS. UPON RECEIPT OF THE CCTV SURVEY THIS DESIGN WILL BE REVIEWED AND CHANGED AS REQUIRED TO ENABLE REUSE OF THE EXISTING DISCHARGE LOCATIONS.
4. ALL BELOW GROUND DRAINAGE WITHIN THE SITE BOUNDARY WILL BE DESIGNED TO BSEN 752:2008 AND BUILDING REGULATIONS - PART H:2015. THE OFF SITE DRAINAGE TO THE PUBLIC SEWER ARE DESIGNED TO SEWERS FOR ADOPTION 7TH EDITION.
5. THIS DESIGN HAS BEEN BASED UPON ASSUMPTIONS OF THE AREAS AND EXISTING DISCHARGE LOCATION POINTS. THIS DESIGN MAY CHANGE WHEN FURTHER DETAILS/INFORMATION ARE AVAILABLE.

DRAINAGE STRATEGY

THE FOLLOWING TEXT DESCRIBES THE SURFACE WATER DRAINAGE DISPOSAL STRATEGY FOR THIS DEVELOPMENT.

THE SITE IS CLASSIFIED AS BROWNFIELD (BEING PREVIOUSLY USED FOR RETAIL PURPOSES.) KEY POINTS FOR THE STRATEGY ARE AS FOLLOWS;

- THE SURFACE WATER IS TO DISCHARGE INTO THE THAMES WATER COMBINED TRUNK SEWER WITHIN DELANCEY STREET
- THE PROPOSED DEVELOPMENT HAS AN IMPERMEABLE AREA OF APPROXIMATELY 779m2 (0.79Ha)
- THE SURFACE WATER FLOW RATE HAS A MAXIMUM DISCHARGE RATE OF 5 l/s INTO THE EXISTING SEWERS. THE EXISTING 1 IN 1 YEAR 15 MINUTE EVENT GIVES A FLOW RATE OF 9.6l/s, AS PER THE LONDON PLAN WE HAVE LOOKED TO REDUCE THE DISCHARGE RATE BY A MINIMUM 50%. REDUCING THE EXISTING FLOW RATE WOULD BRING THE FLOW RATE BELOW 5l/s WHICH IS CONSIDERED A MINIMUM RATE TO AVOID ANY BLOCKAGES.
- DUE TO THE SITE TOPOGRAPHY AND PROPOSED LAYOUT THERE IS NO SPACE FOR ANY OTHER SUDS FEATURES SUCH AS SWALES AND PONDS ETC.
- IT IS PROPOSED TO ATTENUATE THE SURACE WATER AT SOURCE WITH A BLUE ROOF SYSTEM. THIS WILL BE DESIGNED FOR ALL STORM EVENTS UP TO AND INCLUDING THE 1 IN 100 YEAR EVENT + 40% CLIMATE CHANGE. IT IS PROPOSED TO DISCHARGE THE BLUE ROOF AT A MAXIMUM OF 4.5l/s AND NON BLUE ROOFING TO BE DISCHARGED VIA GRAVITY AT A MAXIMUM .5L/S DISCHARGE RATE.
- THIS PRELIMINARY DESIGN HAS BEEN COMPLETED WITHOUT THE KNOWLEDGE OF THE EXISTING FOUL AND SURFACE WATER DISCHARGE POINTS ON SITE. UPON CLARIFICATION OF THESE VIA A CCTV SURVEY THE PRELIMINARY DESIGN WILL BE REVIEWED AND CHANGED ACCORDINGLY.
- IT IS OUR AIM TO REUSE THE EXISTING SURFACE AND FOUL WATER CONNECTION POINTS
- UPON CLARIFICATION OF THE EXISTING FOUL AND SURFACE WATER DISCHARGE LOCATIONS A PRE-DEVELOPMENT APPLICATION WILL BE MADE TO THAMES WATER TO CONFIRM THE PROPOSED FLOW RATE FROM SITE.
- FOUL WATER FLOW ASSUMED TO BE UNRESTRICTED INTO THE PUBLIC SEWER.

MAIN BLUE ROOF AREA

LOWER BLUE ROOF AREA

PLANT AREA

NON BLUE ROOF AREA

EXISTING THAMES WATER TRUNK SEWER

SCALE 1:100m 0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m

NOTE:
THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION PURPOSES

Rev	Date	Description	By	Check	App.
P1	17.05.19	PRELIMINARY	RB	LP	LP

Client	DEMAR HOLDINGS (BVI) Ltd
Project	HIGH STREET HUB HOTEL CAMDEN HIGH STREET LONDON NW1 7JR
Office	NORWICH
Discipline	CIVILS
Title	PRELIMINARY SURFACE WATER SuDS DESIGN
Scale @ A1	1:100
Status	PRELIMINARY

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Originator	Job Number	Discipline	Building/Zone
CCL	28791	C	HUB
Type	**Level**	**Drawing No.**	**Revision**
GA	DRN	400400	P1