Job Number: 180618

CROFT STRUCTURAL ENGINEERS

Croft Structural Engineers
Clock Shop Mews
Rear of 60 Saxon Road
London SE25 5EH

T: 020 8684 4744
E: enquiries@croftse.co.uk
W: www.croftse.co.uk

Basement Impact Assessment – Structural

Property Details
16 Frognal Gardens
London, NW3

Client Information
Holly Walk Developments
Alan Harari
20 Holly Walk
London
NW3 6RA

Structural Design Reviewed by	**Above Ground Drainage Reviewed by**
Chris Tomlin MEng CEng MIStructE	Phil Henry BEng MEng MICE

Hydrogeology Report	**Land Stability Report**
(Separate Report) Mr. Francis Williams M.Geol. (Hons) FGS Cgeol CEnv AGS	(Separate Report) Mr. Francis Williams M.Geol. (Hons) FGS Cgeol CEnv AGS

Revision	Date	Comment
-	03/10/18	First Issue
-	08/10/18	Minor alterations
1	21/12/18	Alterations to comments by Campbell Reith
2	16/09/19	Alterations to comments by Campbell Reith & Alterations to architectural layout
3	07/11/19	Alterations to Audit comments

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Contents

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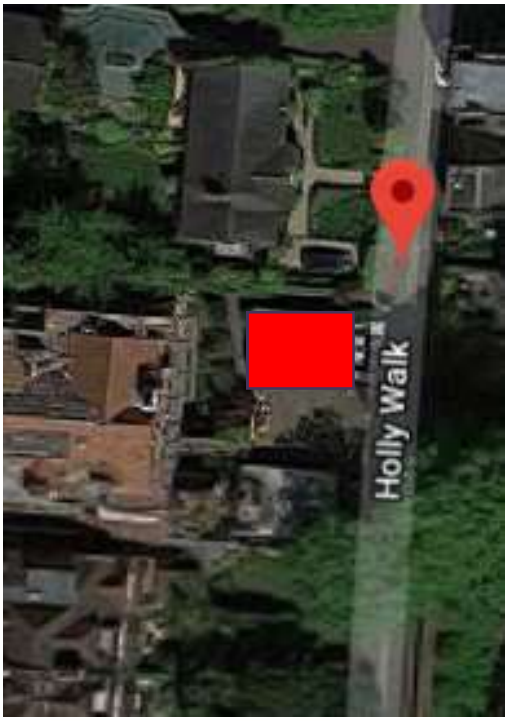
Executive (non-technical) Summary

	The London Borough of Camden requires a Basement Impact Assessment (BIA) to be prepared for developments that include basements and lightwells. This document forms the main part of the BIA and gives details on the impact of surface water flow. The scheme design for the proposed subterranean structure is also included. This document should be used in conjunction with the Land Stability and the Groundwater BIA (GWPR2777/GIR/November 2019). These are separate reports and are referred to, where relevant, within this document. This BIA follows the requirements contained within following; • Camden Council's planning guidance CGP: Basements (March 2018) • Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners • Camden Development Policy (DP) 27: Basements and Lightwells • Camden Development Policy (DP): Water • Camden Local Plan 2017; Policy A5 Basements and Policy CC3 Water and Flooding. In summary, the council will only allow basement construction to proceed if it does not: • cause harm to the built or natural environment and local amenity • result in flooding • lead to ground instability.
Existing Site	The site is in north-west London area of Hampstead in the Borough of Camden. The site is of a rectangular shape on a light slope of Holly Walk and currently occupied by two blocks of garages. The full area of site is tarmac paved.
Proposed Development	The proposed development involves the demolition of the garages and construction of three storey high residential property in its place. The property compromises of the basement extending about 3.3m below the ground level from the position of trial holes BH1 & BH2 as well as underground garage to a formation depth of 2.5-2.6m below ground level.

	 *Figure 1: Aerial view with approx. site area indicated*
Stage 1 – Screening	Refer to Ground and Water BIA report reference GWPR2777/GIR/ November 2019.
Stage 2 – Scoping	Refer to Ground and Water BIA report reference GWPR2777/GIR/ November 2019.
Stage 3 – Site Investigation and Study	Refer to Ground and Water BIA report reference GWPR2777/GIR/ November 2019.
Stage 4 – Impact Assessment	Refer to Ground and Water BIA report reference GWPR2777/GIR/ November 2019.

1. Site Investigation and Desk Study

This section identifies the relevant features of the site and its immediate surroundings, providing further scoping where required.

Desk Study and Walkover Survey

Site & Existing Property

The site is located in north-west London area of Hampstead in the Borough of Camden. The site is of a rectangular shape on a light slope of Holly Walk and currently occupied by two blocks of garages.

Hardstanding

The full area of site is tarmac paved.

Figure 2: Holly walk site view

Trees and Vegetation

Shrubs, but no trees on the site. Some trees on at the adjacent properties although the proposed works are outside of the tree protection areas.

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Proposed Development

The proposed development involves the demolition of the garages and construction of two storey high residential property in its place. The property compromises of the basement extending about 3.3m below the ground level from the position of trial holes BH1 & BH2 as well as underground garage to a formation depth of 2.5-2.6m below ground level.

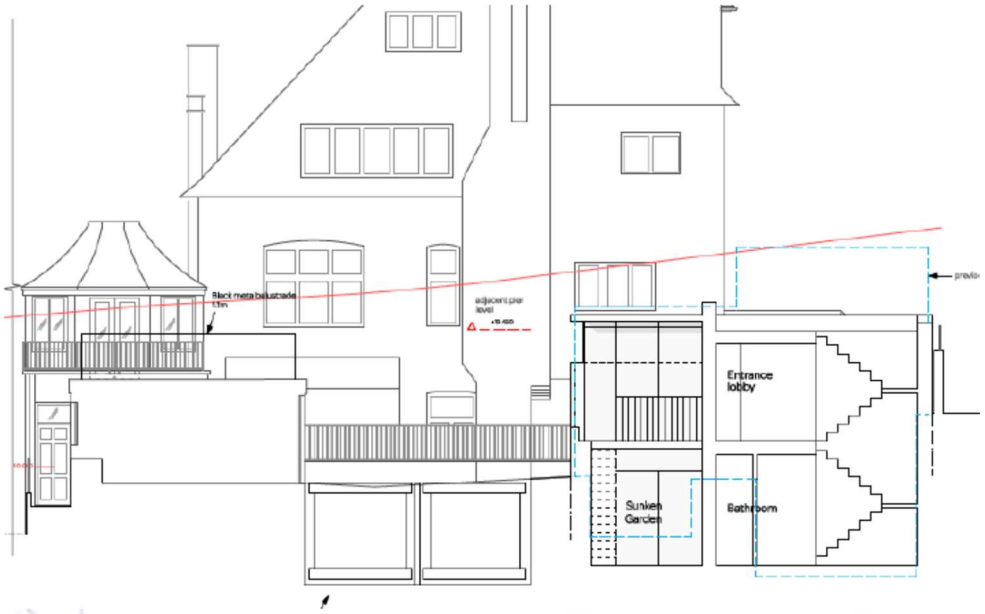


Figure 3: Section through the proposed property

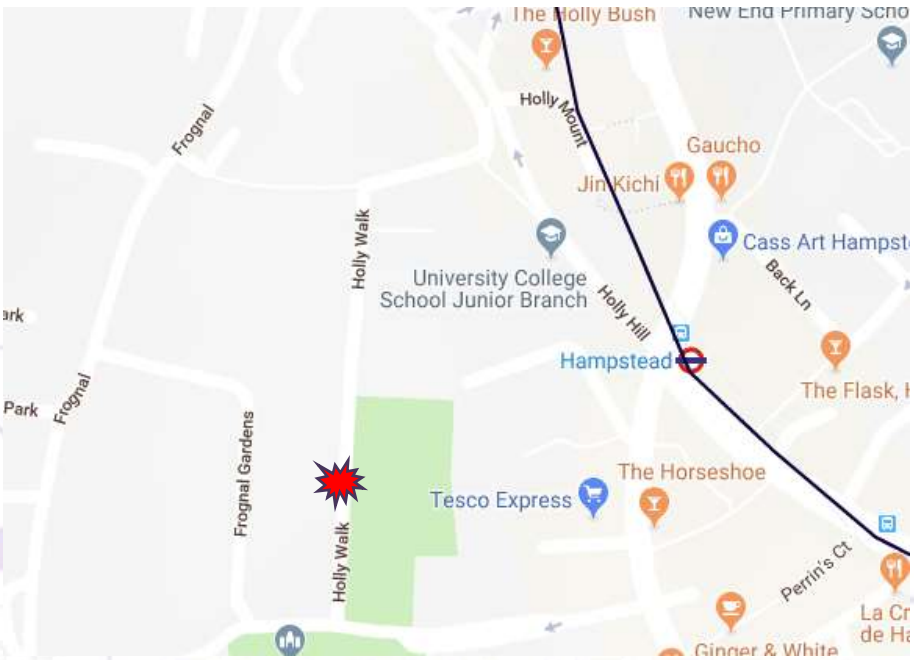
The outline construction sequence is appended to this report.

Listed Buildings and Conservation Areas

Data from Historic England shows that there are no listed buildings close by. There are listed tombs on the opposite site of the Holly Walk street although these are too far to be affected by the proposed works.

Figure 4: Extract showing listed buildings

The site is not in a conservation area.

Geology	Refer to the Ground Investigation report and the Hydrogeological and Land Stability assessment prepared by Ground and Water BIA report reference GWPR2777/GIR/ November 2019.
Highways & public footpaths	The site is within 5m of the public highway.
London Underground and Network Rail	 The site is more than 150m away from the nearest The London Underground Northern Line and the nearest National Rail Line is more than 300m away. These are unlikely to be affected by the new basement.
Proximity of Trees	There are trees close by, in the neighbouring land. These do not have tree preservation orders. The closest tree is more than 4m away from the outline of the proposed basement.
	## Monitoring, Reporting and Investigation The ground investigation report, which has data from initial site investigations and data from subsequent monitoring, is available as a separate report.

Drainage Assessment

Hard standing	The hardstanding area will not change as the site currently is fully covered in tarmac.
SUDS Assessment	From review of the existing and proposed hardstanding the increase will be? 0% Percentage Increase < 5% — No SUDS to be incorporated into scheme Percentage Increase Between 5% to 10% —

Ground Movement Assessment & Predicted Damage Category

	The design and construction methodology aim to limit damage to the existing building on the site, and to the neighbouring buildings, to Category 1 or lower as set out in CIRIA report C760 Table 6.4. For this development, suitable temporary propping during the construction phase will limit the amount of movement due to the basement works. This is described in the Basement Method Statement (appended). The ground movement assessment is contained within Ground and Water BIA report reference GWPR2777/GIR/ November 2019.

Mitigation Measures Ground Movement

A method statement, appended, has been formulated with Croft's experience of over 500 basements completed without error. As mentioned previously, the procedures described in this statement will mitigate the impacts that the construction of the basement will have on nearby properties.

The works must be carried out in accordance with the Party Wall Act and condition surveys will be necessary at the beginning and the end of the works. The Party Wall Approval procedure will reinforce the use of the proposed method statement and, if necessary, require it to be developed in more detail with more stringent requirements than those required at planning stage.

For complete list of mitigation measures refer to Ground and Water BIA report reference GWPR2777/GIR/ November 2019 and ground movement analysis and mitigation measures within.

Monitoring of Structures

In order to safeguard the existing structures during underpinning and new basement construction, movement monitoring is to be undertaken.

Risk Assessment

Monitoring Level proposed	Type of Works.
Monitoring 4 Visual inspection and production of condition survey by Party Wall Surveyors at the beginning of the works and also at the end of the works. Visual inspection of existing party wall during the works. Inspection of the footing to ensure that the footings are stable and adequate. Vertical monitoring movement by standard optical equipment Lateral movement between walls by laser measurements	Basements up to 4.5m deep in clays

Before the works begin, a detailed monitoring report is required to confirm the implementation of the monitoring. The items that this should cover are:

- Risk Assessment to determine level of monitoring
- Scope of Works
- Applicable standards
- Specification for Instrumentation
- Monitoring of Existing cracks
- Monitoring of movement
- Reporting
- Trigger Levels using a RED / AMBER / GREEN System

Recommend levels are shown within the proposed monitoring statement.

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Basement Design & Construction Impacts and Initial Design Considerations

Foundation type

Reinforced concrete cantilevered retaining walls will form the new foundation of the property.

The design of the retaining walls was calculated using software by TEDDS. The software is specifically designed for retaining walls and ensures that the construction is kept to a limit to prevent damage to the adjacent property.

The overall stability of the walls is designed using K_a & K_p values, while the design of the wall structure uses K_0 values. This approach minimises the level of movement from the concrete affecting the adjacent properties.

The design also considers floatation as a risk. The design has accounted for the weight of the building and the uplift forces from the water. The weight of the building is greater than the uplift, resulting in a stable structure.

Intended use of structure and user requirements

Family/domestic use

Loading Requirements (EC1-1)

	UDL kN/m²	Concentrated Load kN
Domestic Single Dwellings	1.5	2.0

Part A3 Progressive collapse

Number of Storeys 3

Is the Building Multi Occupancy? No

Class 1	Single occupancy houses not exceeding 4 storeys

Exposure and wind loading conditions

Basic wind speed V_b = 21 m/s to EC1-2
Topography not considered significant.

Stability Design

The cantilevered walls are suitable for carrying the lateral loading applied from above.

Lateral Actions

Below ground level, the reinforced concrete retaining walls are designed to carry the lateral loading applied from above.

The lateral earth pressure exerts a horizontal force on the retaining walls. The

	retaining walls will be checked for resistance to the overturning force this produces. Lateral forces will be applied from: • Soil loads • Hydrostatic pressures • Surcharge loading from behind the wall These produce retaining wall thrust. This will be restrained by the opposing retaining wall.
Retained soil Parameters	Design overall stability to K_a & K_p values. Lateral movement necessary to achieve K_a mobilisation is height/500 (from Tomlinson). This is tighter than the deflection limits of the concrete wall.
Water Table	**Has a soil investigation been carried out?** Yes Refer to Ground and Water BIA report reference GWPR2777/GIR/ November 2019. Design temporary condition for water table level, If deeper than basement ignore. Design permanent condition for water table level: If deeper than existing, design reinforcement for water table at full basement depth to allow for local failure of water mains, drainage and storm water. Global uplift forces can be ignored when the water table is lower than the basement. BS8102 only indicates guidance.

Additional loading requirements	**Surcharge Loading** The following will be applied as surcharge loads to the front retaining walls: • 10kN/m² if within 45° of road • 5kN/m² if within 45° of Pavement • Garden Surcharge 2.5kN/m² + 1 m of soil (if present above basement ceiling) 20kN/m² • Surcharge for adjacent property 1.5kN/m² + 4kN/m² for concrete ground bearing slab <u>Highways loading:</u> The basement is within 5m of the pavement and within 5m of the public highway. <u>Adjacent Properties:</u> All adjacent property footings within 45° to have additional geotechnical engineer's input. A line at 45° from the base of the neighbours' wall footing would be intersected by the basement retaining wall. This should be accounted for in the design.
Mitigation Measures - Internal Flooding	To mitigate the risks associated with flooding, Croft would recommend the following mitigation measures: • A pumping mechanism will be installed for the proposed basement. There is a likelihood that this may fail and allow excess water to accumulate. If this were to occur, the build-up of water would be gradual and noticeable before it becomes a significant life-threatening hazard. • The pumping system should be a dual mechanism to maintain operation in the event of a failure. This should include a battery backup and a suitable alarm system for warning purposes. • Route all electrical wiring at high level
Mitigation Measures - Drainage and Damp-proofing	The design of drainage and damp-proofing is not within the scope of this assessment and would not normally be expected to be part of the structural engineer's remit at detailed design stage. A common and anticipated detailed design stage approach is to use internal membranes (Delta or similar). These will be integral to the waterproofing of the basement. Any water from this will enter a drainage channel below the slab. This will be pumped and discharged into the exiting sewer system. It is recommended that a waterproofing specialist is employed to ensure all

	the water proofing requirements are met. The waterproofing specialist must name their structural waterproofer. The structural waterproofer must inspect the structural details and confirm that he is happy with the robustness. Due to the segmental construction nature of the basement, it is not possible to waterproof the joints. All waterproofing must be made by the waterproofing specialist. He should review the structural engineer's design stage details and advise if water bars and stops are necessary. The waterproofing designer must not assume that the structure is watertight. To help reduce water flow through the joints in the segmental pins, the following measures should be applied: • All faces should be cleaned of all debris and detritus • Faces between pins should be needle hammered to improve key for bonding • All pipe work and other penetrations should have puddle flanges or hydrophilic strips
Mitigation Measures - Localised Dewatering	Monitor water levels 1 month prior to starting on site and throughout the construction process. Localised dewatering to pins may be necessary.
Temporary Works	Walls are designed to be temporarily stable. Temporary propping details will be required for the ground and this must be provided by the contractor. Their details should be forwarded to the design stage engineer. To demonstrate the feasibility of the works, a proposed basement construction method statement is appended. 1. Demolish existing structure 2. Excavate to formation level and prop as required (propping at base and head is recommended) 3. Construct basement and install drainage 4. Construct above ground structure Prior to construction, temporary propping details will be required. This must be provided by the contractor. Their details should be forwarded to the structural engineer at detailed design stage.

Noise and Nuisance Control	The contractor is to follow the good working practices and guidance laid down in the 'Considerate Constructors Scheme'. The hours of working will be limited to those allowed; 8am to 5pm Monday to Friday and Saturday Morning 8am to 1pm. None of the practices cause undue noise that one would typically expect from a construction site (a conveyor belt typically runs at around 70dB). The site will be hoarded with 8' site hoarding to prevent access. The hours of working will further be defined within the Party Wall Act. The site is to be hoarded to minimise the level of direct noise from the site. Working in the basement generally requires hand tools to be used. The level of noise generally will be no greater than that of digging of soil. The noise is reduced and muffled by the works being undertaken underground. The level of noise from basement construction works is lower than typical ground level construction due to this.
CTMP	The council may require a Construction Traffic Management Plan (CTMP) to be produced. This is outside the brief of the Basement Impact Assessment and is not covered within Croft's brief.

Appendix A: Structural Calculations

As part of the building control pack full calculations must be undertaken and provided at detailed design stage once planning permission is granted. The calculations must be completed to a recognised Standard (BS or Euro Codes). The calculations must take into account the findings of this report and the recommendations of the auditors.

The design must resist:

- Vertical loads from the proposed works and adjacent properties
- Lateral loads from wind, soil water and adjacent properties
- Loadings in the temporary condition
- All other applied loads on the building
- Uplift forces from hydrostatic effects and soil heave

The final proposed scheme must:

- Provide stability in the temporary condition to all forces
- Provide stability to all forces in the permanent condition

As part of the planning Croft structural engineers has considered some of the pertinent parts of the basement structure to ensure that it can be constructed. The following calculations are not a full set of calculations for the final design which must be provided for building regulations. The structural calculations we consider pertinent and included in this appendix for this development are:

1. Front basement foundation & retaining wall with highways loading as necessary
2. Party Wall foundation and retaining wall

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Ref	Slab Uplift										
	Wall DL	35	kN/m				Wall DL	35	kN/m		
	w=	0.35	m								
			soil depth above=		0	m					
				Span=	4.7	m					
									Water =	2.85	m
					H =		3.7	m			
			Slab Thickness =		0.35						
Heel=	0			Slab =	5.1						
			Toe =		0.3	m					
			Toewidth=		1.5	m			soil unit weight=	18	kN/m³

Uplift Calc

Total Dead Load =	Slab=	44.625	kN/m					
	Toe and heel =	27.75	kN/m					
	Wall =	64.75						
	Soil=(	0	+	0	) x 2 +	0 =	0	16.835
	Total Dead load =	207.125	kN/m					
Total Uplift Force=		153.9	kN/m		f.o.s.=	1.35	No Global Uplift	

TYPICAL RC RETAINING WALL DESIGN

Loading

Cavity Wall	DLcavity = 3.98kN/m² × 5.5m = **21.890**kN/m
Floor DL (lower & first floor)	DLfloor = 2 × 0.7kN/m² × 4.1m / 2 = **2.870**kN/m
Roof DL	DLroof = 1.1kN/m² × 4.1m / 2 = **2.255**kN/m
Total Dead Load	DL = DLcavity + DLfloor + DLroof = **27.015**kN/m
Floor LL (lower & first floor)	LLfloor = 2 × 1.5kN/m² × 4.1m / 2 = **6.150**kN/m
Roof LL	LLroof = 0.75kN/m² × 4.1m / 2 = **1.537**kN/m
Total Live Load	LL = LLfloor + LLroof = **7.687**kN/m

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 2.9.07

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Retaining wall details

Stem type	Cantilever		
Stem height	h_{stem} = **3700** mm		
Stem thickness	t_{stem} = **350** mm		
Angle to rear face of stem		α = **90** deg	
Stem density	γ_{stem} = **25** kN/m^3		
Toe length	l_{toe} = **3000** mm		
Base thickness	t_{base} = **350** mm		
Base density	γ_{base} = **25** kN/m^3		
Height of retained soil	h_{ret} = **3700** mm	Angle of soil surface	β = **0** deg
Depth of cover	d_{cover} = **0** mm		
Height of water	h_{water} = **2500** mm		
Water density	γ_w = **9.8** kN/m^3		

Retained soil properties

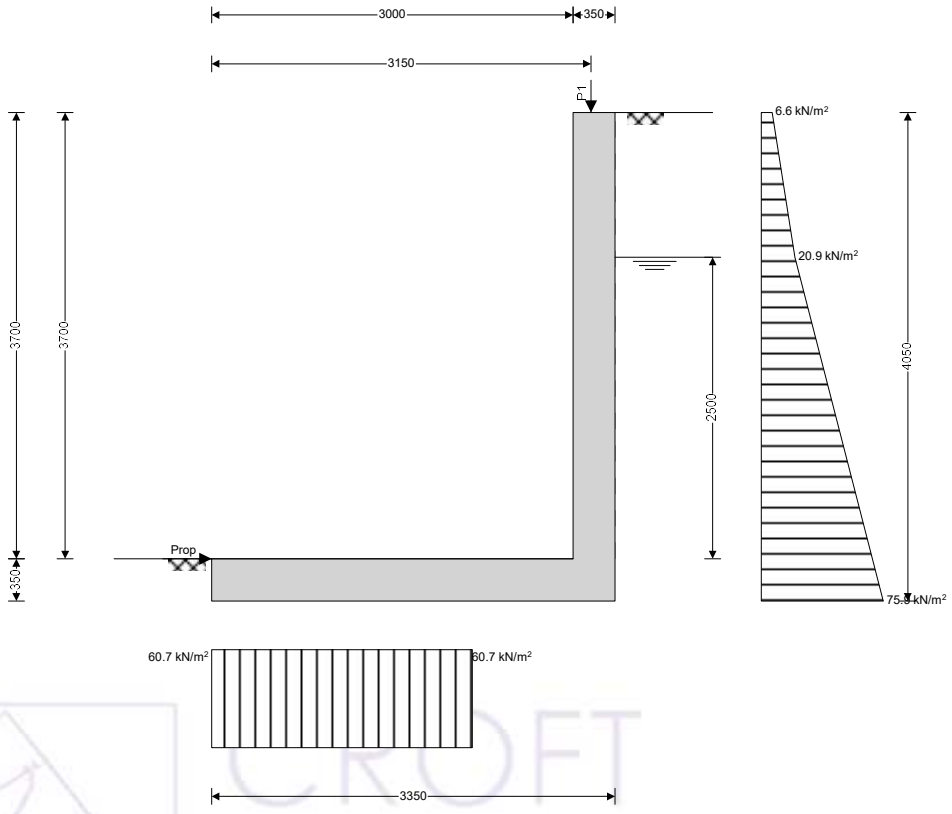
Soil type	Hard clay
Moist density	γ_{mr} = **20** kN/m^3
Saturated density	γ_{sr} = **20** kN/m^3

Base soil properties

Soil type	Hard clay
Soil density	γ_b = **20** kN/m^3

Loading details

Variable surcharge load	$Surcharge_Q$ = **10** kN/m^2		
Vertical line load at 3150 mm		P_{G1} = **27** kN/m	
	P_{Q1} = **7.7** kN/m		



General arrangement

Calculate retaining wall geometry

Base length	l_{base} = **3350** mm		
Saturated soil height	h_{sat} = **2500** mm		
Moist soil height	h_{moist} = **1200** mm		
Length of surcharge load	l_{sur} = **0** mm		
Vertical distance	x_{sur_v} = **3350** mm		
Effective height of wall	h_{eff} = **4050** mm		
Horizontal distance	x_{sur_h} = **2025** mm		
Area of wall stem	A_{stem} = **1.295** m²	Vertical distance	x_{stem} = **3175** mm
Area of wall base	A_{base} = **1.173** m²	Vertical distance	x_{base} = **1675** mm

Design approach 1

Partial factors on actions - Table A.3 - Combination 1

Partial factor set	A1		
Permanent unfavourable action		γ_G = **1.35**	Permanent
favourable action	γ_{Gf} = **1.00**		
Variable unfavourable action		γ_Q = **1.50**	Variable
favourable action	γ_{Qf} = **0.00**		

Partial factors for soil parameters – Table A.4 - Combination 1

Soil parameter set	M1

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Angle of shearing resistance		$\gamma_{\phi'}$ = **1.00**	Effective
cohesion	$\gamma_{c'}$ = **1.00**		
Weight density	γ_{γ} = **1.00**		

Library item Partial factors summary

Retained soil properties

Design moist density	γ_{mr}' = **20** kN/m^3	Design saturated density	γ_{sr}' = **20** kN/m^3

Base soil properties

Design soil density	γ_b' = **20** kN/m^3

Soil coefficients

Coeff.friction to back of wall		K_{fr} = **0.325**	
Coeff.friction to front of wall		K_{fb} = **0.325**	Coeff.friction
beneath base	K_{fbb} = **0.325**		
Active pressure coefficient		K_A = **0.440**	Passive pressure
coefficient	K_P = **2.280**		

Overturning check

Vertical forces on wall

Total $F_{total\_v} = F_{stem} + F_{base} + F_{P\_v} + F_{water\_v} - F_{water\_u}$ = **88.7** kN/m

Horizontal forces on wall

Total $F_{total\_h} = F_{sur\_h} + F_{sat\_h} + F_{water\_h} + F_{moist\_h} + F_{exc\_h}$ = **151.5** kN/m

Overturning moments on wall

Total $M_{total\_OT} = M_{sur\_OT} + M_{sat\_OT} + M_{water\_OT} + M_{moist\_OT}$ = **214.3** kNm/m

Restoring moments on wall

Total $M_{total\_R} = M_{stem\_R} + M_{base\_R} + M_{P\_R}$ = **237** kNm/m

Check stability against overturning

Factor of safety FoS_{ot} = **1.106**

PASS - Maximum restoring moment is greater than overturning moment

Bearing pressure check

Vertical forces on wall

Total $F_{total\_v} = F_{stem} + F_{base} + F_{P\_v} + F_{water\_v}$ = **131.3** kN/m

Horizontal forces on wall

Total $F_{total\_h} = F_{sur\_h} + F_{sat\_h} + F_{water\_h} + F_{moist\_h} + F_{pass\_h}$ = **151.5** kN/m

Moments on wall

Total $M_{total} = M_{stem} + M_{base} + M_{sur} + M_P + M_{sat} + M_{water} + M_{moist}$ = **142** kNm/m

Check bearing pressure

Propping force	F_{prop_base} = **151.5** kN/m		
Bearing pressure at toe	q_{toe} = **60.7** kN/m^2	Bearing pressure at heel	q_{heel} = **0** kN/m^2
Factor of safety	FoS_{bp} = **1.648**		

PASS - Allowable bearing pressure exceeds maximum applied bearing pressure

Design approach 1

Partial factors on actions - Table A.3 - Combination 2

Partial factor set	A2		
Permanent unfavourable action		γ_G = **1.00**	Permanent
favourable action	γ_{Gf} = **1.00**		
Variable unfavourable action		γ_Q = **1.30**	Variable
favourable action	γ_{Qf} = **0.00**		

Partial factors for soil parameters – Table A.4 - Combination 2

Soil parameter set	M2		
Angle of shearing resistance		$\gamma_{\phi'}$ = **1.25**	Effective
cohesion	$\gamma_{c'}$ = **1.25**		
Weight density	γ_γ = **1.00**		

Library item Partial factors summary

Retained soil properties

Design moist density	γ_{mr}' = **20** kN/m^3	Design saturated density	γ_{sr}' = **20** kN/m^3

Base soil properties

Design soil density γ_b' = **20** kN/m^3

Soil coefficients

Coeff.friction to back of wall		K_{fr} = **0.325**	
Coeff.friction to front of wall		K_{fb} = **0.325**	Coeff.friction
beneath base	K_{fbb} = **0.325**		
Active pressure coefficient		K_A = **0.440**	Passive pressure
coefficient	K_P = **2.280**		

Overturning check

Vertical forces on wall

Total $F_{total\_v} = F_{stem} + F_{base} + F_{P\_v} + F_{water\_v} - F_{water\_u}$ = **88.7** kN/m

Horizontal forces on wall

Total $F_{total\_h} = F_{sur\_h} + F_{sat\_h} + F_{water\_h} + F_{moist\_h} + F_{exc\_h}$ = **114.9** kN/m

Overturning moments on wall

Total $M_{total\_OT} = M_{sur\_OT} + M_{sat\_OT} + M_{water\_OT} + M_{moist\_OT}$ = **165.5** kNm/m

Restoring moments on wall

Total $M_{total\_R} = M_{stem\_R} + M_{base\_R} + M_{P\_R}$ = **237** kNm/m

Check stability against overturning

Factor of safety FoS_{ot} = **1.432**

PASS - Maximum restoring moment is greater than overturning moment

Bearing pressure check

Vertical forces on wall

Total $F_{total\_v} = F_{stem} + F_{base} + F_{P\_v} + F_{water\_v}$ = **98.7** kN/m

Horizontal forces on wall

Total $F_{total\_h} = F_{sur\_h} + F_{sat\_h} + F_{water\_h} + F_{moist\_h} + F_{pass\_h}$ = **114.9** kN/m

Moments on wall

Total $M_{total} = M_{stem} + M_{base} + M_{sur} + M_P + M_{sat} + M_{water} + M_{moist} =$ **102.9** kNm/m

Check bearing pressure

Propping force $F_{prop\_base} =$ **114.9** kN/m

Bearing pressure at toe $q_{toe} =$ **47.3** kN/m^2 Bearing pressure at heel $q_{heel} =$ **0** kN/m^2

Factor of safety $FoS_{bp} =$ **2.113**

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 2.9.07

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

Concrete strength class C32/40

Char.comp.cylinder strength $f_{ck} =$ **32** N/mm^2 Mean axial tensile strength $f_{ctm} =$ **3.0** N/mm^2

Secant modulus of elasticity $E_{cm} =$ **33346** N/mm^2 Maximum aggregate size $h_{agg} =$ **20** mm

Design comp.concrete strength $f_{cd} =$ **18.1** N/mm^2 Partial factor γ_C = **1.50**

Reinforcement details

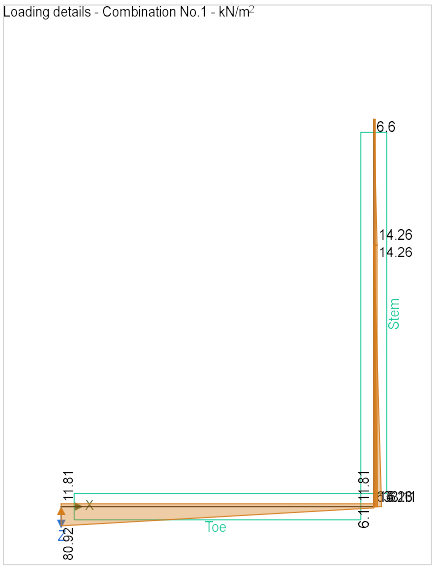
Characteristic yield strength $f_{yk} =$ **500** N/mm^2 Modulus of elasticity $E_s =$ **200000** N/mm^2

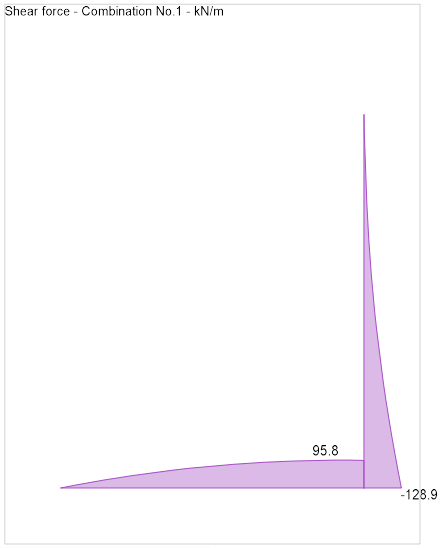
Design yield strength $f_{yd} =$ **435** N/mm^2 Partial factor $\gamma_S =$ **1.15**

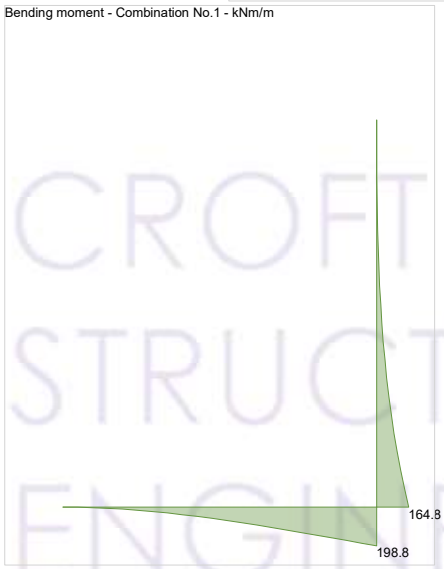
Cover to reinforcement

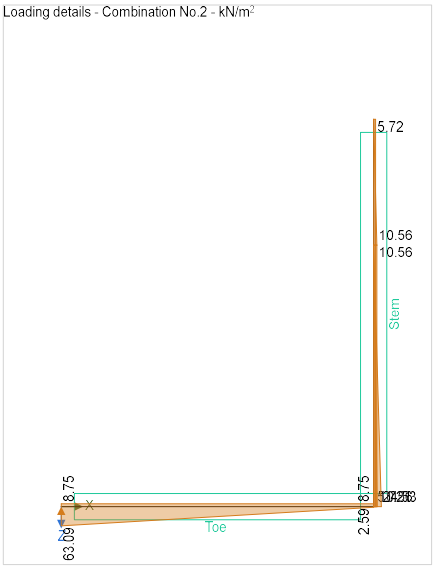
Front face of stem $c_{sf} =$ **40** mm Rear face of stem $c_{sr} =$ **50** mm

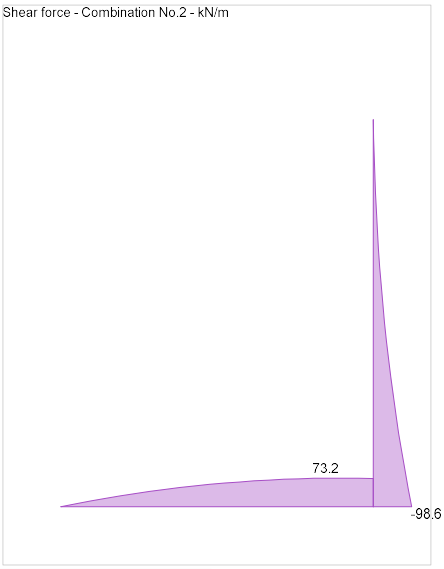
Top face of base $c_{bt} =$ **50** mm Bottom face of base $c_{bb} =$ **75** mm

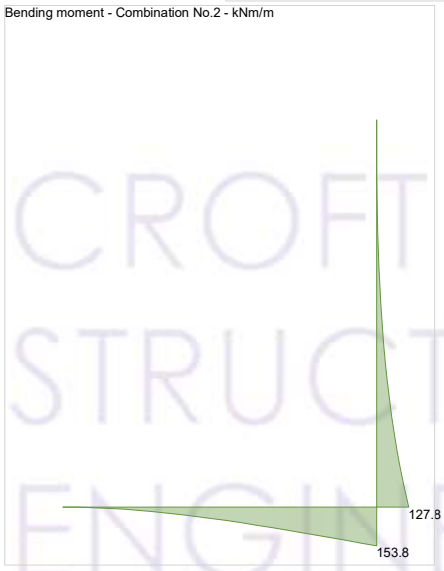

Loading details - Combination No.1 - kN/m²
6.6
14.26
14.26
Stem
11.81
11.81
80.82
Toe


Shear force - Combination No.1 - kN/m
95.8
-128.9


Bending moment - Combination No.1 - kNm/m
164.8
198.8







Check stem design at base of stem

Depth of section h = **350** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **164.8** kNm/m K = **0.060** K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{sr.req}$ = **1376** mm²/m

Tens.reinforcement provided 16 dia.bars @ 100 c/c

Tens.reinforcement provided $A_{sr.prov}$ = **2011** mm²/m

Min.area of reinforcement $A_{sr.min}$ = **459** mm²/m Max.area of reinforcement $A_{sr.max}$ = **14000** mm²/m

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

Library item: Rectangular single summary

Deflection control - Section 7.4

Limiting span to depth ratio 13.3 Actual span to depth ratio 12.7

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

Crack control - Section 7.3

Limiting crack width w_{max} = **0.3** mm Maximum crack width w_k = **0.191** mm

PASS - Maximum crack width is less than limiting crack width**Rectangular section in shear - Section 6.2**

Design shear force V = **128.9** kN/m Design shear resistance $V_{Rd.c}$ = **179.5** kN/m

PASS - Design shear resistance exceeds design shear force

Horizontal reinforcement parallel to face of stem - Section 9.6

Min.area of reinforcement $A_{sx.req}$ = **503** mm²/m Max.spacing of reinforcement s_{sx_max} = **400** mm

Trans.reinforcement provided 12 dia.bars @ 200 c/c

Trans.reinforcement provided $A_{sx.prov}$ = **565** mm²/m

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

Check base design at toe

Depth of section h = **350** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **198.8** kNm/m K = **0.088** K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{bb.req}$ = **1886** mm²/m

Tens.reinforcement provided 20 dia.bars @ 100 c/c

Tens.reinforcement provided $A_{bb.prov}$ = **3142** mm²/m

Min.area of reinforcement $A_{bb.min}$ = **417** mm²/m Max.area of reinforcement $A_{bb.max}$ = **14000** mm²/m

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

Library item: Rectangular single summary

Crack control - Section 7.3

Limiting crack width w_{max} = **0.3** mm Maximum crack width w_k = **0.259** mm

PASS - Maximum crack width is less than limiting crack width**Rectangular section in shear - Section 6.2**

Design shear force V = **95.8** kN/m Design shear resistance $V_{Rd.c}$ = **199.7** kN/m

PASS - Design shear resistance exceeds design shear force

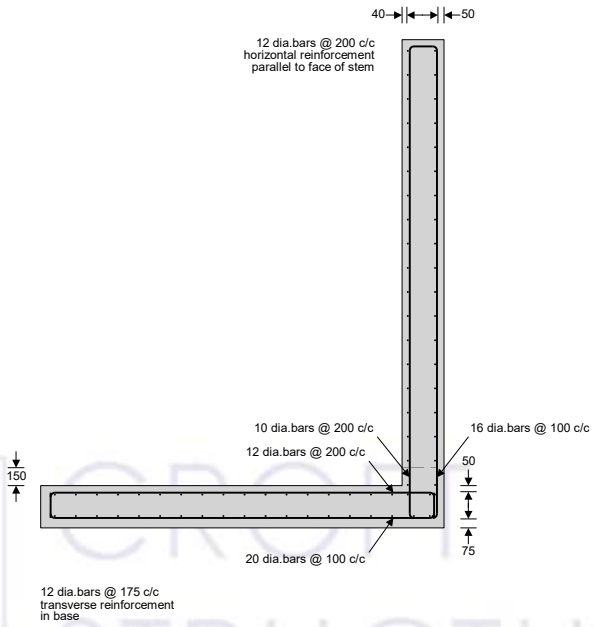
Secondary transverse reinforcement to base - Section 9.3

Min.area of reinforcement $A_{bx.req}$ = **628** mm²/m Max.spacing of reinforcement s_{bx_max} = **450** mm

Trans.reinforcement provided 12 dia.bars @ 175 c/c

Trans.reinforcement provided $A_{bx,prov}$ = **646** mm²/m

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



Reinforcement details

CROFT STRUCTURAL ENGINEERS

Appendix B: Construction Programme

The Contractor is responsible for the final construction programme

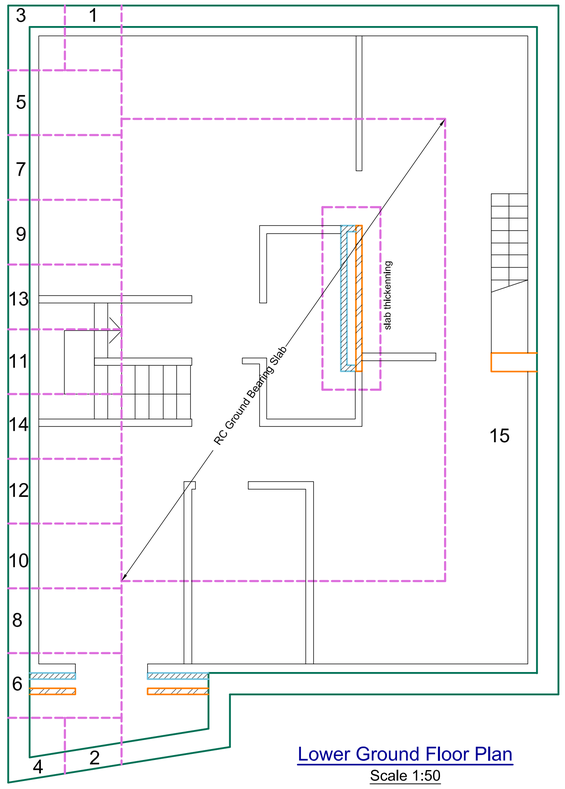
Outline construction Program

(For planning purposes only)

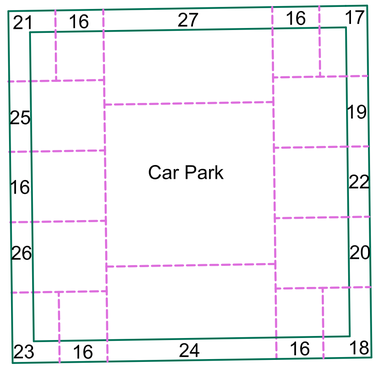
	Months															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Planning approval																
Derailed Design																
Tender																
Party Walls																
Monitoring of Adjacent structures																
Enabling works																
Basement Construction																
Superstructure construction																

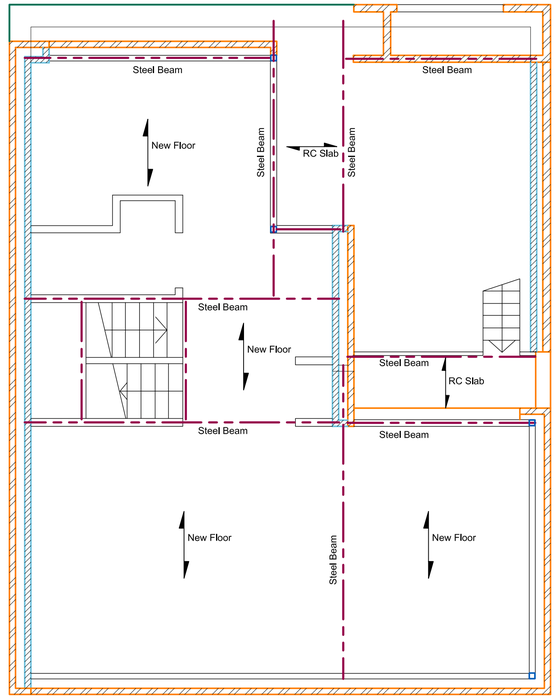
Appendix C: Structural Drawings

1:50 Basement Plan on A3 Showing Neighbouring basements if present
1:50 Ground Floor plan on A3 Showing Neighbouring property
1:50 Section on A3 Including section through Neighbouring Footings

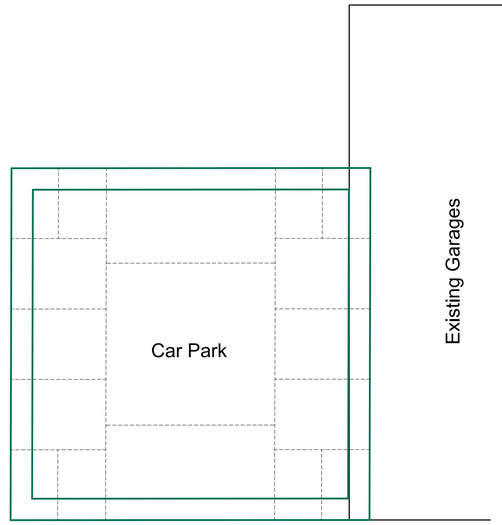


Lower Ground Floor Plan
Scale 1:50





Upper Ground Floor Plan
Scale 1:50



Issued for Planning

Rev	Date	Amendments
3	07/08/2019	Alteration to plans to final architectural plans
2	24/07/2019	Alteration to plans
1	08/10/2018	Basement plan added
-	03/10/2018	First issue for comment

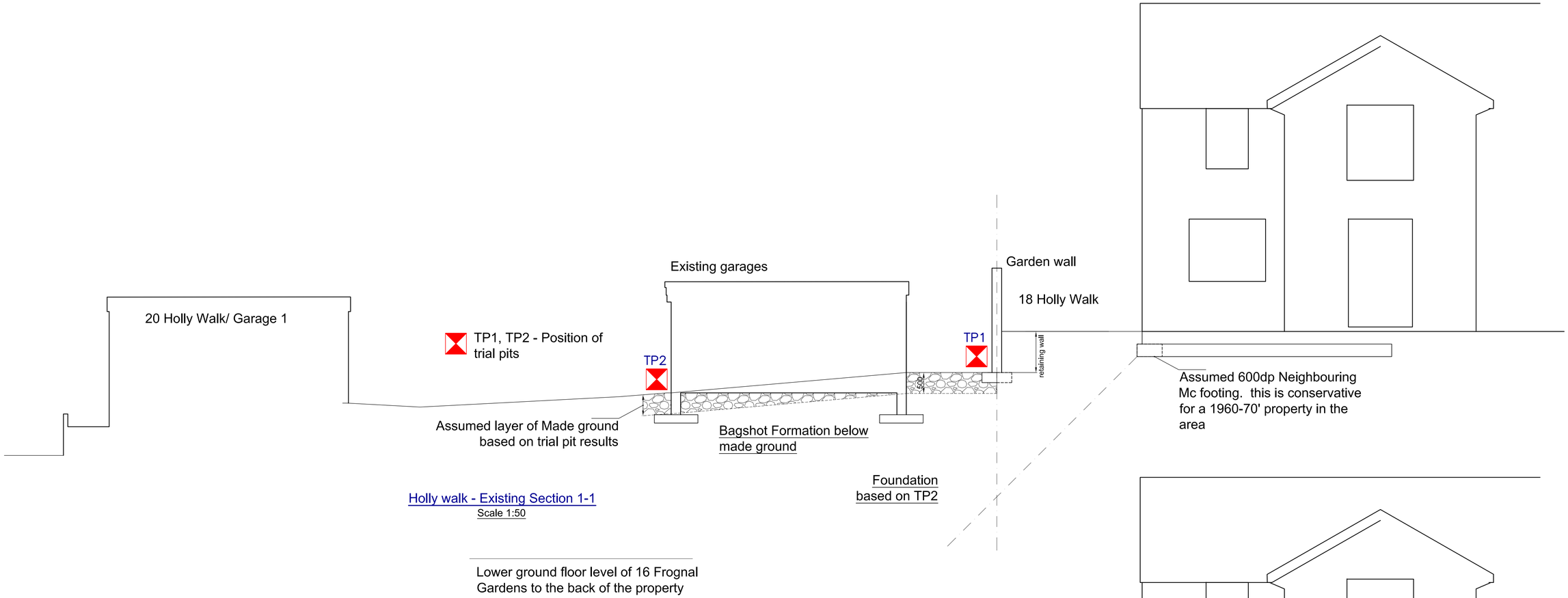
Croft Structural Engineers
Clockshop Mews,
r/o 60 Saxon Rd,
London, SE25 5EH.
020 8684 4744
www.croftse.co.uk

Client: Mr. Alan Harari

Project: Holly Walk

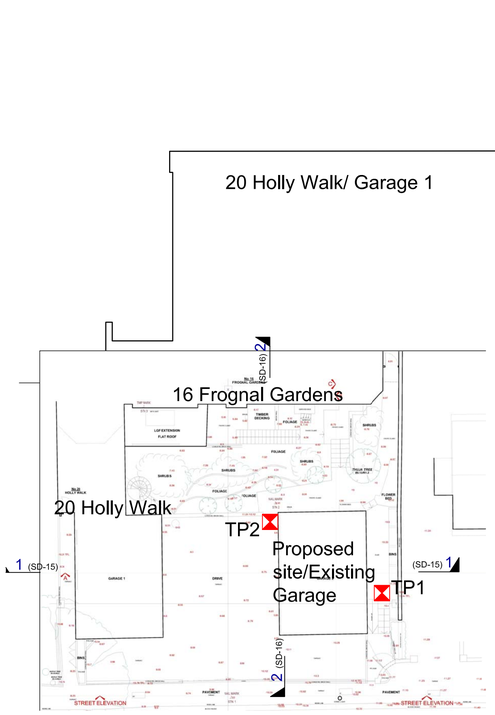
Title : Structural Plans

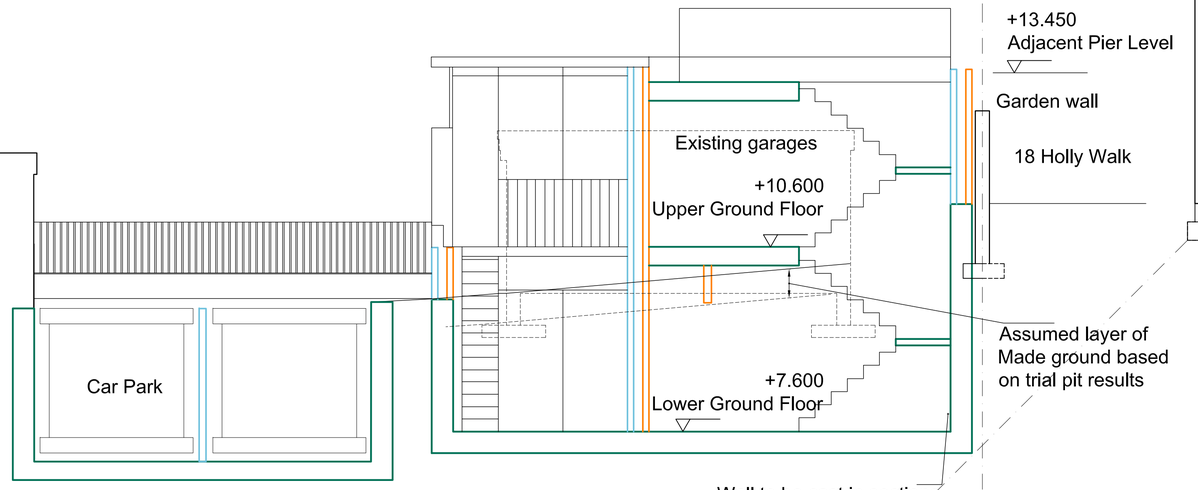
Job Number	Drawn	Scale
180618	pr	as shown
	Chk'd CT	
Dwg Number	Rev	Date
SL-10	3	October '18



Holly walk - Existing Section 1-1
Scale 1:50

Lower ground floor level of 16 Frognal Gardens to the back of the property





Holly walk - proposed Section 1-1
Scale 1:50

Issued for Planning

Rev	Date	Amendments
3	07/08/2019	Alteration to plans to final architectural plans
2	24/07/2019	Section updated
1	08/10/2018	Section updated
-	18/07/2018	First issue for comment

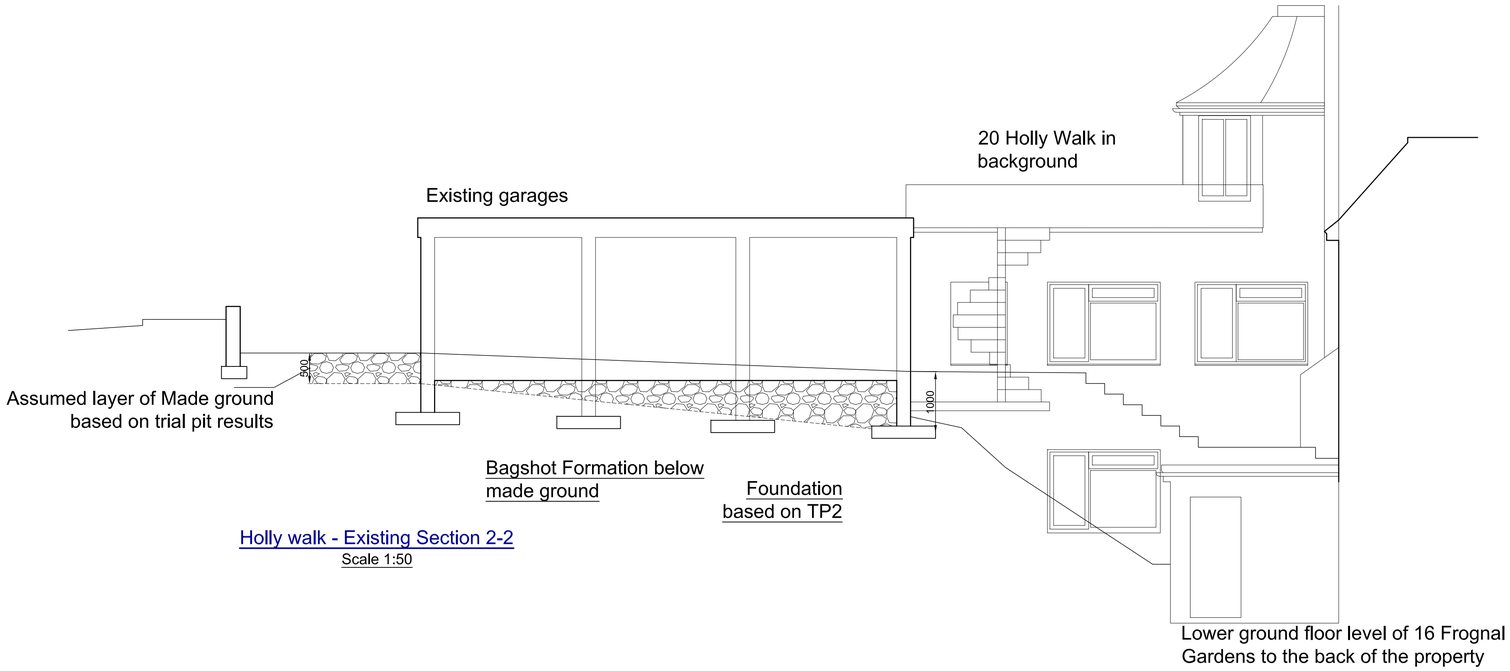
Croft Structural Engineers
Clockshop Mews,
r/o 60 Saxon Rd,
London, SE25 5EH.
020 8684 4744
www.croftse.co.uk

Client: Mr. Alan Harari

Project: Holly Walk

Title : Existing and Proposed section 1-1

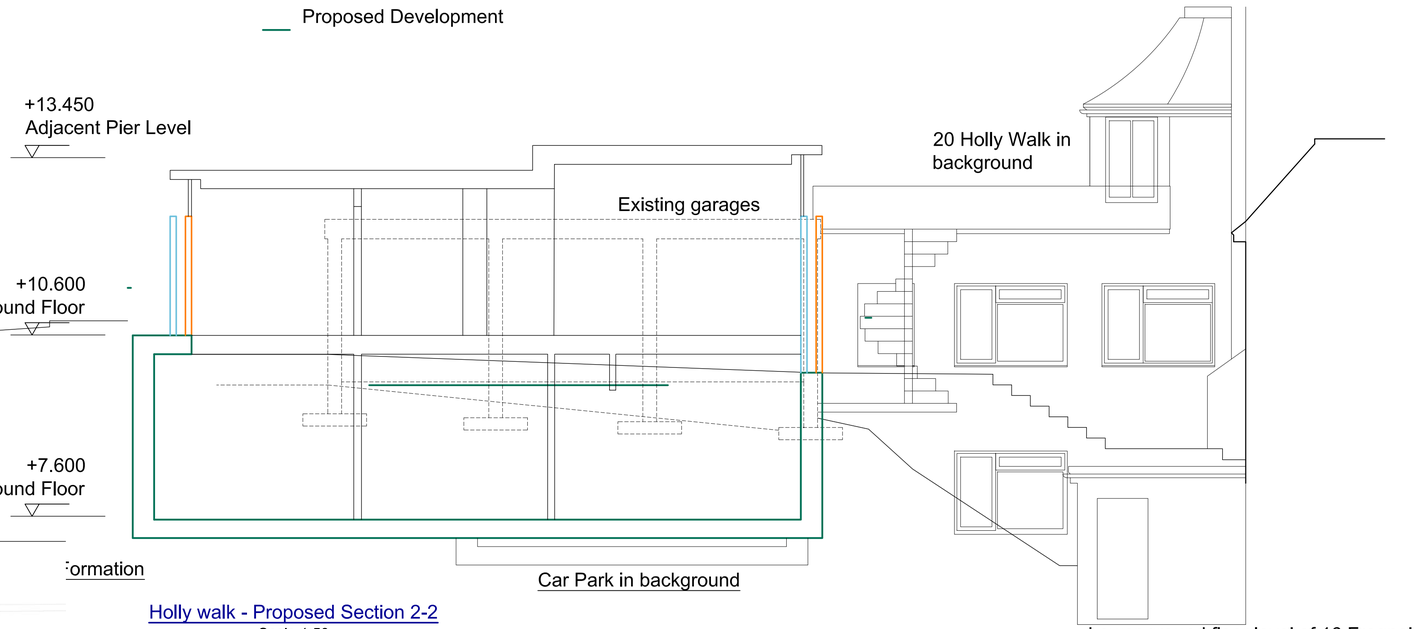
Job Number	Drawn	Scale
180618	pr	as shown
	Chk'd CT	
Dwg Number	Rev	Date
SD-15	3	October '18



Holly walk - Existing Section 2-2

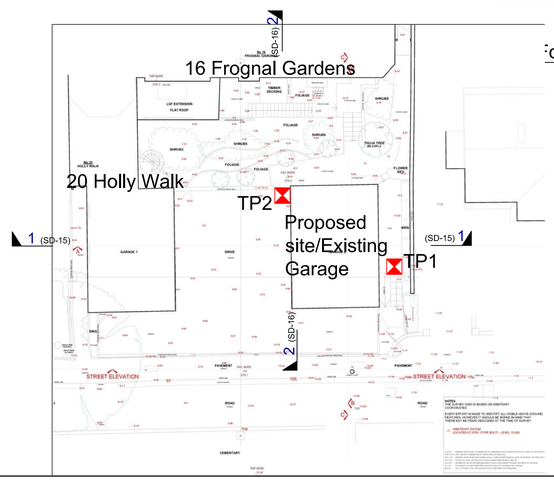
Scale 1:50

Proposed Development



Holly walk - Proposed Section 2-2

Scale 1:50



Issued for Planning

Rev	Date	Amendments
3	07/08/2019	Alteration to plans to final architectural plans
2	24/07/2019	Section updated
1	08/10/2018	Section updated
-	18/07/2018	First issue for comment

Croft Structural Engineers
Clockshop Mews,
r/o 60 Saxon Rd,
London, SE25 5EH.
020 8684 4744
www.croftse.co.uk

Client: Mr. Alan Harari

Project: Holly Walk

Title : Existing and Proposed section 2-2

Job Number	Drawn	Scale
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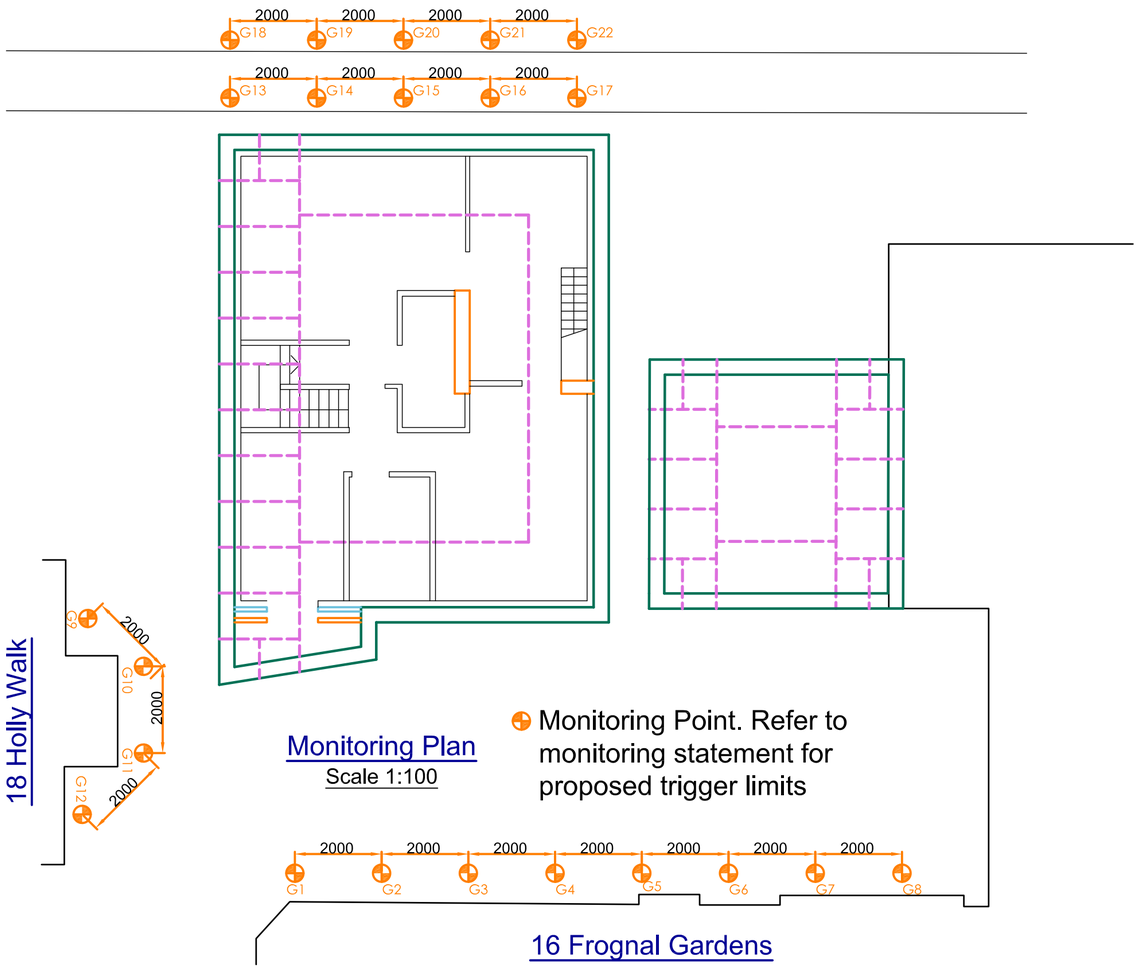
	Ch'd CT	
Dwg Number	Rev	Date
SD-16	3	October '18



Rev	Date	Amendments
4	07/11/2019	Monitoring points added along Holly Walk pavement and highway
3	16/09/2019	Alterations following Movement Assessment report
2	07/08/2019	Alteration to plans to final architectural plans
1	24/07/2019	Monitoring points added, layout altered
-	21/12/2018	First issue for comment

Client: Mr. Alan Harari

Project: Holly Walk

Title : Monitoring Plan

Job Number: 180618	Date: Dec '18
Dwg Number: SD-22	Rev: 4
Drawn: pr	Ch'kd: CT
Scale: As shown @ A2	

Croft Structural Engineers
Clockshop Mews,
r/o 60 Saxon Rd,
London, SE25 5EH.
020 8684 4744
www.croftse.co.uk

Appendix D: Utilities Search

https://www.linesearchbeforeudig.co.uk/website does a wide search of all utilities possibly present within the site and highlight only the ones present within the vicinity. In case of 16 Frognal Gardens electricity cables are the only utility present within site.

The desktop utility search was completed through https://www.linesearchbeforeudig.co.uk/ and discovered that UK Power Networks have assets registered within the vicinity of the site.

UK Power Networks provided the following;

1. Maps of the area showing the electrical lines and/or electrical plant.
2. London Symbol Guide
3. Think before you dig guide

Registered Office:
Newington House
237 Southwark Bridge Road
London SE1 6NP

Registered in England and Wales No: 3870728

Company:
UK Power Networks (Operations) Limited

Our Ref: 14446595 Your Ref: 16 Frognal Gardens

Tuesday, 18 December 2018

Pawel Rogalewicz
Clockshop Mews Clockshop Mews rear of 60 Saxon road
london
London
E255EH

Dear Pawel Rogalewicz

Thank you for contacting us regarding UK Power Networks equipment at the above site. I have enclosed a copy of our records which show the electrical lines and/or electrical plant. I hope you find the information useful.

I have also enclosed a fact sheet which contains important information regarding the use of our plans and working around our equipment. Safety around our equipment is our number one priority so please ensure you have completed all workplace risk assessments before you begin any works.

Should your excavation affect our Extra High Voltage equipment (6.6 KV, 22 KV, 33 KV or 132 KV), please contact us to obtain a copy of the primary route drawings and associated cross sections.

If you have any further queries do not hesitate to contact us.

Plan Provision
0800 056 5866

Registered Office:
Newington House
237 Southwark Bridge Road
London SE1 6NP

Registered in England and Wales No: 3870728

Company:
UK Power Networks (Operations) Limited

This information is made available to you on the terms set out below. If you do not accept the terms of use set out in this fact sheet please do not use the plans and return them to UK Power Networks.

1. UK Power Networks does not warrant that the information provided to you is correct. You rely upon it at your own risk.

2. UK Power Networks does not exclude or limit its liability if it causes the death of any person or causes personal injury to a person where such death or personal injury is caused by its negligence.

3. Subject to paragraph 2 UK Power Networks has no liability to you in contract, in tort (including negligence), for breach of statutory duty or otherwise how for any loss, damage, costs, claims, demands, or expenses that you or any third party may suffer or incur as a result of using the information provided whether for physical damage to property or for any economic loss (including without limitation loss of profit, loss of opportunity, loss of savings, loss of goodwill, loss of business, loss of use) or any special or consequential loss or damage whatsoever.

4. The information about UK Power Networks electrical plant and/or electric lines provided to you belongs to and remains the property of UK Power Networks. You must not alter it in any respect.

5. The information provided to you about the electrical plant and/or electric lines depicted on the plans may NOT be a complete record of such apparatus belonging to UK Power Networks. The information provided relates to electric lines and/or electrical plant belonging to UK Power Networks that it believes to be present but the plans are not definitive: other electric lines and/or electrical plant may be present and that may or may not belong to UK Power Networks.

6. Other apparatus not belonging to UK Power Networks is not shown on the plan. It is your responsibility to make your own enquiries elsewhere to discover whether apparatus belonging to others is present. It would be prudent to assume that other apparatus is present.

7. You are responsible for ensuring that the information made available to you is passed to those acting on your behalf and that all such persons are made aware of the contents of this letter.

8. Because the information provided to you may not be accurate, you are recommended to ascertain the presence of UK Power Networks electric lines and/or electrical plant by the digging of trial holes. Trial holes should be dug by hand only.

   Excavations must be carried out in line with the Health and Safety Executive guidance document HSG 47. We will not undertake this work. A copy of HSG 47 can be obtained from the Health and Safety Executives website.

   All electric lines discovered must be considered LIVE and DANGEROUS at all times and must not be cut, resited, suspended, bent or interfered with unless specially authorised by UK Power Networks.

   The electric line and electrical plant belonging to UK Power Networks remains so even when made dead and abandoned and any such electric line and/or electrical plant exposed shall be reported to UK Power Networks.

   Where your works are likely to affect our electric lines and/or electrical plant an estimate of the price of any protective /diversionary works can be prepared by UK Power Networks Branch at Metropolitan House, Darkes Lane, Potters Bar, Herts. , EN6 1AG, telephone no. 0845 2340040

Registered Office:
Newington House
237 Southwark Bridge Road
London SE1 6NP

Registered in England and Wales No: 3870728

Company:
UK Power Networks (Operations) Limited

9 Any work near to any overhead electricity lines must be carried out by you in accordance with the Health and Safety Executive guidance document GS6 and the Electricity at Work Regulations.

The GS6 Recommendations may be purchased from HSE Books or downloaded from the Energy Networks Association's website.

If given a reasonable period of prior notice UK Power Networks will attend on site without charge to advise how and where "goal posts" should be erected. If you wish to use this service, in the first instance please telephone: 0845 6014516 between 08:30 and 17:00 Monday to Friday.

10. You are responsible for the security of the information provided to you. It must not be given, sold or made available upon payment of a fee to a third party.

11. If in carrying out work on land in, on, under or over which is installed an electric line and/or electrical plant that belongs to UK Power Networks you and/or anyone working on your behalf damages (however slightly) that apparatus you must inform immediately UK Power Networks by our emergency 24 hour three digit telephone number **105** providing;

- your name, address and telephone number;
- the date, time and place at which such damage was caused;
- a description of the electric line and/or electrical plant to which damage was caused;
- the name of the person whom it appears to you is responsible for that damage;
- the nature of the damage.

12. The expression "UK Power Networks" includes UK Power Networks (EPN) plc, UK Power Networks (LPN) plc, UK Power Networks (SEPN) plc, UK Power Networks and any of their successors and predecessors in title.

(G16) TQ 2685 NW-N

(H15) TQ 2585 NE-S

(H17) TQ 2685 NE-S

THERE ARE OTHER CABLES AND PLANT IN THIS AREA— SEE MAPBASE FOR DETAILS.

FOR DETAILS OF ENLARGEMENTS SEE
TQ 2685 NW-S/1 (SHEET 1)

Microfilmed record
Issue new microfiche when revisions are made to this record.

TQ 2685 NW-S	1:500
35.11 (H16)	

(J16) TQ 2685 SW-N

M.W. 10-7-75

Microfilmed record
Issue new microfiche when revisions are made to this record.

1

OAK HILL PARK

2

REDINGTON ROAD

3

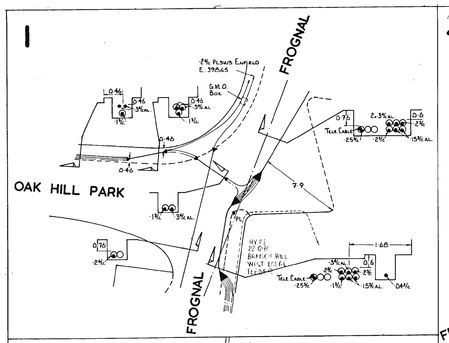
FROGNAL

7

HOLLY WALK

THERE ARE OTHER CABLES AND PLANT IN THIS AREA— SEE MAPBASE FOR DETAILS.

1



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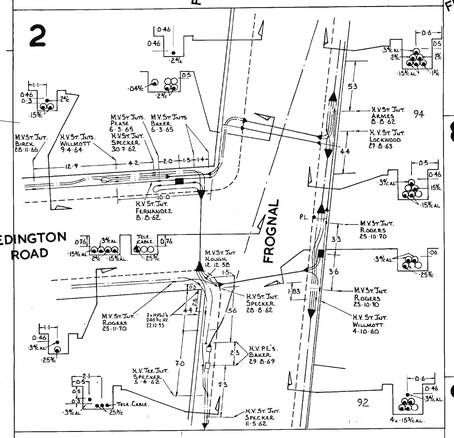

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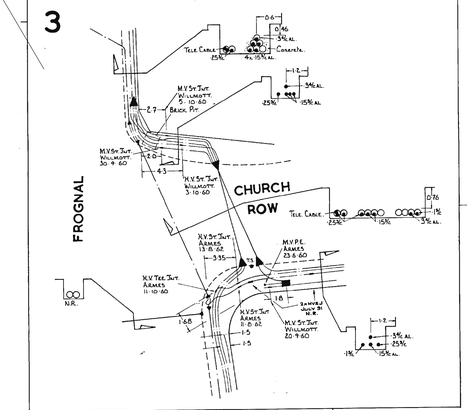

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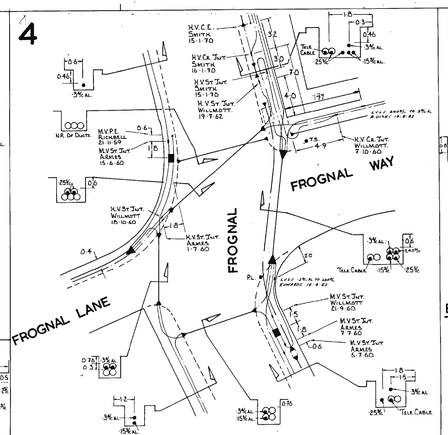

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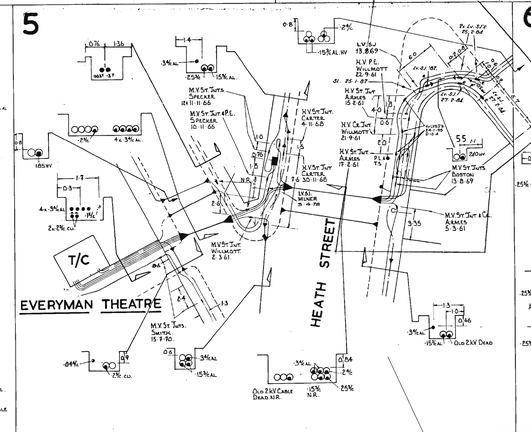

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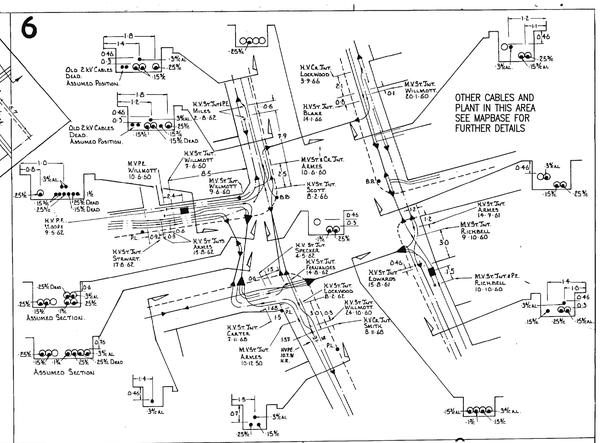

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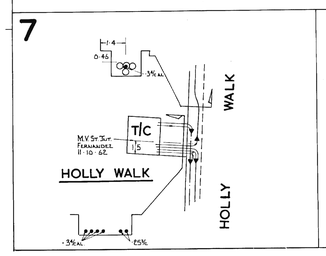

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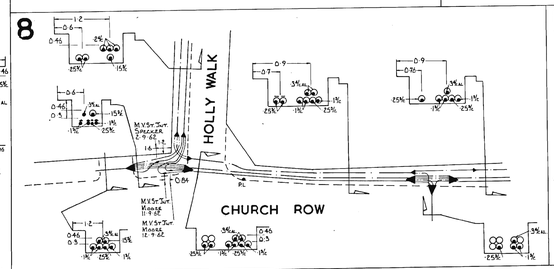

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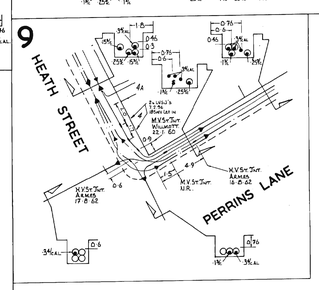

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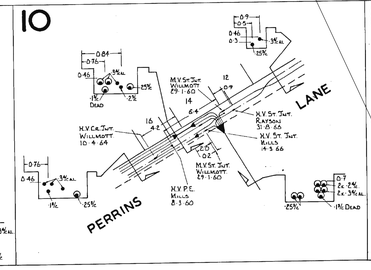

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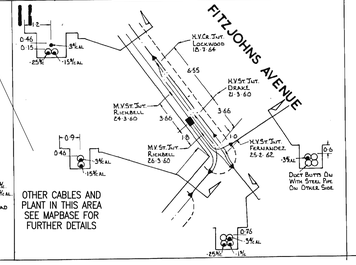


ALL ENLARGEMENTS 1:200

TQ 2685 NW-S/1
35.11/A (H16A)

London Electricity Board
Based upon the Ordnance Survey Map with the sanction of the Controller of H.M. Stationery Office. Crown Copyright Reserved.

Sheet 1

M.W. 18.7.75

1:500 (H16)

M.W. 15-7-75

TQ 2685 NE-S 35.11 (H17)

35.11/A

0·46

·25%c
%cAL

·3%cAL

·15%c

·25%c

H.V.C.E.
SMITH
15·1·70

H.V.CR.JNT.
SMITH
16·1·70

H.V.ST.JNT.
SMITH
15·1·70

H.V.ST.JNT.
WILLMOTT.
19·7·62

3·2

3·0

TELE
CABL

7·0

4·0

77·7

M.V.P.E.
RICKBELL
21·11·59

0·6

M.V.ST.JNT.
ARMES
15·6·60

1·8

T.S.

4·9

H.V.CR.JNT.
WILLMOTT.
7·10·60

FROGNAL WAY

H.V.ST.JNT.
WILLMOTT
18·10·60

1·8

H.V.ST.JNT.
ARMES
1·7·60

0·4

FROGNAL

2·0

P.L.

LVSJ ·3%cAL TO 240%c
EDWARDS 18:8:83

M.V.ST.JNT.
WILLMOTT
21·9·60

1·5

M.V.ST.JNT.
ARMES
7·7·60

1·8

0·6

M.V.ST.JNT
ARMES
6·7·60

Network Records NetMAP Symbols Booklet - London

This symbol booklet is intended as a general guide only - some local variations of these symbols may be found.

Version 1.2

Released October 2010

Always check with your local Network Records office or the UK Power Networks server to ensure that you are using the most up to date copy of this booklet.Tel: 08000 565866

Index:-

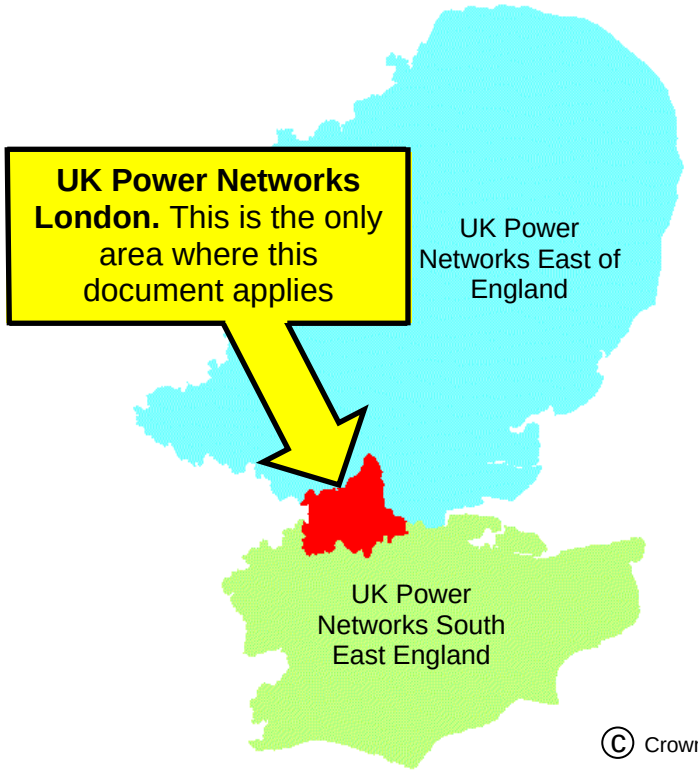
Guidance notes.

Important notice:
If you do not understand the NetMAP record that you are using, please contact UK Power Networks Network Records for guidance
Tel: 08000 565866.

- The position of apparatus shown on NetMAP is believed to be correct, but the original landmarks may have altered since the apparatus was installed.
- It must be assumed that there is at least one service to each property, lamp column, street sign etc. A separate record may be available.
- When excavations are to be carried out near Extra High Voltage (EHV) cables, further details must be obtained before commencement of work.
- Third party cables are not usually shown.
- When two or more maps are supplied for the same area, the maps must be read in conjunction with each other and with this symbol booklet.
- All LV cables are assumed to be 4 core, and all HV cables assumed to be 3 core – unless otherwise stated.
- All Imperial cable sizes are assumed to be copper and all metric cable sizes are assumed to be aluminium – unless otherwise stated.

Plan Provision Team
Fore Hamlet
Ipswich
Suffolk IP3 8AA
Tel: 08000 565866

The area covered by this guide:



Please see the anomalies map at the end of this safety booklet for greater map area detail, and a breakdown of the more significant anomalies within the London area.

Scenery

NetMAP system	Scanned image	Description
		100 metre Ordnance Survey grid line (on O/S based maps only)
		Property fence line
		Building line
		Kerb line
		Kerb line on majority of ways & mains maps
TUNNEL		Cable tunnel or subway
NOT APPLICABLE	or	Borough or City boundary and UK Power Networks boundary
	or	UK Power Networks or Electrical boundary

Scenery for UK Power Networks use only - boxed in red

NetMAP system	Scanned image	Description
Inset Network – Contact xxxx IDNO for further information	Not applicable	Area of inset network - not the asset of UK Power Networks (only visible to UK Power Networks and their immediate contractors)
	Not applicable	Proposed Cross Rail route (only visible to of UK Power Networks and their immediate contractors)
	Not applicable	High pressure pipelines in the general vicinity (only visible to of UK Power Networks and their immediate contractors)

Note: Pipelines are only viewable on NetMAP by UK Power Networks staff and their immediate contractors. Do not carry out any excavation without consent from the relevant agency - legally protected high pressure petroleum products pipeline route in the general vicinity - consult www.linewatch.co.uk for contacts and guidance. Pipeline contact numbers can also be found on the intranet – out of hours, contact our Control Centre.

	Not applicable	Water - surface water (only visible to UK Power Networks and their immediate contractors)
	Not applicable	Water - Source Protection Zone 1 (only visible to UK Power Networks and their immediate contractors)
	Not applicable	Water - Source Protection Zone 2 (only visible to UK Power Networks and their immediate contractors)
	Not applicable	Water - Source Protection Zone 3 (only visible to UK Power Networks and their immediate contractors)

section continued on next page

Scenery for UK Power Networks use only - boxed in red

NetMAP system	Scanned image	Description
	Not applicable	Historical - Scheduled Monuments (only visible to UK Power Networks and their immediate contractors)
	Not applicable	Historical - Parks and Gardens (only visible to UK Power Networks and their immediate contractors)
	Not applicable	Historical - Areas of Archaeological Potential (AAP) (only visible to UK Power Networks and their Immediate contractors)
	Not applicable	Nature - Ramsar Wetlands of International Importance (only visible to UK Power Networks and their immediate contractors)
	Not applicable	Nature - Special Area of Conservation (SAC) (only visible to UK Power Networks and their immediate contractors)
	Not applicable	Nature - Special Protected Area (SPA) (only visible UK Power Networks and their immediate contractors)
	Not applicable	Nature - Site of Special and Scientific Interest (SSSI) (only visible to UK Power Networks and their immediate contractors)

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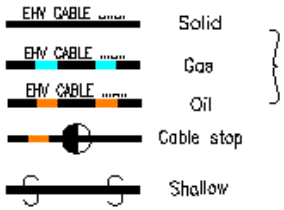
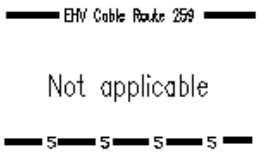
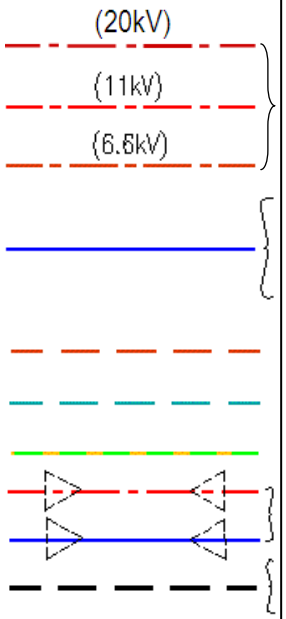
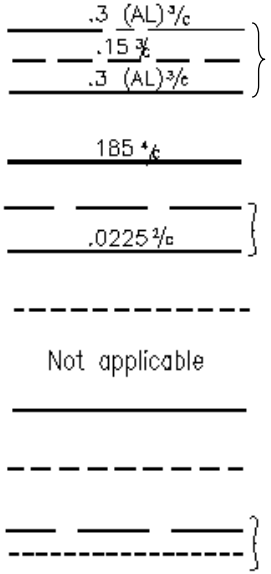
Scenery for UK Power Networks use only - boxed in red

NetMAP system	Scanned image	Description
	Not applicable	Nature - Local Nature Reserve (only visible to UK Power Networks and their immediate contractors)
	Not applicable	Nature - National Nature Reserve (only visible to UK Power Networks and their immediate contractors)
	Not applicable	Nature - Area of Outstanding Natural Beauty (AONB) (only visible to UK Power Networks and their immediate contractors)
	Not applicable	Nature - National Park (only visible to UK Power Networks and their immediate contractors)
	Not applicable	Fluid filled cables - very high sensitivity (only visible to UK Power Networks and their immediate contractors)
	Not applicable	Fluid filled cables - high sensitivity (only visible to UK Power Networks and their immediate contractors)
	Not applicable	Fluid filled cables - medium sensitivity (only visible to UK Power Networks and their immediate contractors)
	Not applicable	Fluid filled cables - low sensitivity (only visible to UK Power Networks and their immediate contractors)

Primary distribution cables

NetMAP system	Scanned image	Description
		UK Power Networks route (11,000 , 22,000 to 132,000 volts) Oil/gas cable stop Part of UK Power Networks cable route where cover is less than normal

Secondary distribution cables

NetMAP system	Scanned image	Description
		HV cable (up to 20kV) 3 phase LV cable (230V or 400/230V) 1 or 2 phase LV cable (230V or 400/230V) Pilot or Telephone cable, often not shown in plan if running with other cables Fibre-optic cable Earth cable HV or LV cable in duct Duct route(s) not containing live cables

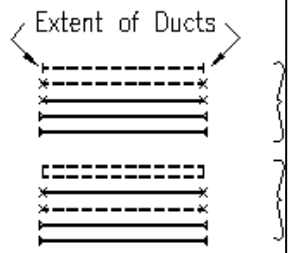
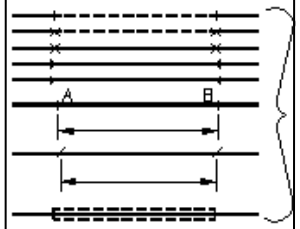
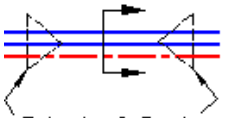
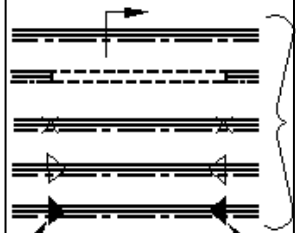
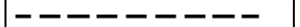
Cable terminology

NetMAP system	Scanned image	Description
PL	PL	Paper Lead
PLS	PLS	Paper Lead Served
PLST or PLSW	PLA	Paper Lead Armoured
PLSTS	PLTS	Paper Lead Steel Tape Served
PLSTS	PLDT	Paper Lead Double Tape
PLSWS	PLWS	Paper Lead Steel Wire Served
PLSW	PLBW	Paper Lead Bright Wire
PLS	LC & H	Lead Covered & Hessian
PLST or PLSW	LC & A	Lead Covered & Armoured
PLSW	LC & BA	Lead Covered & Bright Armoured
PLST	DSTA	Double steel tape armoured
PLST	STA	Steel Tape Armoured
PLSW	SWA	Steel Wire Armoured
Al	Al	Aluminium
Cu	Cu	Copper
WV	WV	Waveconal
CS	CS	Consac
PVC	PVC	Polyvinyl Chloride
EPR	EPR	Ethylene Propylene Rubber
XLPE	XLPE	Cross Linked Polyethylene
SOL	SOLIDAL	Solid Aluminium
ax	TRIPLEX	Triplex (aluminium)
cx	TRIPLEX	Triplex (copper)

Cable size abbreviations

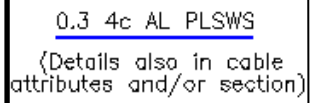
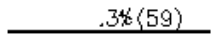
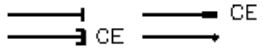
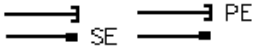
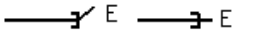
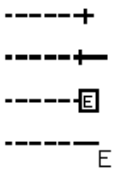
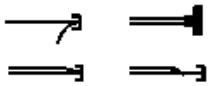
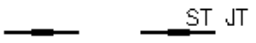
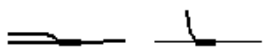
NetMAP system	Scanned image	Description
1c	1c	Single core.
c/c	c/c	Concentric cores
t/c	T/c or T/cc	Triple concentric cores
4c	4c	Four cores
3c CNE	3c (CN)	Three cores and concentric neutral – not of the Waveconal type
2c	2c (or Tw)	Two cores (or twin)
s/c	s/c	Split concentric cores
3c	3c	Three cores
DC	DC	Direct current
P	P	Pilot
Pr	Pr	Number of telephone pairs

Cable ducts

NetMAP system	Scanned image	Description
		Single empty ducts
		Cluster of empty ducts (two or more)
		Cable in single duct
		Group of cables shown in a cluster of ducts, plus one or more empty (shown in section)
		Ex-Western area 'ways' maps: This symbol indicates one or more ducts.

On City of London area maps "extent of ducts" symbols are not in general use as most duct runs are between pits or boxes

Other NetMAP symbols

NetMAP system	Scanned image	Description
		Cable size (and year laid)
		Cable capped end
		Cable pressure (or pot) end or signal end
		Pressure/pot end & earth cable/electrode
		Earth rod (vertical) Earth rod (horizontal) Earth plate Earth plate or end
		Bottle or trouser joint or combined crutch & pressure end – (CPE)
		Straight joints
		Tee joints
		Crutch (or spur) joints (CJ) straight & crutch joints combined (S&CJ)
		Double crutch (or spur) joint
		Sleeve

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Other NetMAP symbols

NetMAP system	Scanned image	Description
		Four way underground disconnecting boxes(DB)
		Link boxes(LB)
		Network boxes(NB) or (NWB)
		4 way 6 entry
		6 way box
		6 way 8 entry
		Split bus-bar
123456	LB123456	Link box with identification number
	or	3 way underground disconnecting boxes
	or	2 way underground disconnecting boxes
		1 way underground disconnecting boxes
123456 0.3 4c PLSWS TAILS DISTRIBUTION PILLAR		Feeder pillars
		Split bus-bar distribution pillar
		Double bus-bar distribution pillar
		Blind pit/pit
		Pit with access

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Other NetMAP symbols

NetMAP system	Scanned image	Description
	or or	Transformer chambers (T/C) & transformer compounds
		Underground transformer chamber
CAUTION Missing Information	Not applicable	Missing data in or near this location
U/G TANK		Underground tank
12 14 ROYAL MEWS	12 14 ROYAL MEWS	Indicates service between separate buildings is looped
Phasing details are in the joint 'world'	29 29	Jointing schedule numbers or phasing diagram
Contaminated Land refer to SHE 01 016	Not applicable	Contaminated land reference
(Cable size/type) ITC	(Cable size/type) Cable traced using CAT	Instrument traced cable or ITC - cable traced electronically using Cable Avoidance Tool (CAT) or similar

Services

NetMAP system	Scanned image	Description

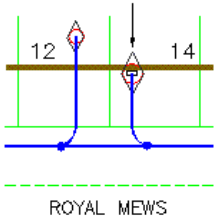
SRC = Service Record Card

Address point

Supply point

Also see SRC and joint/cable attributes

Service in external cabinet

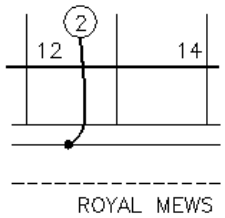


Also see SRC and joint/cable attributes

To a property/metered supply (also see SRC)

Also see SRC

W	Single phase service
1	Connected to 1 core & neutral
R	Connected to red core & neutral
	Three phase service
+	Connected to inner & outer cores of triple conc cable
−	Connected to middle & outer cores of triple conc cable
±	Connected to all three cores of triple conc cable



Existence of a service with its core connection shown in circle

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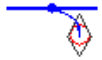
Services

NetMAP system	Scanned image	Description

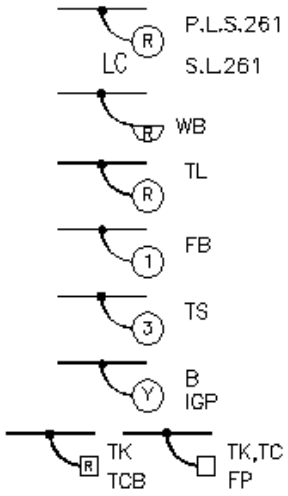
Please note that newly edited street furniture no longer has an address point or an SRC



(Street furniture general)

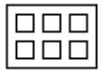
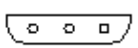
(Street furniture feeder pillar or cabinet)

To street furniture/un-metered supply (also see SRC)



P.L.S.261 / LC / S.L.261	Public lighting / Street lighting
WB	Wall bracket
TL	Traffic light control
FB	Flashing beacon
TS	Traffic sign
B / IGP	Bollard/illuminated guard post
TK / TCB / TK,TC / FP	Telephone kiosk, traffic controller, feeder pillar

Symbols used in cross sections

NetMAP system	Scanned image	Description
		Cable laid direct
		Cable laid in duct
		Blocked duct (sometimes used for unidentified cables)
		Single earthenware duct
2½" S		Single steel pipe
		Square cable duct
		Group of circular ducts
		Group of circular ducts (Sykes)
		Group of square ducts (Doulton)
		Cable trough
		Bitumen casing (Crompton)
		Bitumen filled iron trough (Trunks)
		Bitumen casing (Tri-case)

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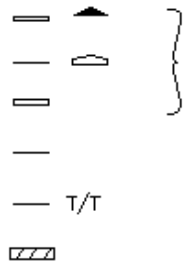
Symbols used in cross sections

NetMAP system	Scanned image	Description
Timber		Protective slab Tiles. Concrete slabs Steel plate Plastic tile tape Timber

Abbreviations used in cross sections

NetMAP system	Scanned image	Description
EW	E.W.D(s) or EW.	Earthenware ducts
F	F.P or F or F.D	Fibre duct
A	ASB or A	Asbestos
P	P	Plastic or pitch fibre
S	S.P or S	Steel
C	C.I or C or C.I.P	Cast iron
WI	W.I	Wrought iron pipe
F	F or F.D	Fibre duct
PRD	PRD	Plastic Rigiduct
Left blank – means NR	D.N.K or D:NR	Depth not known
	N.R or (N.R)	No record
E.V	E.V.P or E.V	Everite pipe
T/T	T/T	Tape Tile
N/A	3/62 or NOV 79	Date cable laid
N/A–destination now only shown in cable attribute	ABCD etc	HV cable destination (See section sheet HV ref)

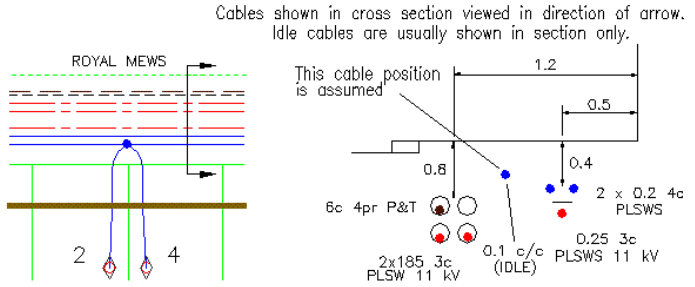
Please note:

Ducts are assumed to be 4"/100mm earthenware – unless otherwise stated

Typical plan and cross section representations

Multi-line composite NetMAP/vector representation

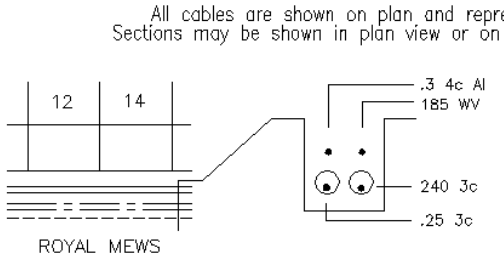
All areas – drawn/redrawn using NetMAP GIS



Applies to all composite vector records in both shaded and unshaded areas of the anomalies map.

Multi-line representation - general composite raster (style 1)

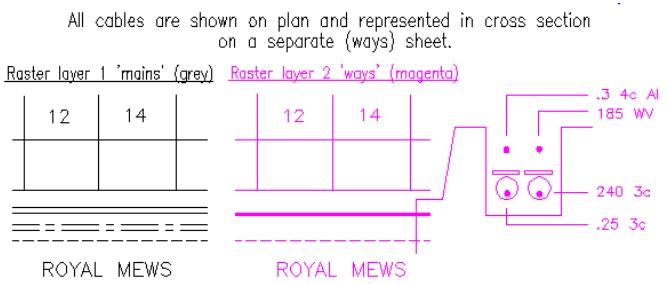
All areas



Applies to all composite raster records within the unshaded areas of the anomalies map.
Can also be found in some shaded areas – in particular the ex–North Eastern shaded areas 3 (b) and 3 (c)

Main and ways representation – dual layer raster

Ex Western area Holborn and parts of Ex-South Eastern Area only



Applies to area 1(a) of the anomalies map.

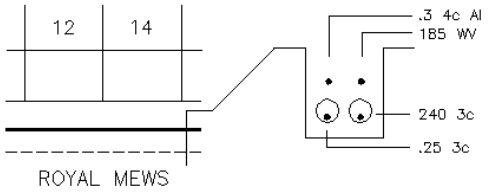
Applies to area 2(a) of the anomalies map.

Typical plan and cross section representations

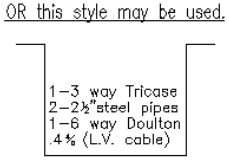
Single line representation - raster or vector data

The City of London only

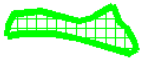
All cables are shown as a single line in plan.
Sections may be written and not drawn.



OR this style may be used.



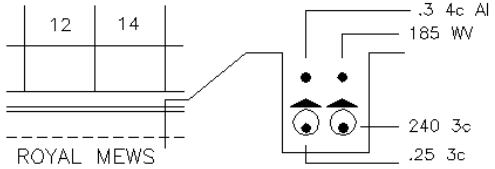
Applies to area 2(b) on the anomalies map.



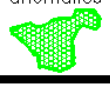
Multi-single line representation general (style 1)

Finsbury and Shoreditch only

Only the top cables in a vertical cable run are shown in the plan view. See the example below.
Note that the two lower cables that are in ducts (in this instance), are not shown in plan.
Therefore cross sections are particularly important, as each line represents one or more cables.



Applies to area 2 (c) of the anomalies map.

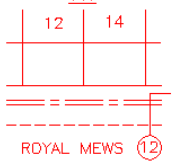


HV and LV map representation – dual layer raster

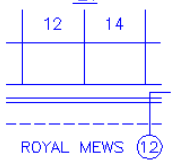
Ex-North Eastern area only

HV and LV cables are shown on separate raster layers. These layers MUST be read in conjunction with each other. Sections are shown on a combined supplementary section sheet in numerical sequence.

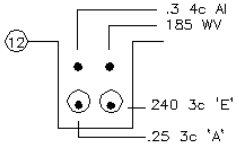
Raster layer 1 HV (red)



Raster layer 2 LV (blue)



Separate raster section sheet



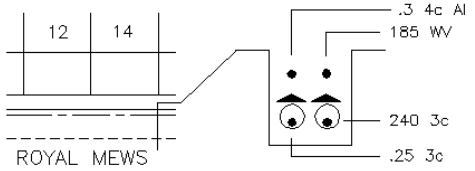
Applies to area 3(a) of the anomalies map.

Typical plan and cross section representations

Multi-single line representation general (style 2)

Ex-North Eastern area only

In this area each voltage (HV and LV) is represented as an individual line. For example, three HV cables and four LV cables in the same run will be indicated by a single HV line and a single LV line. Therefore cross sections are particularly important, as each line represents one or more cables of that voltage.

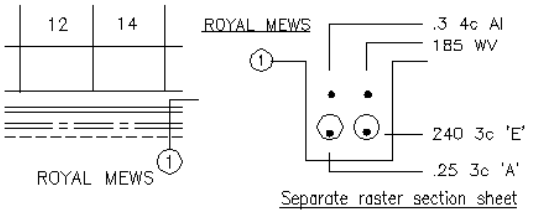


Applies to area 3 (b) of the anomalies map.

Multi-line representation - composite raster (style 2)

Ex North Eastern area only

All cables are individually shown in plan.
Sections are shown on a supplementary section sheet and recorded under the relevant road name.



Applies to area 3(c) of the anomalies map.

Important note regarding sections:

It does not follow that if the number of cables shown in the cross section have been located, that all live cables have been found. You may have found an unrecorded cable, or a cable belonging to another authority.

Regional NetMAP Anomalies - general overview:

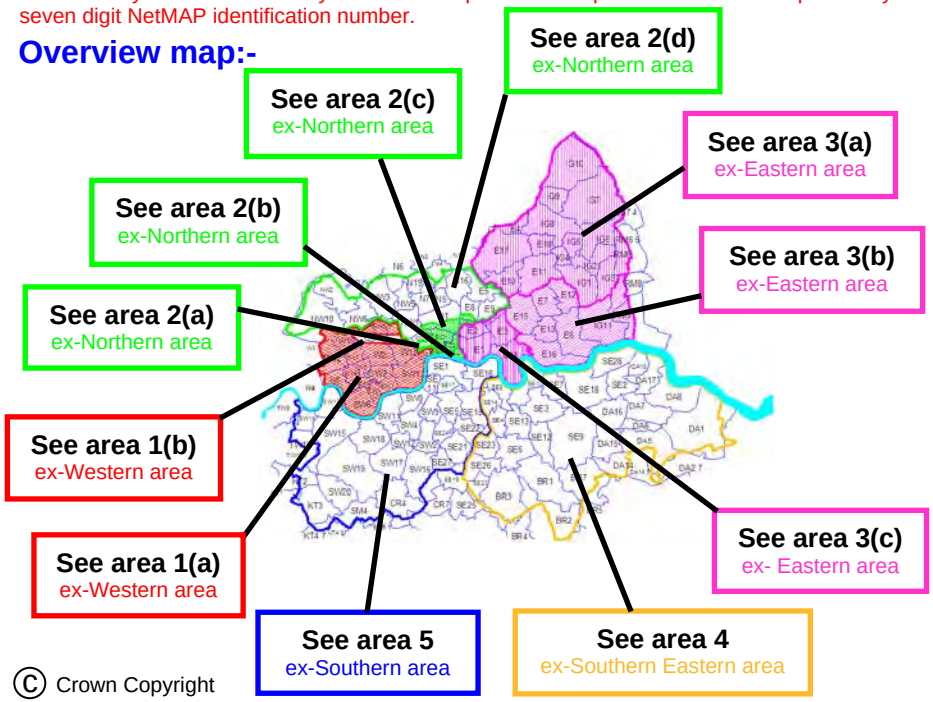
The following pages explain the various major map style anomalies found within the London area. These styles are a legacy from the five individual London Electricity areas which were again formed from seventeen separately organised LEB districts. Areas with significant anomalies are shown in the following pages as cross-hatched areas. Areas with standard composite vector and raster layer information are shown as un-hatched areas.

Cautionary note: - any region or sub-region, either shaded or un-shaded, may contain some local anomalies not mentioned in the following pages – if in doubt, please contact the UK Power Networks Plan Provision team on telephone number 08701 963797.

All regions (1-5) will contain recently created composite vector (NetMAP/AutoCAD) data.

Recent work created using the NetMAP system and previously created using the AutoCAD system (as opposed to raster/scanned data) are recorded in the composite vector style shown on the UK Power Networks London area symbol sheet - see the first example on page 18 of this document. Recent data will be indicated by the existence of multi-coloured cables on the NetMAP system, but this may not be reflected on printed matter produced with a black and white printer. AutoCAD data looks similar to the coloured NetMAP data, but does not hold any cable 'attributes' when selected using the NetMAP system. These cables will be represented individually (multi-line representation). New NetMAP cross sections may be accessed electronically on the NetMAP system and are presented in printed format accompanied by a seven digit NetMAP identification number.

Overview map:-



See following pages for further details.

Region 1 ex-Western area

This region includes Westminster, Kensington, Chelsea, Hammersmith and Fulham. The region is covered by two map layer systems – **region 1(a)** mains and ways dual layer raster, and **region 1(b)** composite raster. The following explains this in greater detail.

Region 1(a) (hatched)

Mains and ways representation:

This system consists of two maps layers for the same area.

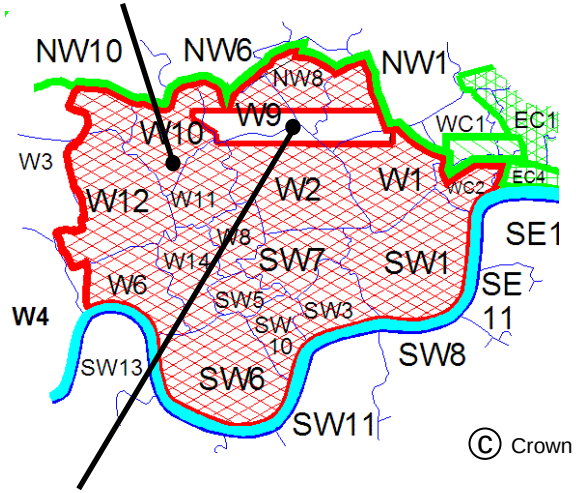
i) The mains map shows all cable routes.

ii) The ways map shows pipe and duct routes with cross sections.

There are some enlargement sheets, cross sections and jointing details. EHV routes are shown on either the mains or the ways map.

It is important that all these maps are read in conjunction with each other.

Caution: - It is also important to note that the kerb line detail on these maps is a dash/dot line, which on the majority of UK Power Networks Central (London) records would refer to an HV cable route. HV cables are shown as a solid line when laid direct and a dashed line when in a duct.



Region 1(b) (un-hatched)

Composite single layer (style 1) maps:

Whenever possible, all the information is on one map layer. There are some enlargement sheets in the Aberdeen Place area. Please note that the kerb line is shown as a dotted line and HV cables are shown as dash/dot lines.

Region 2 ex-Northern area

This region includes Islington, Hackney, the City of London and parts of Brent, Camden and Ealing. The region is covered by four map layer systems - **Region 2(a) -** mains and ways dual layer raster (Holborn area), **Region 2(b)** - single line representation (City of London), **Region 2(c) -** multi-single line representation (Finsbury and Shoreditch) and **Region 2(d)** - composite multi-line maps (all other areas). This following explains this in greater detail.

Region 2(a) (hatched)

Covers part of WC1 and WC2 (Holborn).

Mains and ways representation:

This system consists of two maps layers for the same area.

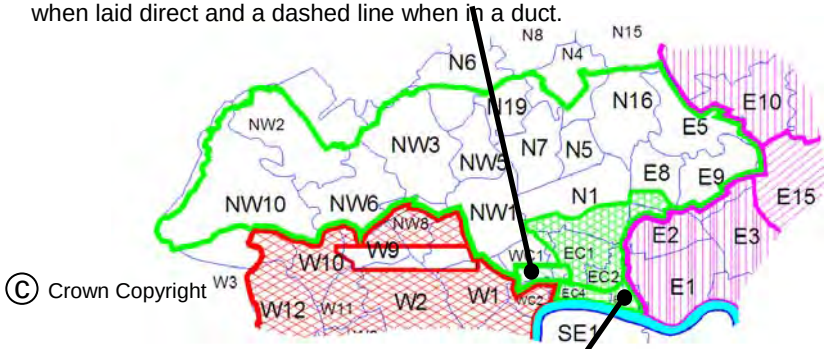
i) The mains map shows all cable routes.

ii) The ways map shows pipe and duct routes with cross sections.

Where needed, extra sheets have been added for enlargements, cross sections and jointing details. EHV routes are shown on the mains map layer.

It is important that all these maps are read in conjunction with each other.

Caution: - It is also important to note that the kerb line detail on these maps is a dash/dot line, which on the majority of UK Power Networks Central (London) records would refer to an HV cable route. HV cables are shown as a solid line when laid direct and a dashed line when in a duct.



Region 2(b) (hatched)

Covers parts of postal areas EC1, EC2 and all of postal areas EC3 and EC4.

Single line representation maps:

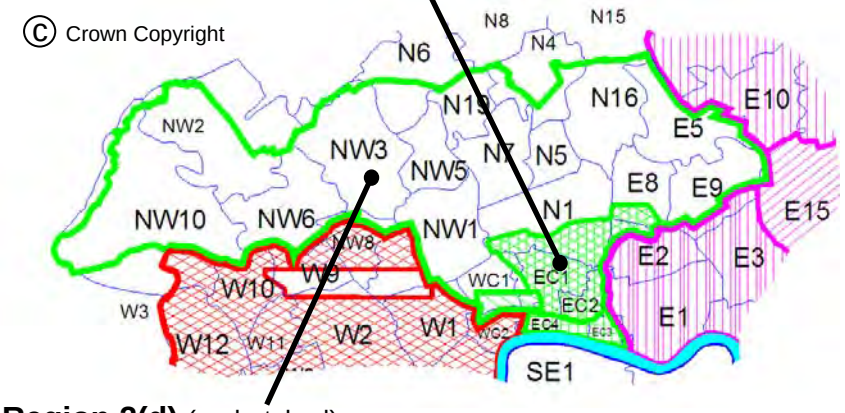
Whenever possible, all the information is on one map layer .One line can represent any number of cables or ducts. It is therefore very important to use cross sections. In some cross sections details may be written and not drawn. In complex and redrawn areas, some detail may be drawn using multi-line representation. There are some enlargement sheets.

Region 2(c) (hatched)

Covers parts of postal areas EC1, EC2, N1, E1, E2 and E8.

Multi-single line representation (style 1) maps:

Whenever possible, all the information is on one map layer. When cables lay immediately above/below each other, it is shown as a single line. For example if six cables lay three on three, only three lines would indicate the six cables. If the cables were laid flat, six separate lines would be shown. It is therefore important not to assume that the lines drawn indicate the number of cables, at any point. **Cross sections must be used.**



Region 2(d) (un-hatched)

Covers all other postal areas in this region

Composite single layer (style 1) maps:

Whenever possible, all the information is on one map layer. There are some enlargement sheets.

Region 3 ex-North Eastern area

This region includes Tower Hamlets, Newham, Redbridge, Waltham Forest, Loughton (Epping) and Barking and Dagenham. This region is covered by three mapping systems.

Region 3(a) (hatched)

Separate HV and LV representation maps:

This system consists of two maps layers for the same area.

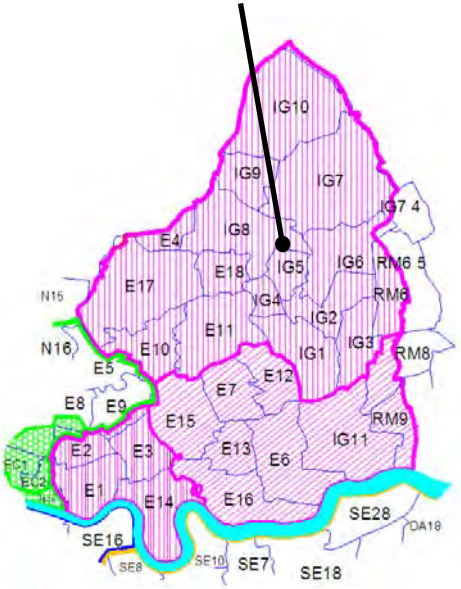
i) The HV map layer showing HV cables and duct routes.

ii) The LV map layer showing LV cables and duct routes.

Cross sections for both HV and LV cable routes are shown on a separate sheet.

EHV cable routes are shown on the HV map layer.

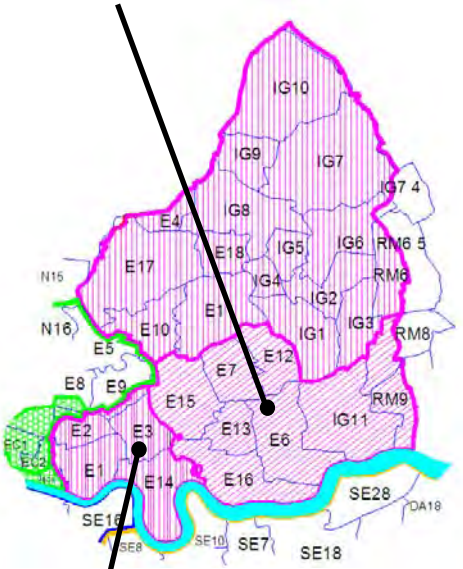
It is important that all these maps are read in conjunction with each other.



Region 3(b) (hatched)

A combination of composite single layer (style 1) and multi-single line (style 2):

Whenever possible, all the information is on one map layer. There are some enlargement sheets. There is a combination of map styles used in this area. Some areas may be conventional multi-line line representation with many areas of multi-single line representation. In the multi-line areas each (live) cable is shown individually in plan. In the multi-single line map areas, there is a single line for each voltage type, with a single HV line and a single LV line representing more than one cable run of each voltage (when applicable). Therefore a cable run containing three HV cable and four LV cables will be represented by one HV line and one LV line.



Region 3(c) (hatched)

A combination of composite single layer (style 2) and multi-single line (style 2):

Whenever possible, all the information is on one map layer. There are some enlargement sheets. In this area (postal code areas E1, E2, E3, E14 and part of E9), the cross sections are listed under each road name. It is therefore extremely important that you have the correct cross sections for the road you are working in.

There is a combination of map styles used in this area. Most areas are composite single layer (style 2) with some areas of multi-single line representation, as described in region 3(b).

Region 4 ex-South Eastern area

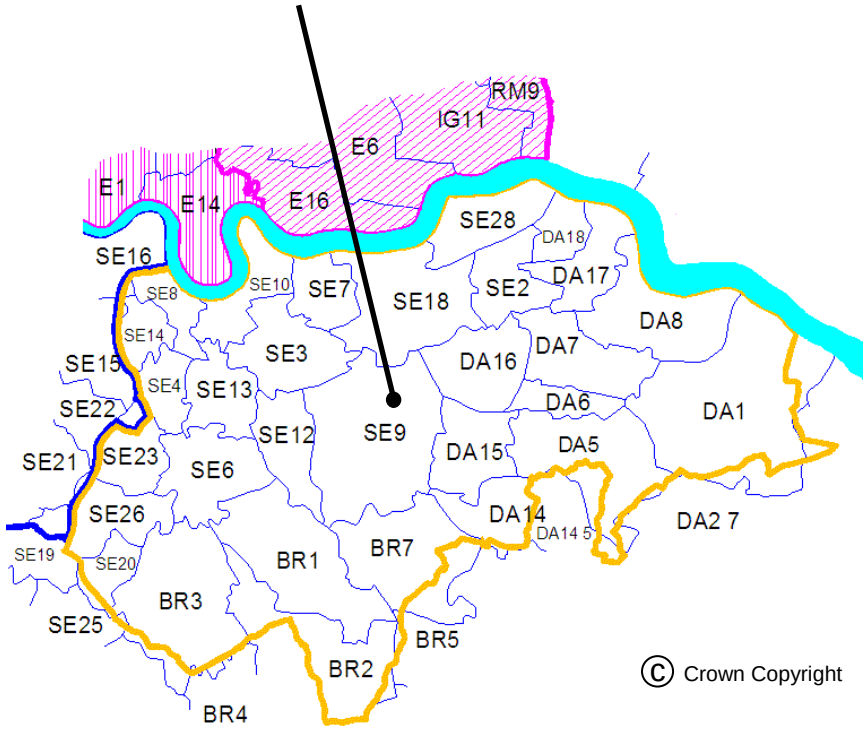
This region includes Lewisham, Greenwich, Bromley, Bexley and Dartford.

Nearly all maps are drawn in one style – single layer composite raster/vector.

Region 4 (un-hatched)

Composite single layer (style 1) with a small number of mains and ways representation maps :

Mainly composite maps - whenever possible, all the information is on one map layer. There are some enlargement and cross section sheets. Some maps do not show single phase services unless they are long and deviating. There are however some maps drawn using the mains and ways style. These are rare, but please be aware that they exist.



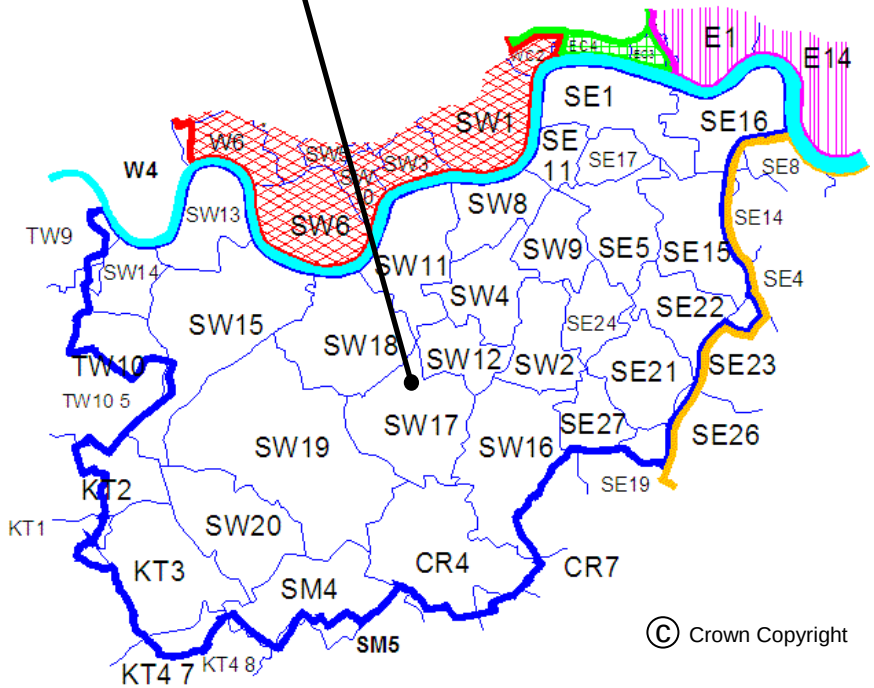
Region 5 ex-Southern area

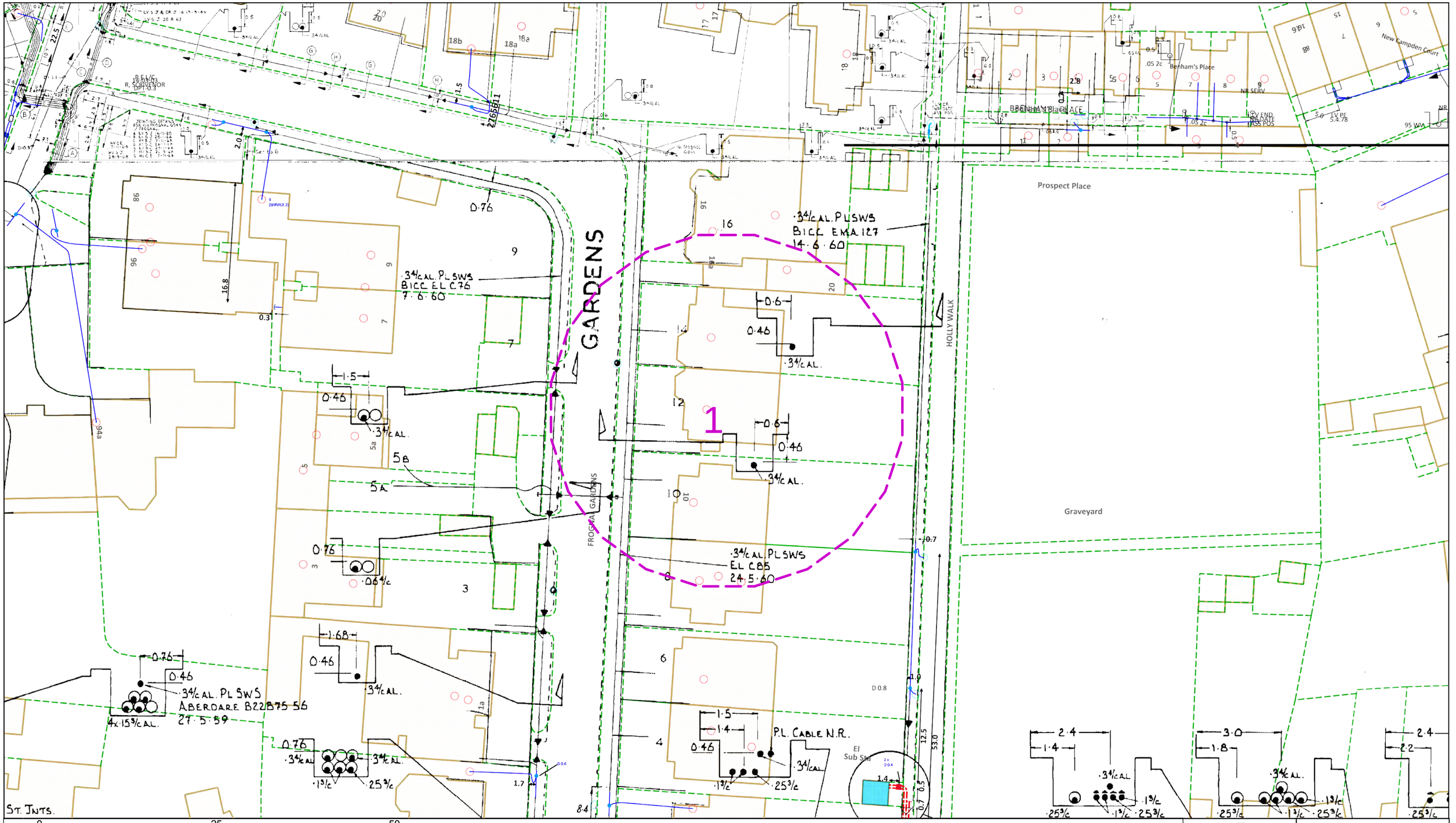
This region includes Southwark, Lambeth, Wandsworth, Merton, Kingston upon Thames and Richmond upon Thames. All maps are drawn to one style - single layer composite raster/vector.

Region 5 (un-hatched)

Composite single layer (style 1) maps:

Composite maps - whenever possible, all the information is on one map layer. There are some enlargement and cross section sheets. A small number of maps may not show services.





Dig Sites Area: Line:

The quality and accuracy of any print will depend on your printer, your computer and its print settings. Measurements scaled from this plan may not match measurements between the same points on the ground.

This plan must be used with the attached 'Symbols' document.

Date Requested: 18/12/2018
Job Reference: 14446595
Site Location: 526142 185678
Requested by:
Mr Pawel Rogalewicz
Your Scheme/Reference: 16 Frognal Gardens

Scale: 1:500 (When plotted at A3)

1. The position of the apparatus shown on this drawing is believed to be correct but the original landmarks may have been altered since the apparatus was installed.
2. The exact position of the apparatus should be verified – use approved cable avoidance tools prior to excavation using suitable hand tools.
3. It is essential that trial holes are carefully made avoiding the use of mechanical tools or picks until the exact location of all the cables have been determined.
4. It must be assumed that there is a service cable into each property, lamp column and street sign, etc.
5. All cables must be treated as being live unless proved otherwise by UK Power Networks.
6. The information proved must be given to all people working near UK Power Networks plant and equipment. Do not use plans more than 3 months after the issue date for excavation purposes.
7. Please be aware that electric cables/lines belonging to other owners of licensed electricity distribution systems may be present and it is your responsibility to identify their location.

1. UK Power Networks does not warrant that the information provided to you is correct. You rely upon it at your own risk.
2. UK Power Networks does not exclude or limit its liability if it causes the death of any persons or causes personal injury to a person.
3. Subject to paragraph 2 UK Power Networks has no liability to you in contract, in tort (including negligence), for breach of statutory duty or otherwise for any loss, damage, cost, claims, demands, or expenses that you or any third party may suffer or incur as a result of using the information provided whether for physical damage to property or for any economic loss (including without limitation loss of profit, loss of opportunity, loss of savings, loss of goodwill, loss of business, loss of use) or any special or consequential loss or damage whatsoever.
4. This plan has been provided to you on the basis of the terms of use set out in the covering letter that accompanies this plan. If you do not accept and/or do not understand the terms of use set out in the covering letter you must not use the plan and must return it to the sender of the letter.
5. You are responsible for the security of the information provided to you. It must not be given, sold or made available upon payment of a fee to a third party.

UK Power Networks

IF IN DOUBT – ASK!
PHONE 0800 056 5866
EMERGENCY – If you damage a cable or line Phone 0800 783 8838 (24hrs) URGENTLY

LOOK OUT LOOK UP

ALWAYS LOOK UP BEFORE YOU START WORK
Refer to HSE Guidance note GS6

Maps produced at 1:2500 scale are Geo-Schematics which show LV mains cables and overhead lines (in some cases all voltages). Prior to carrying out excavations you must refer to the 1:500 records to determine the location of all known underground plant and equipment.

Cross Section : 2765611

0.3 4c

Cross Section

2765611

1. The position of the apparatus shown on this drawing is believed to be correct but the original landmarks may have been altered since the apparatus was installed.
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5. All cables must be treated as being live unless proved otherwise by UK Power Networks.
6. The information proved must be given to all people working near UK Power Networks plant and equipment. Do not use plans more than 3 months after the issue date for excavation purposes.
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1. UK Power Networks does not warrant that the information provided to you is correct. You rely upon it at your own risk.
2. UK Power Networks does not exclude or limit its liability if it causes the death of any persons or causes personal injury to a person.
3. Subject to paragraph 2 UK Power Networks has no liability to you in contract, in tort (including negligence), for breach of statutory duty or otherwise for any loss, damage, cost, claims, demands, or expenses that you or any third party may suffer or incur as a result of using the information provided whether for physical damage to property or for any economic loss (including without limitation loss of profit, loss of opportunity, loss of savings, loss of goodwill, loss of business, loss of use) or any special or consequential loss or damage whatsoever.
4. This plan has been provided to you on the basis of the terms of use set out in the covering letter that accompanies this plan. If you do not accept and/or do not understand the terms of use set out in the covering letter you must not use the plan and must return it to the sender of the letter.
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Appendix E: Basement Method Statement

CROFT STRUCTURAL ENGINEERS

16 Frognal Gardens

1. Preamble

1.1. This method statement provides an approach that will allow the basement design to be correctly considered during construction. The statement also contains proposals for the temporary support to be provided during the works. The Contractor is responsible for the works on site and the final temporary works methodology and design on this site and any adjacent sites.

1.2. This method statement has been written by a Chartered Engineer. The sequencing has been developed using guidance from ASUC (Association of Specialist Underpinning Contractors). Croft Structural Engineers are an Associate Member of ASUC.

1.3. This method has been produced to allow for improved costings and for inclusion in the Party Wall Award. Final site conditions need there to be flexibility in the method statement: Should the site staff require alterations to the Method statement this is allowed once an alternative methodology, of the changes is provided, and an Addendum to the Party Wall Award will be required.

1.4. Contact Party Wall Surveyors to inform them of any changes to this method statement.

1.5. On this development, the approach is: demolish the existing garages, construct the underpin segments in pin sequence accordingly to the structural drawings, once the substructure RC shell is completed, erect superstructure.

1.6. Temporary props will be provided along the height of the pin in the temporary condition. Before the base is cast cross props are needed. The base/ground slab provides propping in the final condition. In the temporary condition, the edge of the slab is buttressed against the soil in the middle of the property. Also, the skin friction between the concrete base and the soil provides further resistance. The central soil mass is to be removed in portions (thirds but no greater than 8m) and cross propping subsequently added as the central soil ass is removed

1.7. A ground investigation has been undertaken. The soil present is Bagshot Formation.

1.8. The bearing pressures have been limited to 125kN/m^2.

1.9. It is not expected to encounter water table.

1.10. The structural waterproofer (not Croft) must comment on the proposed design and ensure that he is satisfied that the proposals will provide adequate waterproofing.

1.11. Provide engineers with concrete mix, supplier, delivery and placement methods two weeks prior to the first pour. Site mixing of concrete should not be employed apart from in small sections (less than 1m3). The contractor must provide a method on how to achieve site mixing to the correct specification. The contractor must undertake toolbox talks with staff to ensure site quality is maintained.

2. Enabling Works

2.1. The site is to be hoarded with ply board sheets, at least 2.2m high, to prevent unauthorised public access.

2.2. Licences for skips and conveyors should be posted on the hoarding.

2.3. Provide protection to public where conveyor extends over footpath. Depending on the requirements of the local authority, construct a plywood bulkhead over the pavement. Hoarding to have a plywood roof covering over the footpath, night-lights and safety notices.

2.4. No significant dewatering is expected. Localised removal of water may be required to deal with rain from perched water or localised water. This is to be dealt with by localised pumping. Typically achieved by a small sump pump in a bucket.

2.5. On commencement of construction, the contractor will determine the foundation type, width and depth. Any discrepancies will be reported to the structural engineer in order that the detailed design may be modified as necessary.

3. Basement Sequencing

3.1. Demolish existing garages.

3.2. Excavate area 600mm below external ground level.

3.3. Excavate first pin as per plans. (Follow methodology in Section 4)

3.4. Excavate second pin as per plans. (Follow methodology in Section 4)

3.5. Continue cantilevered wall formation around perimeter of basement following the numbering sequence on the drawings.

3.5.1. Excavation for the next numbered sequential sections of underpinning shall not commence until at least 8 hours after drypacking of previous works. Excavation of adjacent pin to not commence until 48 hours after drypacking. (24hours possible due to inclusion of Conbextra 100 cement accelerator to dry pack mix). No more than

3.6. Cast base to internal wall.

3.7. Excavate and cast floor slab

3.7.1. Excavate 1/3 of the middle section of basement floor. As excavation proceeds, place Slim Shore props at a maximum of 2.5m c/c across the basement. Locate props at a third of the height of the wall.

3.7.2. Continue excavating the next 1/3 and prop then repeat for the final 1/3.

3.7.3. Place below-slab drainage. Croft recommends that all drainage is encased in concrete below the slab and cast monolithically with the slab. Placing drainage on pea shingle below the slab allows greater penetration for water ingress.

3.7.4. Place reinforcement for basement slab.

3.7.5. Building Control Officer and Engineer are to be informed five working days before reinforcement is ready and invited for inspection.

3.7.6. Once inspected, pour concrete.

3.8. Provide structure to ground floor and water proofing to retaining walls as required. It is recommended to leave 3-4 weeks between completion of the basement and installing drained cavity. This period should be used to locate and fill any localised leakage of the basemen

4. Mitigation measures where potential soft spots encountered

4.1.1. Where soft spots are encountered, leave in trench sheets or alternatively back prop with precast lintels or sacrificial boards. If the soil support to the ends of the lintels is insufficient, then brace the ends of the PC lintels with 150x150 C24 timbers and prop with Acrows diagonally back to the ground.

4.1.2. Where voids are present behind the lintels or trench sheeting, grout voids behind sacrificial propping. Grout to be 3:1 sand/cement packed into voids.

4.1.3. Prior to casting, place layer of DPM between trench sheeting (or PC lintels) and new concrete. The lintels are to be cut into the soil by 150mm either side of the pin. A site stock of a minimum of 10 lintels should be present to prevent delays due to ordering.