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Basement Impact Assessment

Site:

29 Ulysses Road
NW6 1ED

Client:

Ms. Obi Odogwu
29 Ulysses Road
NW6 1ED

Rev	Date	Author	Checker	Comment
-	22.11.2021	VLD	GW	First Issue
1	08.04.2022	VLD	PH	Revision due to Audit queries
2	27.06.22	VLD	PH	Section 8.4 modified
3	05.01.23	VLD	PH	Revised for latest drawings

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Contents

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Basement Impact Assessment for 29 Ulysses Road

1. Non-Technical Summary

1.1. Existing Property, Site & Neighbouring Sites

The existing property is a mid-terraced late-Victorian property with external masonry walls and timber floors. The structure comprises a main building and a rear addition. The main building is two storeys high above street level. The rear addition is three storeys high. The Ground Floor of the rear addition is at a lower level than the Ground Floor of the main building. This is to suit the external ground level at the rear, which is lower than the ground level at the front. The arrangement of the existing structure is indicated on drawings, available separately, by Proficiency Design & Build. The upper floors of the rear addition are also at different levels to the floors of the main building.

There is a cellar, which is under the hallway and the stairs. Adjacent to the cellar there is a void below the remainder of the ground floor. The front ground floor is made of timber and is supported on the front rear walls, a spine walls and an array of masonry piers.

There is also a front garden at street level, and a lower-level rear garden.

1.2. Proposed Development

The proposed development involves the lowering the existing cellar and excavating below the main building to form a single-storey, full-width habitable basement. The Ground Floor of the rear addition will also be lowered slightly. There are also alterations proposed above ground level. This assessment is concerned with alterations below ground level only.

Figure 1: Aerial view with site located

1.3. Land Stability

The assessment of impacts relating to Geology and Land Stability are summarised in the combined Land Stability and Hydro-geology BIA by Maund Geo-consulting [ref BIA MGC-GMA-21-47, dated November 2021]. The key features and concerns are reproduced below:

- A ground investigation confirms that the formation level of the basement will be on clay.
- The anticipated Damage Category (as defined on the Burland Scale) will not be greater than Category 1 (Very Slight).
- Monitoring of existing structures should be carried out during construction

1.4. Hydrogeology

The assessment of impacts relating to Hydro-geology are summarised in the combined Land Stability and Hydro-geology BIA by Maund Geo-consulting [ref BIA MGC-GMA-21-47, dated November 2021].

The report concluded that groundwater is not a concern given that the water table is below the formation level of the proposed basement. Any local seepages encountered during construction can be controlled and discharged.

1.5. Drainage, Surface Water & Flooding

The Basement Impact Assessment (BIA, hereafter) has identified:

- The construction of the basement will not have any significant impacts on the surface water or affect the surface water discharge to other properties or the Hampstead Heath Ponds.

- The area is in a CDA (Critical Drainage area) but a separate Flood Risk Assessment has concluded that flooding is not a concern because the risks of flooding are low. Mitigation factors will be put into place to deal with residual risks of flooding.
- The risk of flooding from excess surface water is not considered significant. There is a risk of flooding due to the failure of the pumping system but this can be reduced to acceptable levels with appropriate design and installation measures.

2. Introduction

2.1. Report Authors and Qualifications

2.1.1. Land Stability

Croft has appointed the following suitably qualified professional to assess the impacts related to Land Stability:

Julian Maund BSc PhD FGS CGeol MIMMM CEng
Maund Geo-Consulting Ltd

This assessment has been reviewed by:

Vijaya Dubagunta MEng CEng MICE
Croft Structural Engineers

2.1.2. Hydrogeology

Croft has appointed the following suitably qualified professional to assess the impacts related to Hydrogeology and Groundwater Flooding:

Julian Maund BSc PhD FGS CGeol MIMMM CEng
Maund Geo-Consulting Ltd

2.1.3. Surface Water and Flooding.

The following individuals have reviewed the impacts related to Surface Water and Flooding:

Phil Henry MEng CEng MICE
Croft Structural Engineers

Chris Tomlin MEng CEng MIStructE

2.2. Sources of Information

The following baseline data have been referenced to complete the BIA in relation to the proposed development:

- Site walkover survey on 20th October 2021;
- LB Camden, Strategic Flood Risk Assessment (produced by URS, 2014);
- LB Camden, Floods in Camden, Report of the Floods Scrutiny Panel (2013);

LB Camden, Planning Guidance (CPG) – Water and Flooding (March 2019);

- LB Camden, Planning Guidance (CPG) – Basements (January 2021);
- LB Camden, Camden Geological, Hydrogeological and Hydrological Study – Guidance for Subterranean Development (produced by Arup, 2010), GSD hereafter;
- LB Camden, Local Plan Policy A5 Basements (2017);
- LB Camden's Audit Process Terms of Reference;

Other sources of data are referred to within the relevant sections of this report.

2.3. Existing Site & Location

The site, 29 Ulysses Road, is located in north-west Camden and is in a densely built-up area.

Figure 2: Plan view of site (approx. area outlined in red) and the surrounding properties

For further information refer to the Desk Study Section.

2.4. Proposed Works

The proposed development involves the lowering the existing cellar and excavating below the main building to form a single-storey, full-width habitable basement. The Ground Floor of the rear addition will also be lowered slightly. There are also alterations proposed above ground level. This assessment is concerned with alterations below ground level only.

A site location plan is shown above. This site is indicated. In addition to the basement area, this also includes areas that are likely to be temporarily occupied for construction purposes.

Engineering outline design proposals and a temporary works construction sequence are appended.

Architectural drawings that show the extent of the proposed alterations have been produced by Proficiency and are available separately.

3. Desk Study & Walk over Survey

For Camden BIAs, site investigations are expected to follow after Screening and Scoping stages. In this assessment initial inspections and studies were carried out to give a more informed view for the screening and scoping. These are presented in this section. More detailed investigations are referred to after the scoping stage.

3.1. General Desk Study

29 Ulysses Road is a mid-terrace property situated in Fortune Green. The land surrounding the site has a gentle downward slope from north-west to south-east. From inspection of OS maps and aerial photos, there are no natural open water features, significant steep slopes or cuttings in the immediate vicinity.

3.1.1. Site History

The property is understood to have been constructed in the 1890s. The surrounding area is understood to have been occupied by residential buildings for over 150 years. Further review of the site history through the use of historical maps is contained in the assessment completed by Maund Geo-consulting.

3.1.2. Listed Buildings

The existing building is not listed. Data from Historic England shows that there are no listed buildings close by.

Extract from Listed buildings map

The site is not in a conservation area.

3.1.3. London Underground and Network Rail Infrastructure

The site is more than 400m away from any subterranean or surface rail line. . Rail lines are therefore unlikely to be affected by the new basement.

3.1.4. Highways

The front lightwell will be within 5m of the public highway.

3.1.5. UK Power Networks

There are no significant items of electrical infrastructure (such as pylons, substations or tunnels) in the immediate vicinity.

3.1.6. Utility Search

A utility search has been completed and is appended. This includes a Thames Water Asset location search which confirm that a public sewer is present below the main road.

3.2. Walk Over Survey

A structural engineer from Croft Structural Engineers visited the site on 20th October 2021.

3.2.1. Site and Existing Property

The property is a mid-terraced residential property with external masonry walls. The site is generally flat but has a change in level between the front and the rear. There is hard standing in the front. There is garden to the rear with paving tiles up to the rear addition. Soft landscaping occupies the remainder of the garden. The boundary walls in the front entrance area and in the rear garden are timber fence walls. The neighbouring buildings sharing party walls are similar in construction.

From inspection of OS maps and aerial photos, there are no natural open water features, significant steep slopes or cuttings in the immediate vicinity.

Front of the property

Rear of the property

3.2.2. 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 6m away from the outline of the proposed basement.

3.2.3. Adjacent Properties

The property to the left when seen from the street is no. 27 Ulysses Road. This is a mid – terraced residential property of Victorian age. The property's construction is like No. 29.

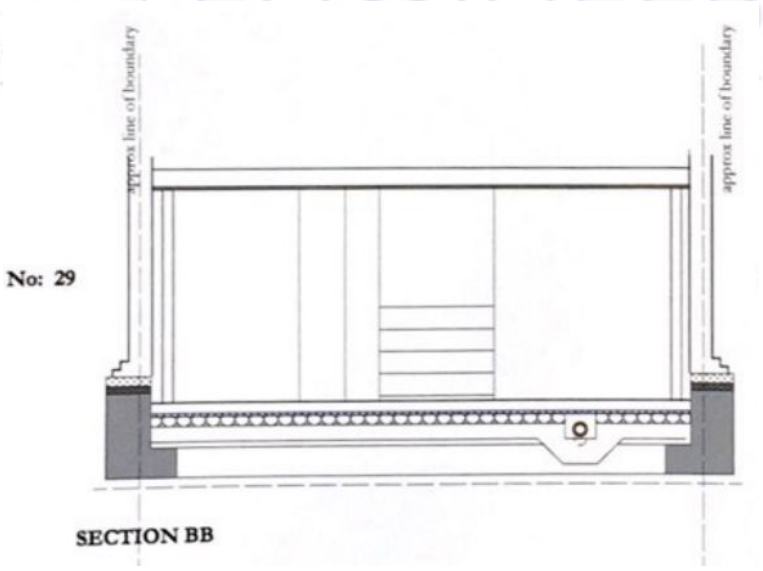
Neighbouring property-No. 27 Ulysses Road

The property to the right when seen from the street is No. 31 Ulysses Road. This is also a mid – terraced residential property of Victorian age. The property's construction is like No. 29.

Neighbouring property no. 31

The property has a basement which was built in the recent past (c. 2010). The depth of the basement is similar to the proposed depth of the basement of No. 29. However, this will be confirmed during construction by the contractor.

Drawings of this basement have been forwarded to Croft. An extract showing a section through the basement is shown below:



3.3. Land Stability and Hydrogeology : Ground Investigation

The ground investigation report, which has data from site investigations and data from subsequent monitoring, is available as a separate report by Maund Geo-consulting [ref MGC-21-47]

This contains data required for assessing the impacts related to Land Stability and Hydrogeology.

3.4. Surface Water and Drainage Walk Over Survey

3.4.1. Hardstanding

The hardstanding on the site is limited to existing structure and paving areas outside of the external walls of the building. The remainder of the site is covered with soft landscaping.

3.4.2. Site Drainage

Rainwater downpipes discharge surface water from the building into conventional drainage. One rainwater pipe is situated to the rear at the junction of main building and the rear addition.

The foul water drainage pipes exist to the rear of the property where kitchen and bathroom are located. From viewing the below-ground void from the cellar, a drain is visible which runs towards the front of the property.

It is likely that this is a combined drain and foul water and surface water is routed along this before discharging to the mains sewer below the road.

There is a rainwater pipe is located to the front of the property which is also likely to be discharging into the same drain

3.4.3. Surface Water

No areas of surface water in the form of ponds lakes, streams or rivers were noted on the site.

4. Screening Stage

This stage identifies any areas for concern that should be investigated further.

4.1. Land Stability

For the screening of features relating to Land Stability, refer to the combined Land Stability and Hydro-geology BIA by Maund Geo-consulting [ref BIA MGC-GMA-21-47, dated November 2021]

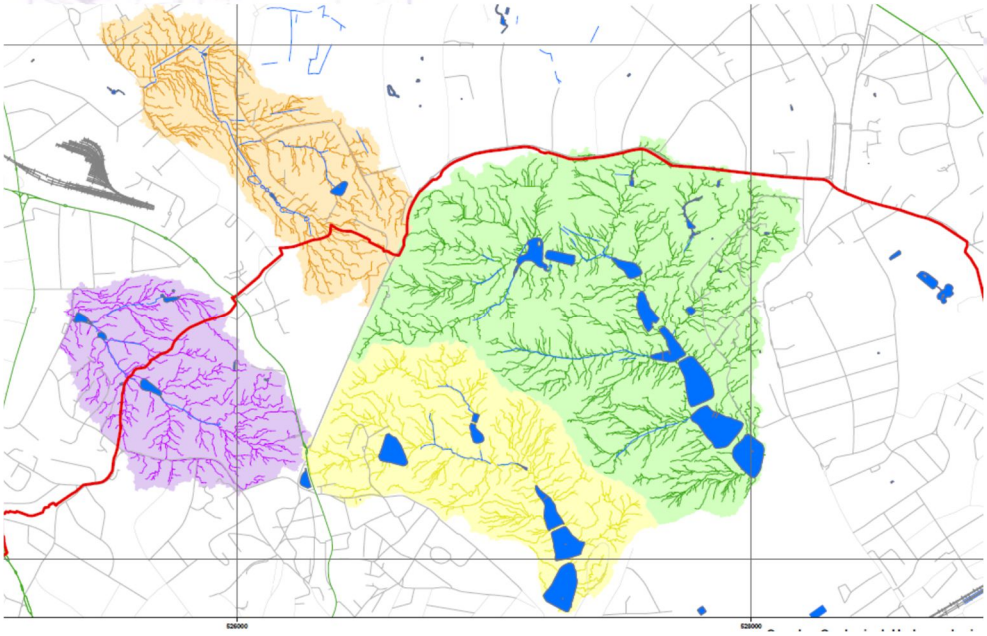
4.2. Hydro-geology

For the screening of features relating to Land Stability, refer to the combined Land Stability and Hydro-geology BIA by Maund Geo-consulting [ref BIA MGC-GMA-21-47, dated November 2021]

4.3. Surface Flow and Flooding

Question 1: Is the site within the catchment of the pond chains on Hampstead Heath?

No. The site lies outside the areas denoted by Figure 14 of the GSD (extract shown below)



Extract from Figure 14 of the GSD (site lies beyond)

Question 2. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?

No – The surface water that flows from the proposed development will be routed the same way as before: water collected from the building will enter the existing drainage system; water on soft-landscaped areas will discharge to the ground.

Question 3. Will the proposed basement development result in a change to the hard surfaced /paved external areas?

Unknown – Due to the removal of paving slabs at the rear and subsequent construction of the rear extension and the front lightwell, the hard surfaced areas may change. Carry forward to scoping

Question 4. Will the proposed basement result in changes to the inflows (instantaneous and long term) of surface water being received by adjacent properties or downstream watercourses?

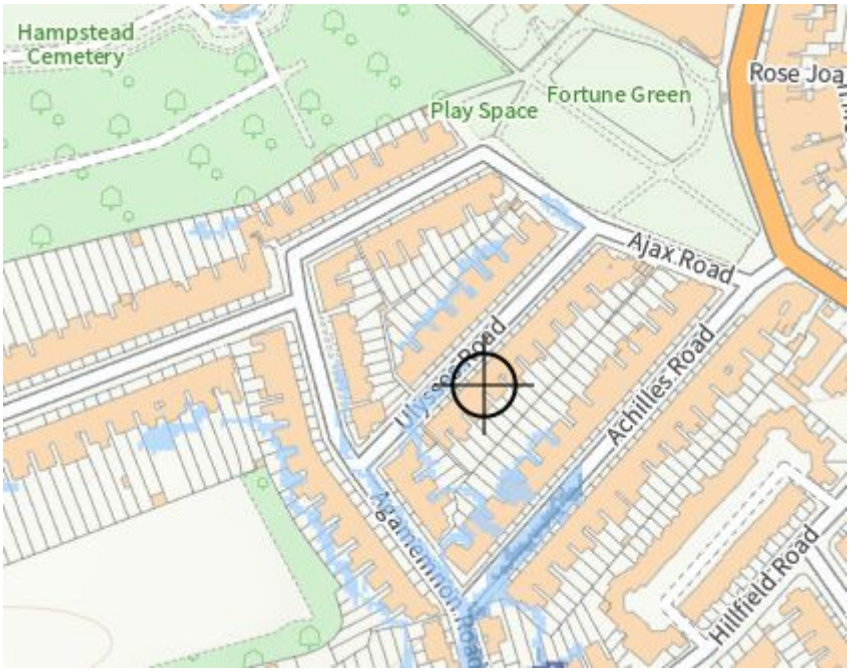
No. Surface water that is received by adjacent properties and downstream watercourses is not from the site. This will remain the case with the proposed development.

Question 5. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?

No. Collected surface water will be from building roofs and paving, as before. The quality of the water received downstream will therefore not change.

Question 6 : Is the site in an area identified to have surface water flood risk according to either the Local Flood Risk Management Strategy or the Strategic Flood Risk Assessment or is it at risk from flooding, for example because the proposed basement is below the static water level of nearby surface water feature?

No. The site is in an area identified as having a low risk of surface water flooding. There are no surface water features nearby.



The site is not on a street that was recorded as flooded in either 1975 or 2002.

Summary

Conclusive negative answers apply to all of the Screening questions in this section with the exception of Question 3. However, Camden Council request that a flood risk assessment be carried out for properties in Critical Drainage Areas. These need to be identified to determine whether the property is within the boundaries of one of these. A flood risk assessment will also explore any impacts related to the change in hard standing.
Carry forward to Scoping Stage.

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5. Scoping Stage

5.1. Land Stability

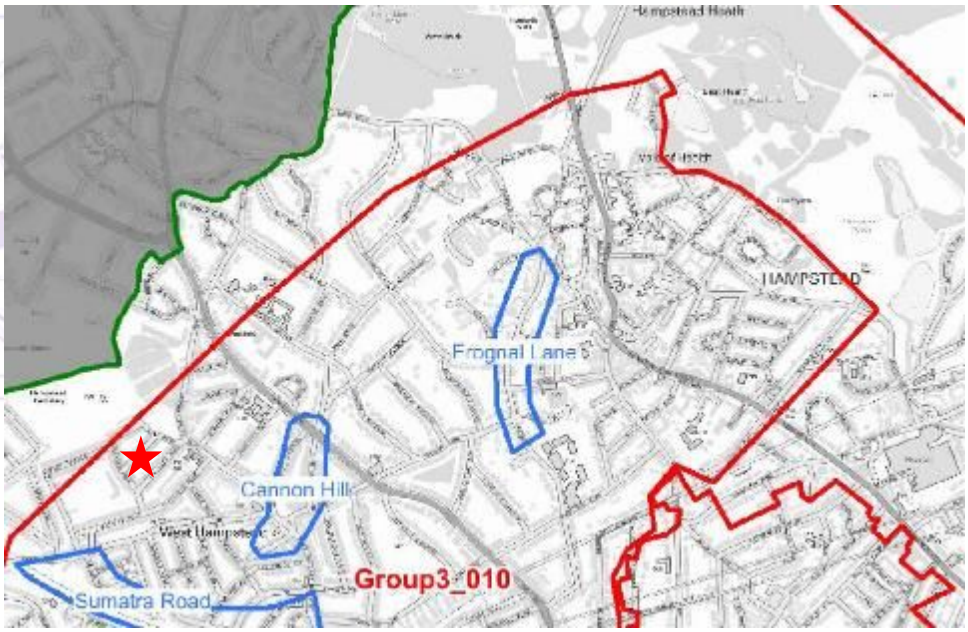
For the scoping of features relating to Land Stability, refer to the combined Land Stability and Hydro-geology BIA by Maund Geo-consulting [ref BIA MGC-GMA-21-47, dated November 2021]

5.2. Hydro-geology

For the scoping of features relating to Hydro-geology, refer to the combined Land Stability and Hydro-geology BIA by Maund Geo-consulting [ref BIA MGC-GMA-21-47, dated November 2021]

5.3. Surface Flow and Flooding

The site lies in a CDA (Critical Drainage Area). This is identified as 'Group3_010' and is indicated below.



*Extract from Camden CDA map (site indicated with *)*

A flood risk assessment is therefore required. This will also assess any impacts related to a change in hard-standing. This is available under a separate cover.

6. Site Investigation / Additional Assessments

Investigations for Land Stability and Hydrogeology are described within the BIA by Maund Geo-Consulting.

As mentioned previously, a Flood Risk Assessment is required. This has been produced by Croft (and is available as a separate) and this explores impacts related to Surface Water and Flooding.

7. Construction Methodology and Engineering Statements

7.1. Loading and Geotechnical Design Parameters

From sections 5 and 6 of the combined Land Stability and Hydrogeology BIA by Maund Geo-consulting, the following soil properties are proposed:

Soil density γ = 20 kN/m^3

Active and passive co-efficient for overall stability
K_a = 0.46
K_p = 2.3

7.1.1. Intended Use & Loadings

The intended use of the building is residential. 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 should 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.

7.1.2. Surcharge Loading

Where applicable, the following will be applied as surcharge loads to the retaining walls:

- 10kN/m^2 if within 45° of road
- 5kN/m^2 if within 45° of Pavement
- Garden Surcharge 2.5kN/m^2 + 1 m of soil (if present above basement ceiling) 20kN/m^2

- Surcharge for adjacent property 1.5kN/m^2 + 4kN/m^2 for concrete ground bearing slab

7.1.3. Hydrostatic Pressure

The ground investigations show that no water is present above the formation level of the basement. The walls however will be designed to resist a hydrostatic pressure. Design of retaining walls should account for the anticipated worst-case scenario for ground water levels. It is possible that a water main may break causing a local high-water table. To account for this, the wall is designed for water at ¾ the height of the wall. This will be applied to the front basement which is likely to be in proximity of the incoming water mains.

7.2. Permanent Design Proposals

7.2.1. Permanent Structure

The foundation of the new structure will consist of RC (reinforced concrete) cantilevered retaining walls. These will be designed to resist the lateral loads around the perimeter of the basement. The lateral thrust on the basement walls will be resisted by the friction between the basement structure and the surrounding soil, and the passive pressures mobilised on the opposite sides. The basement floor structure will comprise a reinforced concrete slabs, adjoining the bases of the retaining walls and also the existing basement structure in the neighbouring property (No. 31). The RC walls will also transfer vertical loads to the ground.

Calculations of one of the most heavily loaded retaining walls are appended. The most critical parameters have been used for this.

7.2.2. Temporary Works

Walls are designed to be structurally stable with high and low level propping. Temporary propping details will be required to be provided by the contractor and must be completed by a suitability qualified professional.

To demonstrate the feasibility of the works, a proposed basement construction sequence is appended.

7.3. Ground Movement Assessment

All excavations cause minor movement in the surrounding ground. The degree of movement is partly dependent on depth of the excavation and the control of the construction procedures. For an analysis of the predicted ground movement, refer to the combined Land Stability and Hydro-geology BIA by Maund Geo-consulting [ref BIA-MGC-21-47, dated November 2021].

The proposed method (appended) is such that it minimises the risk of movement to the above structure and any properties close by. The method statement should be followed carefully to limit any possible movement. Croft does not expect any movement greater than Category 1 (Very Slight) on the Burland Scale.

7.4. Control of Construction Works

7.4.1. Pre-construction Procedures

A construction sequence has been formulated with Croft's experience of over 500 basements. The procedures described in this statement will mitigate the impacts that the construction of the basement will have on nearby properties.

To reduce the risk to the development:

- Employ a reputable firm that has extensive knowledge of basement works.
- Employ suitably qualified consultants Croft Structural Engineers has completed over 500 basements in the last five years.
- Provide method statements for the contractors to follow; this should be in accordance with guidance from ASUC (Association of Specialist Underpinning Contractors)
- Investigate the ground this has now been done.
- Record and monitor the properties close by. This is completed by a condition survey under the Party Wall Act, before and after the works are completed.

7.4.2. 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 has car parking to the front to which the skip will be stored.

The site will be hoarded with 8' site hoarding to prevent unauthorised 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.

7.4.3. Construction Management Plan

For the Construction Phase it may be beneficial to compile a Construction Management Plan (CMP). A suitably qualified person, typically the contractor, would provide the CMP. The items that should be considered are:

- Delivery routes and times
- Expected working hours
- Times when local roads may become busy (due to schools and other construction sites)
- Volume of muck-away, how this is managed and when.
- Required plant
- Noise dust and vibration
- Waste Management

This is outside the brief of the Basement Impact Assessment by Croft.

7.4.4. Monitoring

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

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
- Frequency of Monitoring
- Specification for Instrumentation
- Monitoring of Existing cracks
- Monitoring of movement
- Reporting

As a minimum, monitoring target locations should be attached at 2m intervals on the party walls.

A drawing showing the proposed monitoring locations is appended.

The final locations should be advised by the design team at detailed design stage.

Croft would recommend that the monitoring frequency should follow:

Pre-construction: Monitored once.

During construction: Monitored after every pin is cast for first 4 no. pins to gauge effect of underpinning. If all is well, monitor after every other pin.

Post construction works: Monitored once.

Trigger values and contingency actions are noted in the table below.

MOVEMENT		CATEGORY	ACTION
Vertical	Horizontal		
0mm-3mm	0-2mm	Green	No action required
3mm-6mm	2-4mm	AMBER	Detailed review of Monitoring: Check studs are OK and have not moved. Ensure site staff have not moved studs. If studs have moved reposition. Relevel to ensure results are correct and tolerance is not a concern. Inform Party Wall surveyors of amber readings. Double the monitoring for 2 further readings. If stable revert back. Carry out a local structural review and inspection. Preparation for the implementation of remedial measures should be required. Double number of lateral props
6mm-10mm	4-6mm		Implement remedial measures review method of working and ground conditions
>10mm	>6mm	RED	Implement structural support as required; Cease works with the exception of necessary works for the safety and stability of the structure and personnel; Review monitoring data and implement revised method of works

8. Basement Impact Assessment

8.1. Conceptual Site Model

A conceptual site model is described in Section 8 of Land Stability and Hydrogeology BIA by Maund Geo-consulting. This, and the following sections of the report, highlight the following:

- Temporary works (require careful consideration to minimise ground movement)
- Any retaining walls should be appropriately designed.
- Mitigation measures to minimise potential movements (these are proposed and appended. This includes the use of propping throughout the works)
- Ground water is not anticipated to affect the construction works
- Any localised seepages (eg from perched water) can be pumped away
- Movement monitoring of existing structures should be carried out during the works

Examples of permanent design calculations and temporary works proposals are appended.

8.2. Land stability

For impacts relating to Land Stability, refer to the combined Land Stability and Hydrogeology BIA by Maund Geo-consulting.

8.3. Hydro-geology

For impacts relating to Hydrogeology, refer to the combined Land Stability and Hydrogeology BIA by Maund Geo-consulting.

8.4. Surface Water & Flooding Assessment

The Screening and Scoping Stage identified the site as lying in a Critical Drainage area and confirmed the requirement for a Flood Risk Assessment. A separate flood risk assessment has reviewed the impacts of the increased hard surfaces.

The flood risk assessment has concluded that impacts on neighbouring properties, related to Surface Water and Flooding are low and can be appropriately mitigated. The flood risk assessment has also assessed the potential for flooding within the subject property and has concluded that these can be suitably controlled.

8.5. Conclusion

For the proposed development, there is minor concern over the movement of the ground nearby. This assessment has demonstrated that the impacts of these can be adequately mitigated with appropriate design and construction measures. The proposed development can be constructed without any significant adverse effects on the immediate neighbouring properties or the surrounding vicinity.

Appendix A : Structural Calculations

Building Regulations will be required after planning. 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.

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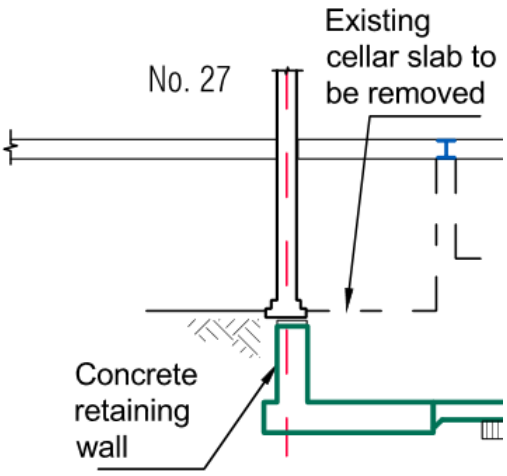
Wall 1 (below party wall with No. 27)



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 2.9.14

Retaining wall details

Stem type	Cantilever		
Stem height	h_{stem} = **1500** mm		
Stem thickness	t_{stem} = **325** mm		
Angle to rear face of stem		α = **90** deg	
Stem density	γ_{stem} = **25** kN/m^3		
Toe length	l_{toe} = **1850** mm		
Heel length	l_{heel} = **300** mm		
Base thickness	t_{base} = **300** mm		
Base density	γ_{base} = **25** kN/m^3		
Height of retained soil	h_{ret} = **1500** mm	Angle of soil surface	β = **0** deg
Depth of cover	d_{cover} = **0** mm		
Height of water	h_{water} = **1500** mm		
Water density	γ_w = **9.8** kN/m^3		

Retained soil properties

Soil type	Firm clay	
Moist density	γ_{mr} = **20** kN/m^3	
Saturated density	γ_{sr} = **20** kN/m^3	
Characteristic effective shear resistance angle		$\phi'_{r.k}$ = **20.5** deg
Characteristic wall friction angle		$\delta_{r.k}$ = **9** deg

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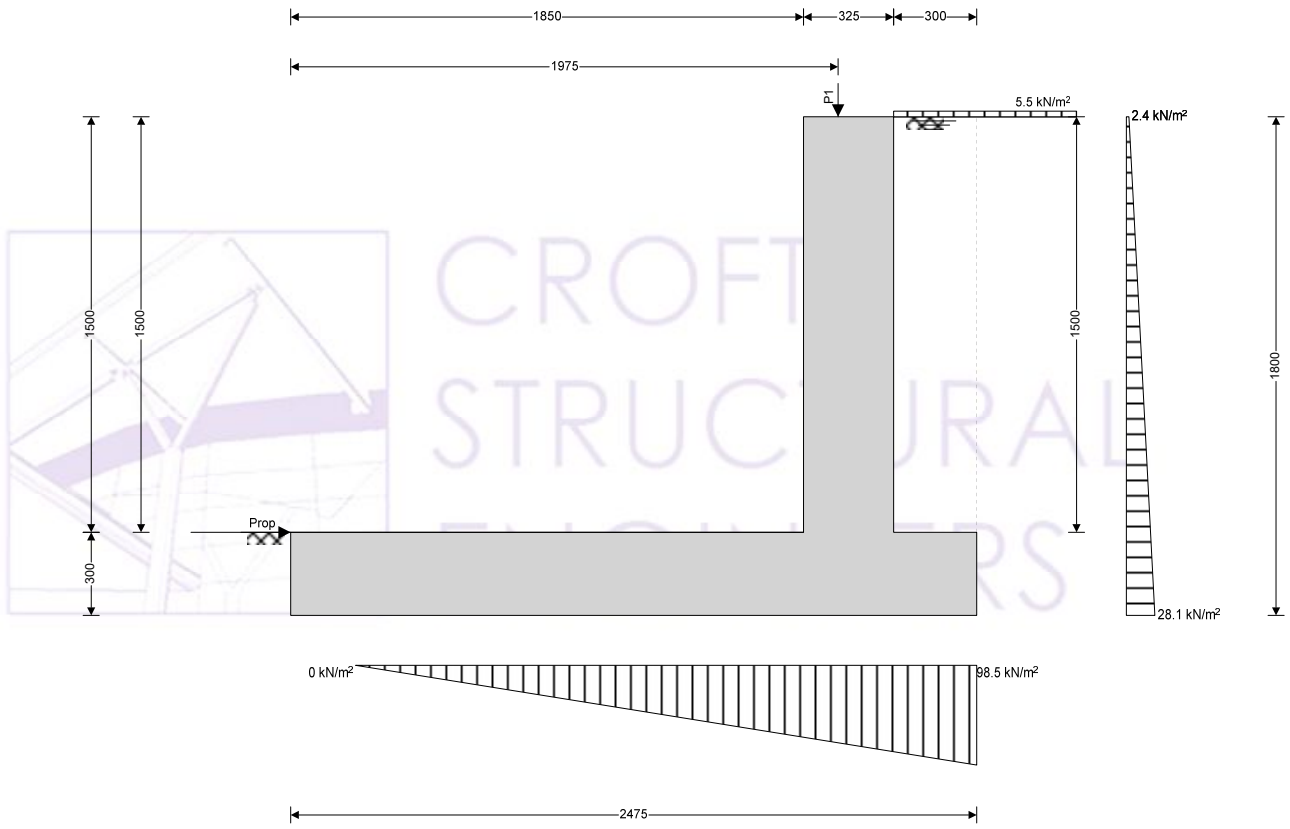
Base soil properties

Soil type	Stiff clay
Soil density	γ_b = **20** kN/m^3
Characteristic effective shear resistance angle	$\phi'_{b.k}$ = **20.5** deg
Characteristic wall friction angle	$\delta_{b.k}$ = **9** deg
Characteristic base friction angle	$\delta_{bb.k}$ = **12** deg
Presumed bearing capacity	$P_{bearing}$ = **100** kN/m^2

Loading details

Variable surcharge load	Surcharge$_Q$ = **5.5** kN/m^2
Vertical line load at 1975 mm	P_{G1} = **55** kN/m
	P_{Q1} = **14** kN/m



General arrangement

Calculate retaining wall geometry

Base length	l_{base} = **2475** mm
Saturated soil height	h_{sat} = **1500** mm
Moist soil height	h_{moist} = **0** mm
Length of surcharge load	l_{sur} = **300** mm
Vertical distance	x_{sur_v} = **2325** mm
Effective height of wall	h_{eff} = **1800** mm
Horizontal distance	x_{sur_h} = **900** mm

Area of wall stem	A_{stem} = **0.488** m²	Vertical distance	x_{stem} = **2013** mm
Area of wall base	A_{base} = **0.743** m²	Vertical distance	x_{base} = **1238** mm
Area of saturated soil	A_{sat} = **0.45** m²	Vertical distance	x_{sat_v} = **2325** mm
		Horizontal distance	x_{sat_h} = **600** mm
Area of water	A_{water} = **0.45** m²	Vertical distance	x_{water_v} = **2325** mm
		Horizontal distance	x_{water_h} = **600** mm

Using Coulomb theory

Active pressure coefficient		K_A = **0.442**	Passive pressure coefficient
	K_P = **2.621**		

Bearing pressure check

Vertical forces on wall

Total $F_{total\_v} = F_{stem} + F_{base} + F_{sur\_v} + F_{P\_v} + F_{sat\_v} + F_{water\_v}$ = **110.4** kN/m

Horizontal forces on wall

Total $F_{total\_h} = F_{sur\_h} + F_{sat\_h} + F_{water\_h} + F_{moist\_h} + F_{pass\_h}$ = **25.1** kN/m

Moments on wall

Total $M_{total} = M_{stem} + M_{base} + M_{sur} + M_P + M_{sat} + M_{water} + M_{moist}$ = **190.8** kNm/m

Check bearing pressure

Propping force	F_{prop_base} = **25.1** kN/m		
Bearing pressure at toe	q_{toe} = **0** kN/m²	Bearing pressure at heel	q_{heel} = **98.5** kN/m²
Factor of safety	FoS_{bp} = **1.015**		

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 2.9.14

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

Concrete strength class	C30/37		
Char.comp.cylinder strength		f_{ck} = **30** N/mm²	Mean axial tensile strength
	f_{ctm} = **2.9** N/mm²		
Secant modulus of elasticity		E_{cm} = **32837** N/mm²	Maximum aggregate size
	h_{agg} = **20** mm		
Design comp.concrete strength		f_{cd} = **17.0** N/mm²	Partial factor γ_C = **1.50**

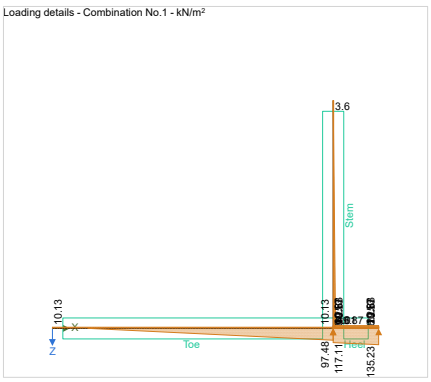
Reinforcement details

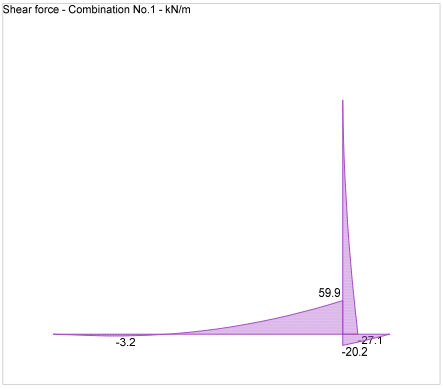
Characteristic yield strength		f_{yk} = **500** N/mm²	Modulus of elasticity
	E_s = **200000** N/mm²		
Design yield strength	f_{yd} = **435** N/mm²	Partial factor	γ_S = **1.15**

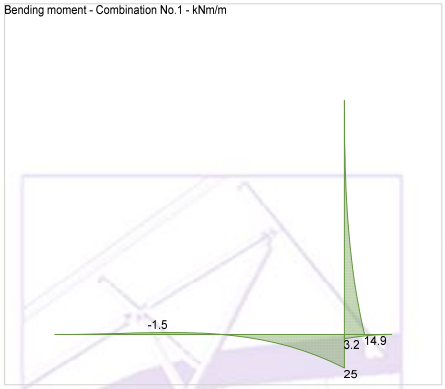
CROFT STRUCTURAL ENGINEERS

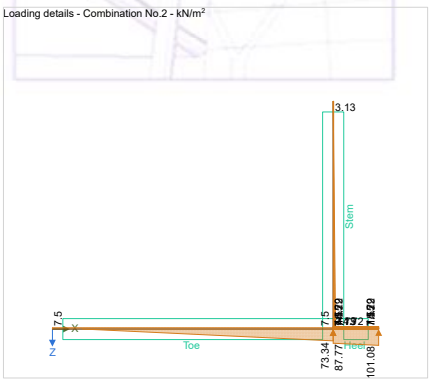
Cover to reinforcement

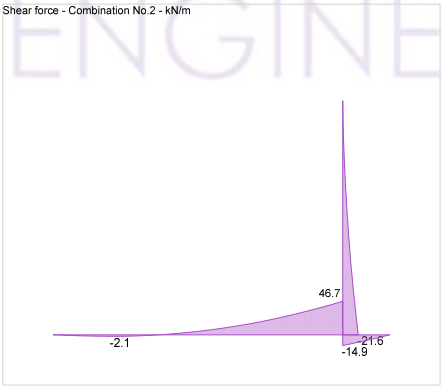
Front face of stem	c_{sf} = **40** mm	Rear face of stem	c_{sr} = **50** mm
Top face of base	c_{bt} = **50** mm	Bottom face of base	c_{bb} = **75** mm

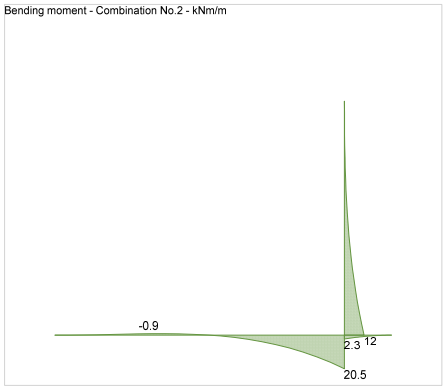












Check stem design at base of stem

Depth of section h = **325** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **14.9** kNm/m K = **0.007** K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{sr.req}$ = **134** mm²/m

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

Tens.reinforcement provided $A_{sr.prov}$ = **565** mm²/m

Min.area of reinforcement $A_{sr.min}$ = **405** mm²/m Max.area of reinforcement $A_{sr.max}$ = **13000** 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 16 Actual span to depth ratio 5.6

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

Crack control - Section 7.3

Limiting crack width w_{max} = **0.3** mm Maximum crack width w_k = **0.104** mm

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

Design shear force V = **27.1** kN/m Design shear resistance $V_{Rd.c}$ = **131.1** kN/m

PASS - Design shear resistance exceeds design shear force

Horizontal reinforcement parallel to face of stem - Section 9.6

Min.area of reinforcement $A_{sx.req}$ = **325** mm²/m Max.spacing of reinforcement s_{sx_max} = **400** mm

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

Trans.reinforcement provided $A_{sx.prov}$ = **393** mm²/m

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

Check base design at toe

Depth of section h = **300** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **25** kNm/m K = **0.018** K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{bb.req}$ = **279** mm²/m

Tens.reinforcement provided 16 dia.bars @ 200 c/c

Tens.reinforcement provided $A_{bb.prov}$ = **1005** mm²/m

Min.area of reinforcement $A_{bb.min}$ = **327** mm²/m Max.area of reinforcement $A_{bb.max}$ = **12000** 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 = **0.131** mm

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

Design shear force V = **59.9** kN/m Design shear resistance $V_{Rd.c}$ = **122.7** kN/m

PASS - Design shear resistance exceeds design shear force

Check base design at toe

Depth of section h = **300** mm

Rectangular section in flexure - Section 6.1

Design bending moment M = **1.5** kNm/m K = **0.001** K' = **0.207**

K' > K - No compression reinforcement is required

Tens.reinforcement required $A_{bt.req}$ = **15** mm²/m

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

Tens.reinforcement provided $A_{bt.prov}$ = **565** mm²/m

Min.area of reinforcement $A_{bt.min}$ = **368** mm²/m Max.area of reinforcement $A_{bt.max}$ = **12000** 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 = **0.027** mm

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

Design shear force V = **20.2** kN/m Design shear resistance $V_{Rd.c}$ = **123** kN/m

PASS - Design shear resistance exceeds design shear force

Secondary transverse reinforcement to base - Section 9.3

Min.area of reinforcement $A_{bx.req}$ = **201** mm²/m Max.spacing of reinforcement s_{bx_max} = **450** mm

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

Trans.reinforcement provided $A_{bx.prov}$ = **393** mm²/m

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

CROFT STRUCTURAL ENGINEERS

Appendix B: Construction Programme

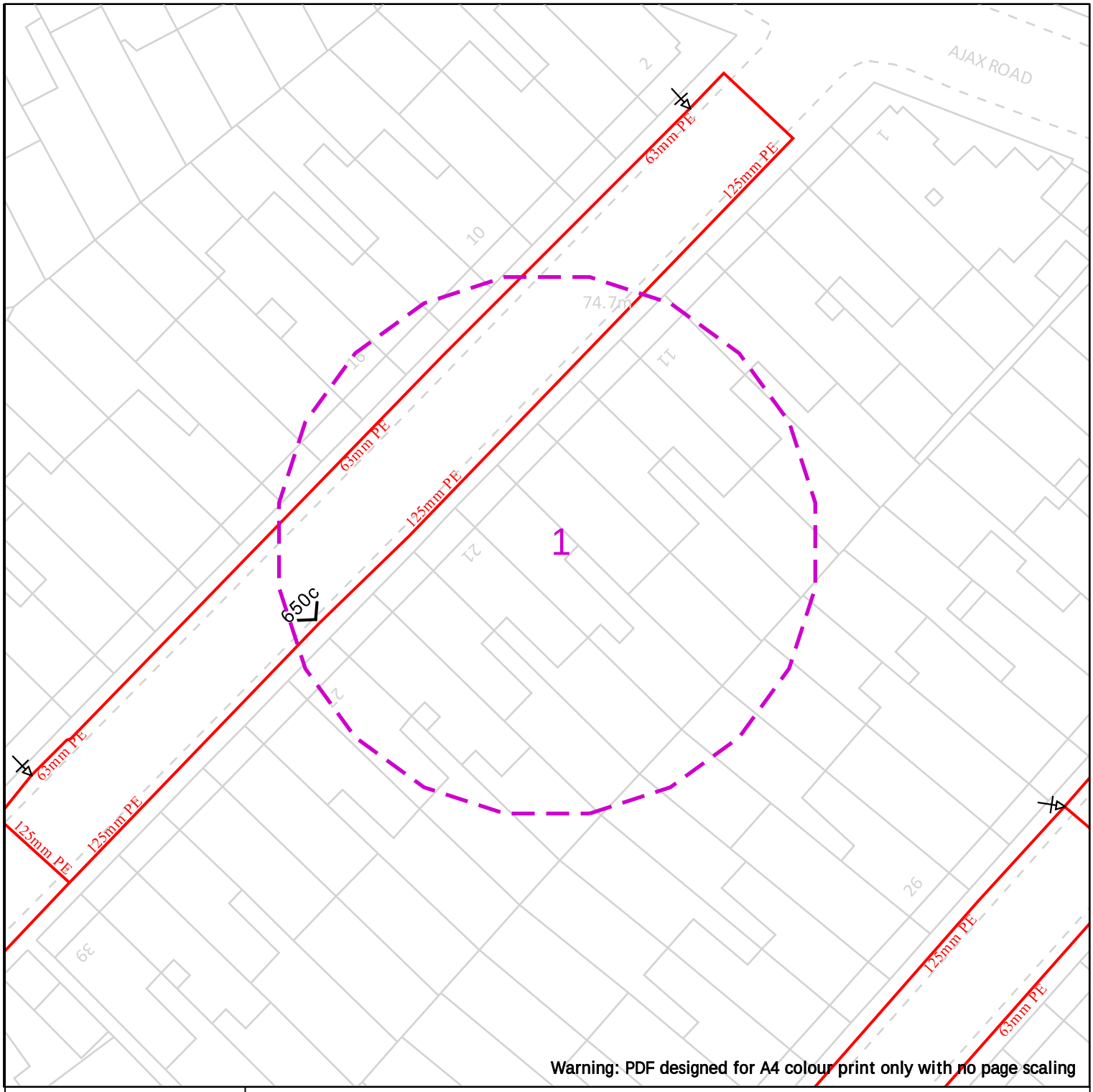
The Contractor is responsible for the final construction programme

Outline construction Programme

(For planning purposes only)

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

Appendix C : Utilities Searches



25m

Dig Sites Area: Line:

LP Mains
MP Mains
IP Mains
LHP Mains

Valve
Depth of cover
Syphon

Diameter Change
Material Change
Out of Standard Service

Cadent
Your Gas Network

Date Requested: 25/10/2021
Job Reference: 23657395
Site Location: 525013 185424
Requested by: Mr Pawel Rogalewicz

Your Scheme/Reference: 29 Ulysses Road

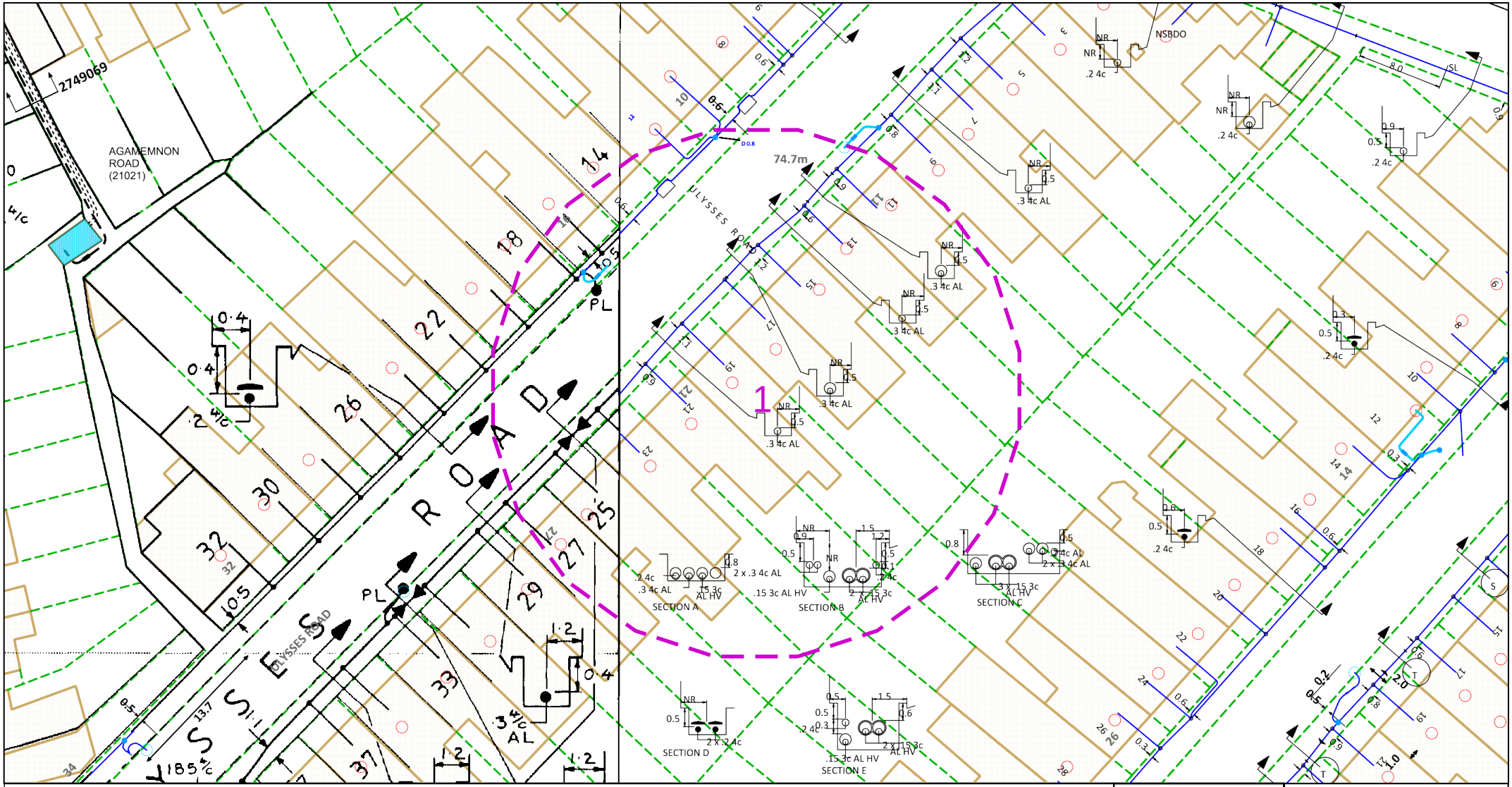
View extent: 100m, 100m

Scale: 1:500 (When plotted at A4)

IMPORTANT NOTICES

This plan shows these pipes owned by Cadent Gas Limited in its role as a Licensed Gas Transporter (GT). Gas pipes owned by other GT's or otherwise privately owned may be present in this area. Information with regards to such pipes should be obtained from the relevant owners. The information shown on this plan is given without warranty, the accuracy thereof cannot be guaranteed. Service pipes, valves, syphons, stub connections etc. are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Cadent Gas Limited or their agents, servants or contractors for any errors or omission. Safe digging practices, in accordance with HS(G)47, must be used to verify and establish the actual position of mains, pipes, services and other apparatus on site before any mechanical plant is used. It is your responsibility to ensure that this information is provided to all persons (either direct labour or contractors) working for you on or near gas apparatus. The information included on this plan should not be referred to beyond a period of 28 days from the date of issue.

In case of emergency call - 0800 111 999



0 12.5 25
metres

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: 23/10/2021
Job Reference: 23657395
Site Location: 524963 185387
Requested by: Mr Pawel Rogalewicz

Your Scheme/Reference: 29 Ulysses Road
Scale: 1:500 (When plotted at A4)

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.
8. Please be aware the Low Voltage Overhead power lines are not currently displayed for the Eastern Region via this service, if you require records on the location of these please contact our Plan Provision team directly via plans@ukpowernetworks.co.uk.

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.
6. Please Note: The Overview map does not display UK Power Networks electricity network and should not be used for the location of UK Power Networks assets. For detail of the electricity network please view the relevant page as highlighted in the Overview map.

N W E S

UK Power Networks

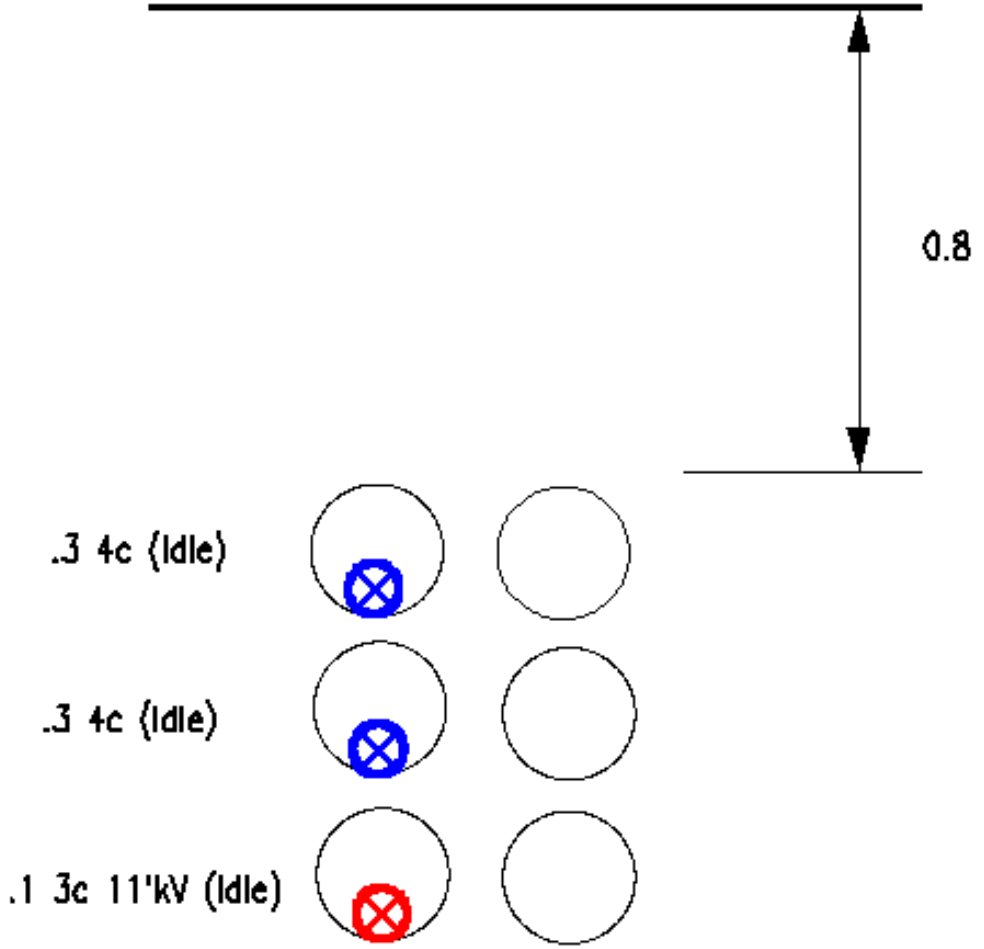
IF IN DOUBT - ASK! PHONE 0800 056 5866
EMERGENCY - If you damage a cable or line Phone 0800 783 8838 (24hrs) URGENTLY

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 : 2749069



Cross Section
2749069

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.

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

UK Power Networks

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.

UK Power Networks Feedback Tool

Please help UK Power Networks improve the accuracy of their network records and help make it safer for all those working around them in future.

All you need to do is:

1. Use your phone camera to scan the QR code:
2. Provide feedback on what you have found on site (good or bad)
3. Upload a photo if needed

Thank you for making the area a safer place to dig.

UK Power Networks, working with LSBUD

Asset location search

Property Searches

Croft Structural Engineers
LONDON
SE25 5EH

Search address supplied 29
Ulysses Road
London
NW6 1ED

Your reference 29 Ulysses Road

Our reference ALS/ALS Standard/2021_4537503

Search date 8 November 2021

Knowledge of features below the surface is essential for every development

The benefits of this knowledge not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility of any development.

Did you know that Thames Water Property Searches can also provide a variety of utility searches including a more comprehensive view of utility providers' assets (across up to 35-45 different providers), as well as more focused searches relating to specific major utility companies such as National Grid (gas and electric).

Contact us to find out more.

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0800 009 4540

Asset location search

Property Searches

Search address supplied: 29, Ulysses Road, London, NW6 1ED

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This searchprovides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk
Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an ‘as constructed’ record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

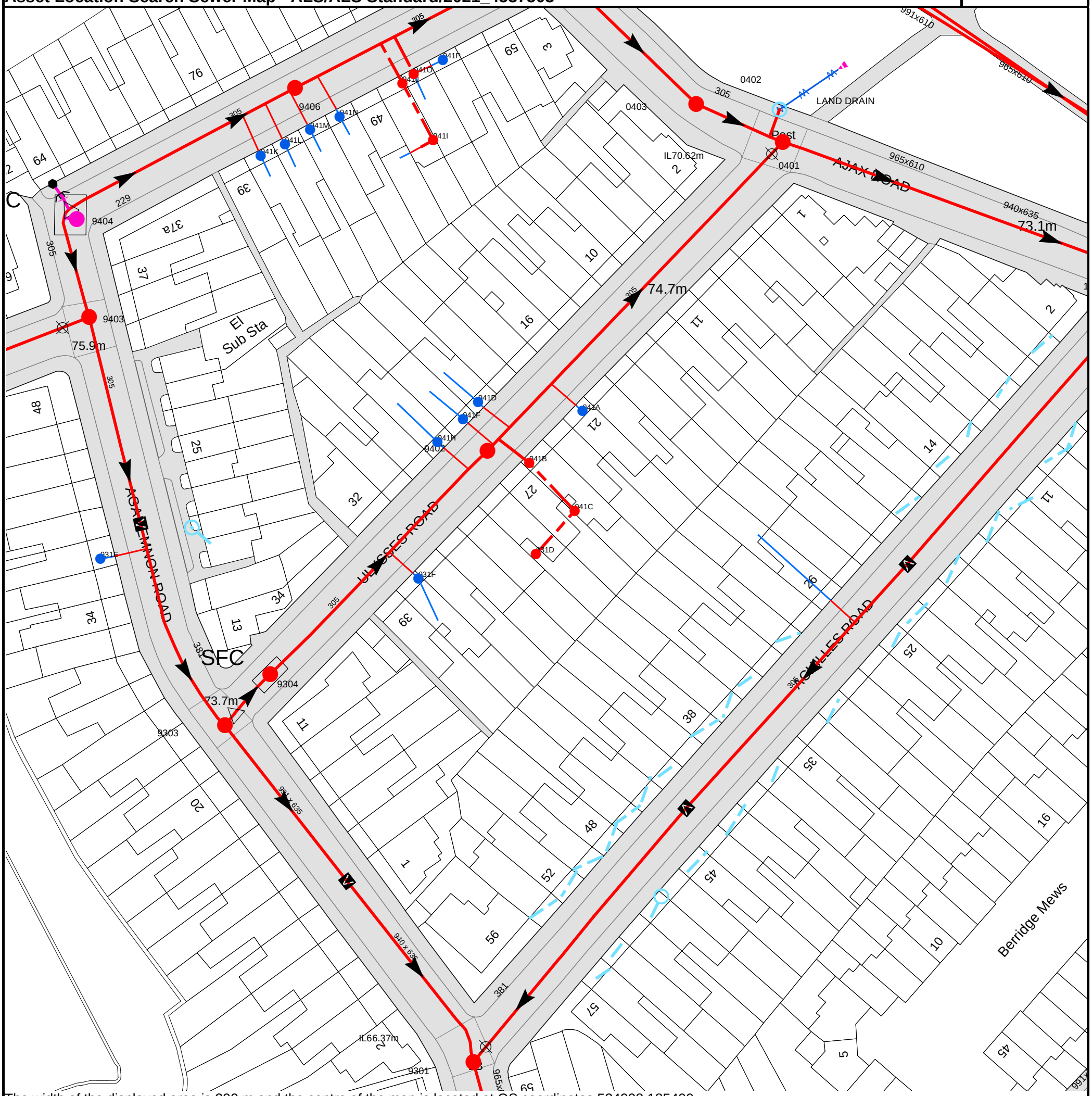
Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2021_4537503



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 524998,185400

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

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
94AJ	n/a	n/a
9303	73.81	70.61
941K	n/a	n/a
9304	73.83	71.7
941L	n/a	n/a
9406	75.9	72.86
941M	n/a	n/a
941N	n/a	n/a
941J	n/a	n/a
941O	n/a	n/a
931F	n/a	n/a
941I	n/a	n/a
941H	n/a	n/a
941P	n/a	n/a
941F	n/a	n/a
9301	69.05	66.01
941D	n/a	n/a
9402	74.12	71.16
941B	n/a	n/a
931D	n/a	n/a
041C	n/a	n/a
041A	n/a	n/a
03HJ	n/a	n/a
0403	74.74	70.99
0402	n/a	n/a
0401	74.47	70.49
931E	n/a	n/a
9403	75.81	72.98
9404	76.01	73.48

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

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

Control Valve

Drop Pipe

Ancillary

Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

Outfall

Undefined End

Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.

2) All measurements on the plans are metric.

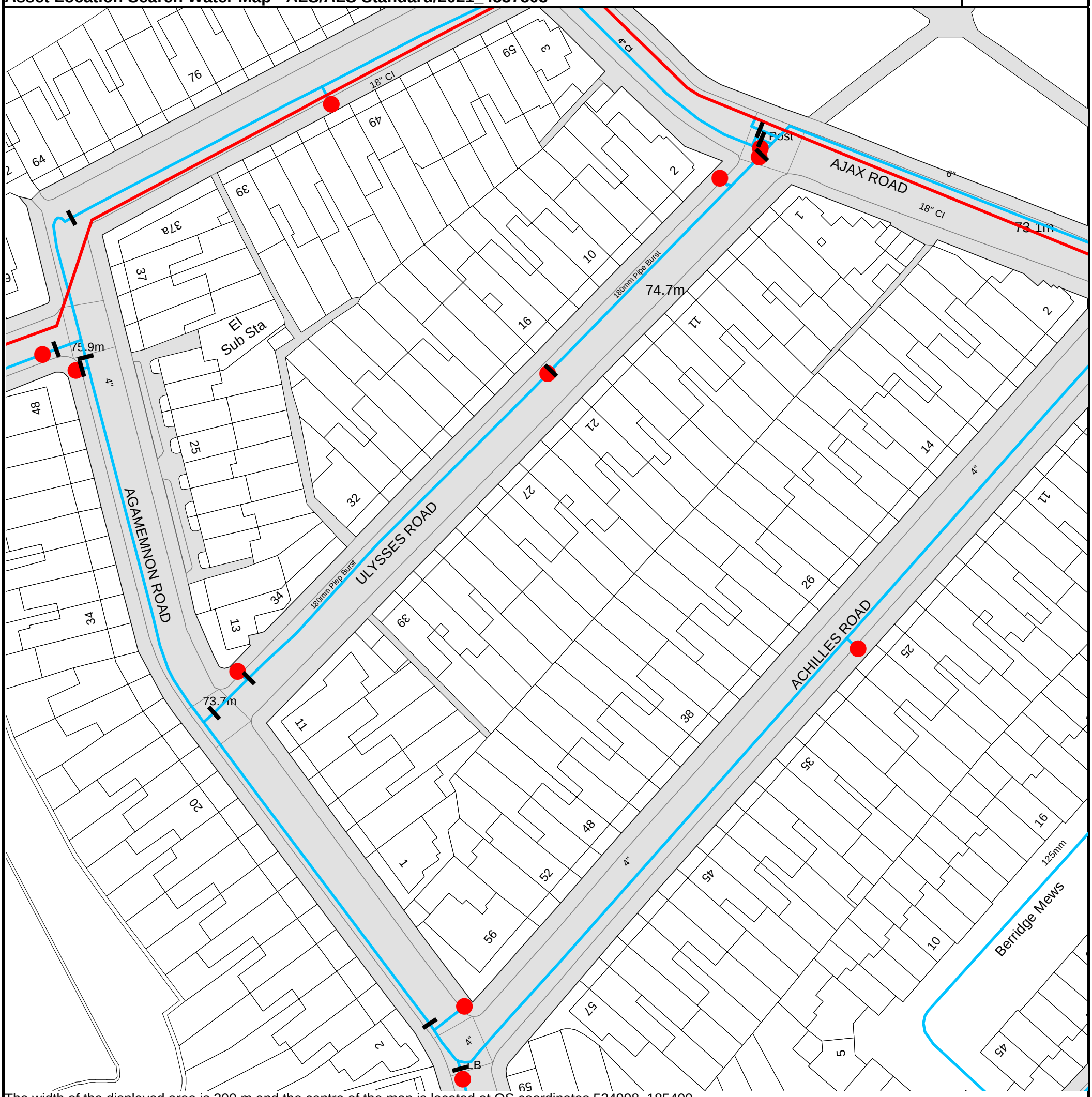
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

5) 'na' or '0' on a manhole level indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Searches on 0800 009 4540.

Asset Location Search Water Map - ALS/ALS Standard/2021_4537503



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 524998, 185400.

ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

4"

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

16"

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

3" SUPPLY

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

3" FIRE

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

3" METERED

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Other Water Pipes (Not Operated or Maintained by Thames Water)

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indiates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL`s terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

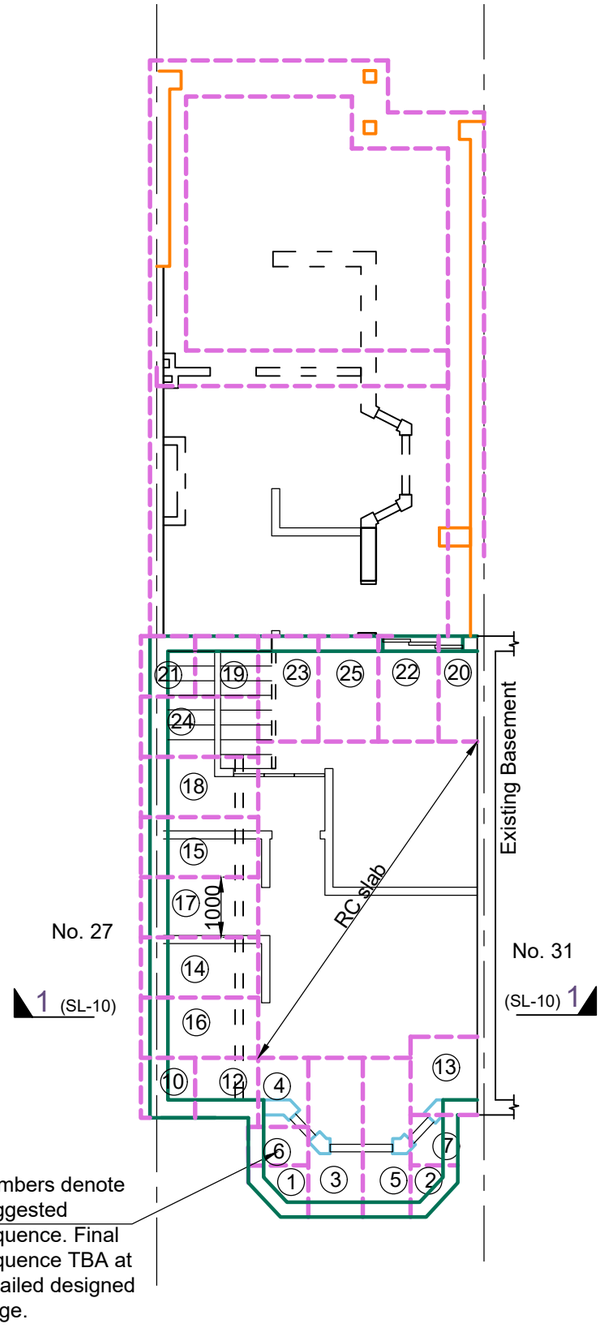
Ways to pay your bill

Credit Card	**BACS Payment**	**Telephone Banking**	**Cheque**
Call **0800 009 4540** quoting your invoice number starting CBA or ADS / OSS	Account number **90478703** Sort code **60-00-01** A remittance advice must be sent to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.** or email **ps.billing@thameswater.co.uk**	By calling your bank and quoting: Account number **90478703** Sort code **60-00-01** and your invoice number	Made payable to '**Thames Water Utilities Ltd**' Write your Thames Water account number on the back. Send to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW** or by DX to **151280 Slough 13**

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.

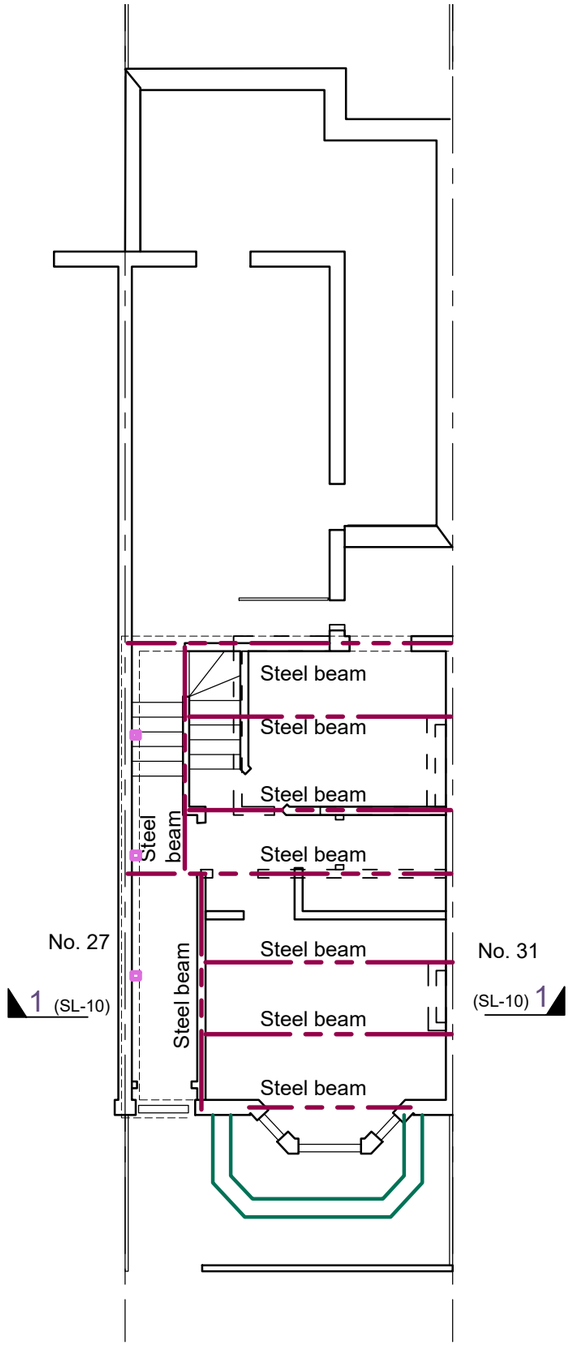
CROFT STRUCTURAL ENGINEERS

Appendix D : Structural Drawings



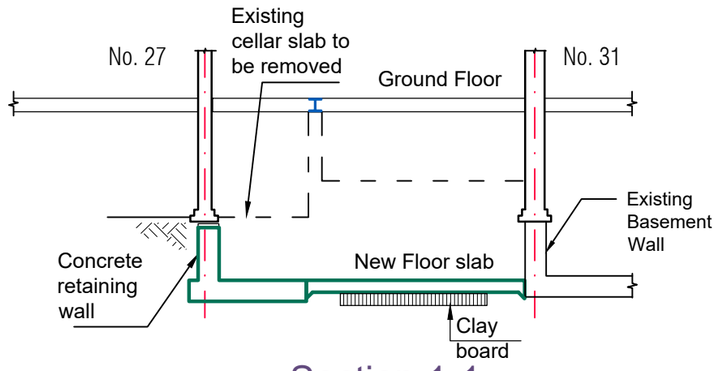
Proposed Basement Plan

Scale 1:100



Proposed Ground Floor Plan

Scale 1:100



Section 1-1

(1:100)

Rev	Date	by	Amendments
1	05.01.2023	VLD	Front Light well reduced
-	22.11.2021	VLD	First Issue

Ms. Obi Odogwu

29 Ulysses Road, NW6

Floor Plans

Issued for **PLANNING ONLY**

Job Number	Dwg Number
210925	SL-10
Scale: As shown @A3	Rev: 1
By: VLD	Approved by: GW

CRØFT STRUCTURAL+ CIVIL

r/o 60 Saxon Rd, London, SE25 5EH.

020 8684 4744

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Appendix E : Temporary Works Sequence

PHASE 1

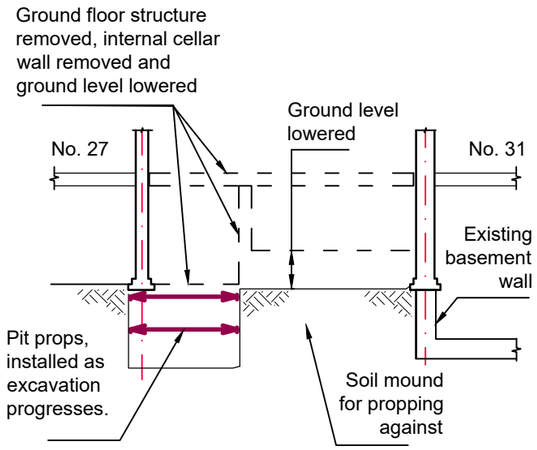
1.1. Excavate and form front light-well
  1.1.1. De-water ground if required
  1.1.2. Needle and prop front wall, constructing temporary mass concrete pads where necessary.
  1.1.3. Prop initial excavations; install lintels with props where soil is loose
  1.1.4. Place reinforcement and cast retaining wall
1.2. Remove ground floor joists and lower the level of the ground below to the level of the existing foundations
  1.2.1. where the level of the existing foundations vary, then the general lowering of the ground should be no lower than the highest foundation
1.3. Excavate and cast underpins below party wall with No 27
  1.3.1. Outline of pin segments are shown in drawing SL-10; underpin sequence TBA at detailed design stage. Suggested sequence shown.
  1.2.5. Excavation below existing wall to be carried out in segments not exceeding 1m
  1.2.1. Prop pits as excavation progresses
  1.2.2. When excavating below rear wall, install vertical props to brickwork above

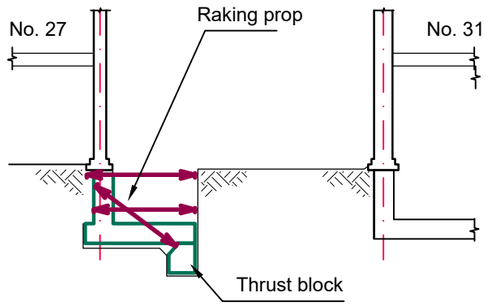
PHASE 2

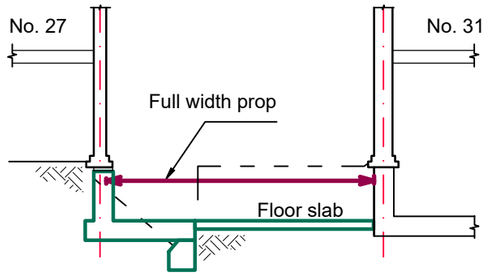
2.1. Continue with excavation and casting of pins in a hit and miss sequence
  2.1.1. When reaching formation level, excavate further for mass concrete thrust block
  2.1.2. Install sacrificial raking prop from wall from thrust block
  2.1.3. Place reinforcement and cast retaining wall
2.2. Continue for remaining underpins below party wall
  2.2.1. Do not commence excavation for pin until at least 48 hours after dry-packing for adjacent pin is complete
2.3. Needle and prop walls above as necessary.
2.4. Excavate and cast pins for rear light-well, installing props excavations progress

PHASE 3

3.1. Excavate remaining soil mass below building
  3.1.1. Initial horizontal props may be removed as excavation progresses
  3.1.2. Install full width cross prop
3.2. Install below slab drainage
3.3. Cast concrete floor slab.
3.4. After basement slab has gained sufficient strength, remove raking props or trim if cast as sacrificial. Full width horizontal props may also be removed after Basement structure is complete
3.5. Proceed with construction of internal walls, columns and Ground floor support







Section 1-1 : Construction Sequence

FOR LOCATION OF SECTION, REFER TO DRAWING SL-100

(1:100)

Rev	Date	by	Amendments
-	22.11.21	VLD	First Issue

Job Number	Dwg Number
210925	TW-10
Scale: As shown @A3	Rev: -
By: VLD	Approved by: GW

Client: Ms. Obi Odogwu

Property: 29 Ulysses Road, NW6

Title: Temporary Works Sequence

Issued for **PLANNING ONLY**

Croft Structural Engineers

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