

Elm Court, Cholmeley Park, London

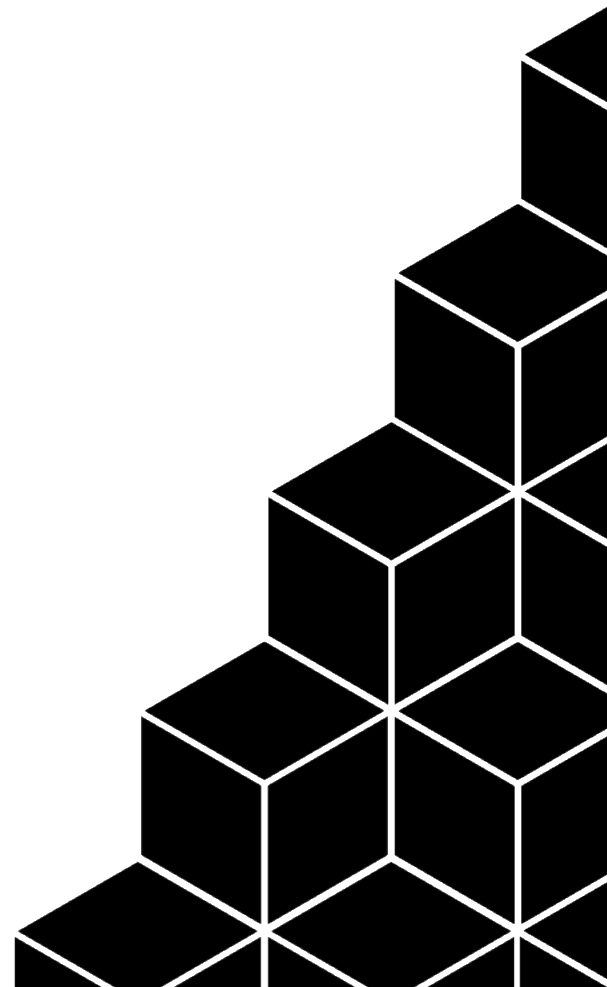
Structural Report & Basement Impact Assessment

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Elm Court, Cholmeley Park, London

Structural Report & Basement Impact Assessment

Assessment

QUALITY CONTROL

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EXECUTIVE SUMMARY

INTRODUCTION

This report outlines the proposed basement development at Elm Court, located off Cholmeley Park in the London Borough of Haringey. The project involves construction of a new basement beneath the existing residential building while maintaining occupation throughout the works. The site sits on the Highgate hillside and is predominantly underlain by London Clay, with variable near-surface deposits of Made Ground and slope-derived materials. These predictable geological conditions are well-suited to underpinning and basement formation, although some perched groundwater may be encountered within sandier layers.

STRUCTURAL DESIGN

The structural design proposes minimal intervention to the existing superstructure, retaining all existing concrete floors while introducing a new pitched roof. The new basement will be formed using reinforced concrete (RC) retaining walls and a suspended RC slab. Existing foundations will be supported by mass concrete underpinning in a hit-and-miss sequence, enabling safe load transfer while maintaining building stability. Localised steel beams (254 UC) will be installed to support existing masonry where larger openings are required at the new garden-floor level.

CONSTRUCTION METHOD STATEMENT

A preliminary construction method statement sets out a feasible and safe approach to forming the basement externally, avoiding internal excavation and ensuring continued building occupation. The method includes establishing an external working corridor, hit-and-miss underpinning, controlled excavation from outside the footprint, forming the RC slab and retaining walls, and reinstating all external areas. Temporary works, ground support, and structural monitoring are integral to ensuring that all works progress without compromising building stability.

BASEMENT IMPACT ASSESSMENT

A Building Impact Assessment (BIA) confirms that the proposed development is structurally feasible and poses minimal risk to surrounding buildings, infrastructure, or the local environment. Nearby borehole records indicate shallow Made Ground over sand and gravel, underlain by competent London Clay. Groundwater is expected to be limited and manageable, and the basement will sit well above the main water table. The site lies in Flood Zone 1 and is not subject to environmental designations such as SSSI, greenbelt, or protected landscapes. The basement is not anticipated to affect local hydrogeology or existing vegetation, and no trees require removal.

Planning and environmental considerations confirm that the proposed scheme aligns with the character of the area and poses no adverse impacts on nearby listed buildings, subject to ongoing monitoring of movement, vibration, and noise during construction. Sustainable design measures will be embedded into the project to reduce energy demand and ensure compliance with local and national policy. Further site investigation and stakeholder engagement will be undertaken to refine the design.

CONCLUSIONS

Overall, the proposed basement at Elm Court is a technically robust and environmentally considerate development. The staged underpinning strategy, controlled excavation sequence, and monitoring regime collectively ensure a safe and coordinated approach. With further detailed design and planning approvals, the scheme can proceed with confidence in its structural integrity, sustainability, and minimal impact on its surroundings.

INTRODUCTION

INTRODUCTION

This report summarises the structural design and calculations, indicative proposed sequence of works and basement impact assessment to support the planning application for the development at Elm Court, Cholmeley Park, London N6 5EJ. The proposed development consists of the existing Elm Court building being retained and its existing footprint unaltered. The building will be extended vertically through the addition of basement and rooftop extension to the existing building. These extensions will accommodate additional residential units.

BUILDING DESCRIPTION

Elm Court is a traditional masonry property built sometime in the late 1940s to early 1950s according to OS Map records. The structure currently consists of 4 storeys of flats with a non-domicile timber roof.

It is our understand that the property is of traditional construction comprising load bearing masonry walls, with concrete floors and a timber pitched roof.



Figure 1 – Street View of Site

SITE APPRAISAL

SITE LOCATION

The proposed site is located in North London, off Cholmeley Park in the London Borough of Haringey. The development site is the existing residential building Elm Court, which is broken up into flats. The building is located off Cholmeley Park road, which is located to the west at the front elevation. The building footprint is indicatively shown bounded red in the figure below.

The site is centred at:

- Elm Court, Cholmeley Park, London, N6 5EJ
- National Grid Reference: TQ 28837 87483
- Easting, Northing: 528837 , 187483



Figure 2 - Proposed Site

GEOLOGY AND HYDROGEOLOGY

Elm Court lies on the Highgate hillside, where the ground is underlain mainly by the London Clay Formation, a stiff, shrink swell clay, likely including its upper, slightly sandier Claygate Beds at this elevation. Near the surface, the clay is typically overlain by a thin, variable layer of made ground and slope deposits made of clay, sand, and gravel derived from the surrounding hill. This combination means shallow soils can be mixed and irregular, but competent London Clay is encountered a few metres down, sometimes with perched groundwater in the sandier horizons. Overall, it is classic Highgate ground, possibly variable near the surface with made ground, but predominantly London Clay beneath.

STRUCTURAL PROPOSAL

STRUCTURAL DESIGN

The structural proposal drawings are included in Appendix A to this document. These include GA plans, Sections, an indicative sequence of works and key Details. Preliminary structural calculations for the key design items can be found in Appendix B.

Superstructure

No structural change is proposed to the existing concrete floors. The proposed roof structure will be constructed with a traditional pitched timber roof.

Substructure

The proposed basement will be formed primarily by 225mm thick RC walls and a 200mm RC suspended slab. The non-retaining face of the proposed "garden floor" will be constructed using traditional masonry walls.

The foundations of the existing walls are proposed to be underpinned with mass concrete underpinning of 900mm width, taken into the bearing strata below the proposed FFL and hardcore of the proposed RC basement slab to take the increased loads. The underpinning is proposed to be completed using traditional hit and miss pattern with a maximum 1.0m wide pin. Refer to the figure below for a typical sequence, to be further developed at as the design progresses.

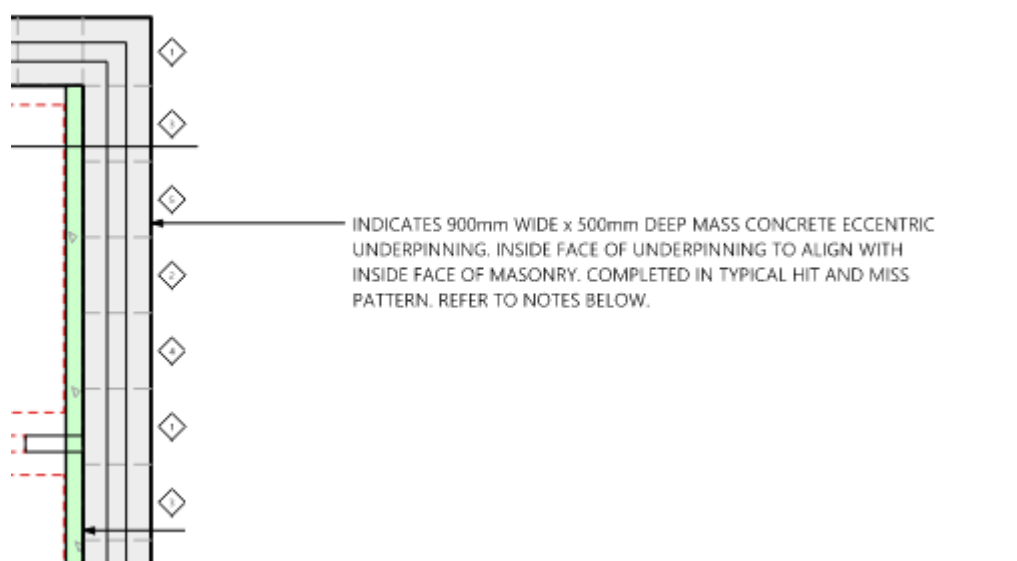


Figure 3 – Indicative Typical Underpinning Sequence

Newly introduced steel 254 UC sections will be used to support existing ground floor walls and foundations where a large opening is architecturally required below at the proposed "garden floor" level.



Figure 4 – Steel Beam Supporting Existing Masonry Wall

At the rear and sides of the structure the proposed retaining wall due to the change in levels internal levels and will also act as a form of waterproofing for the basement. This is proposed to act as a 225mm thick reinforced concrete cantilever retaining wall. The wall is to cantilever from the floor slab and is to extend to the underside of the existing ground floor slab. This height can be reduced if required of architectural or MEP reasons, as long as it is still above the required retaining height of the external level.

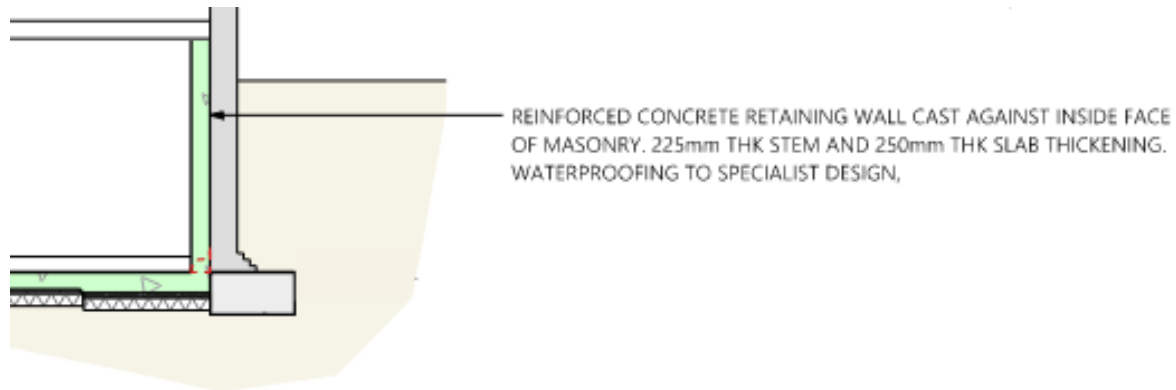


Figure 5 Retaining Wall Section

PRELIMINARY CONSTRUCTION METHOD STATEMENT

Below is a preliminary construction method statement to be developed further as the project progresses. This method statement outlines a feasible construction approach for forming a new basement beneath the existing dwelling without any internal excavation works. The strategy relies on external battering, hit-and-miss underpinning, and progressive excavation from outside the building footprint. The ground floor remains fully intact throughout construction, allowing continued safe occupation by residents.

A visual representation of this preliminary sequence of works can be found in Appendix A to this document.

1. Pre-Construction Preparation

- Install structural movement monitoring (crack gauges, tell-tales, automated monitoring where required).
- Carry out service tracing, CCTV drainage survey, and confirm ground conditions.
- Erect protective hoarding, temporary fencing, and pedestrian segregation zones.
- Remove landscaping, paving, and obstructions around the building perimeter.
- Agree safe working hours and protection measures with residents.

Pre-construction activities ensure the building can be safely worked on while occupied. Monitoring provides early detection of any movement during excavation, and service locating prevents accidental strikes. External clearance allows controlled trench access around the property.

2. Controlled External Level Reduction

- Reduce external ground levels in controlled stages around the building perimeter.
- Excavation to be limited to shallow lifts and taken down to approximately 250mm above the proposed basement FFL.
- Install temporary shoring and ground support as excavation progresses.

Restricting early excavation to the exterior maintains internal stability and safe occupation while allowing access for underpinning works.

3. *Perimeter Underpinning – Hit-and-Miss*

- Excavate 1m long underpin pits externally in a hit-and-miss pattern.
- Maintain safe working depth.
- Install temporary trench supports and façade bracing where required.
- Cast mass concrete underpins to a minimum of 150mm below proposed basement slab soffit.
- Dry-pack to the underside of existing walls after curing.
- Allow underpins to achieve specified strength before proceeding to adjacent sections.

The hit-and-miss sequence maintains continuous support to the walls while gradually transferring loads onto new underpin elements. This is crucial for an occupied building, as it prevents differential settlement or loss of stability.

4. *Trench-In Basement Excavation from Outside*

- Form a deep access trench from one side or rear of the property to full basement formation level.
- Progressively excavate beneath the existing structure from the external trench, working inward under controlled conditions.
- Maintain temporary propping and shoring to support the underside of the existing structure as excavation advances.
- Remove all spoil externally via the trench access.
- Repeat Step 3 for the required internal underpins.

This method allows formation of the basement void without disturbing internal floors, preserving the safety and habitability of the dwelling.

5. *Final Excavation to Slab Formation Level*

- Complete excavation across the full basement footprint to the final slab formation level.
- Trim formation and prepare subgrade.
- Review monitoring data prior to proceeding.

Final excavation is only undertaken once underpinning is complete, ensuring all loads are safely supported at depth.

6. *Formation Preparation and Basement Wall & Slab Construction*

- Prepare formation and install blinding concrete.
- Install sump chamber, drainage routes, and below-ground services.
- Complete waterproofing as per the waterproofing strategy.
- Cast reinforced concrete wall and slab to structural drawings.
- Form any required internal basement beams, columns, and walls elements.
- Ensure lateral restraint is achieved before removing temporary supports.

The formed structure resists both vertical loads from the existing structure and lateral earth pressures. Once the permanent structure is complete, they perform as a stiff structural unit, allowing safe removal of temporary supports.

7. External Backfilling and Reinstatement

- Apply external waterproofing to basement walls as per the waterproofing strategy.
- Install drainage blankets or perimeter drains if required.
- Backfill with controlled material.
- Reinstatement paving, landscaping, and external drainage routes.

Backfilling restores the ground profile and ensures proper protection to the waterproofing system. Perimeter drainage helps manage groundwater and reduces hydrostatic pressure on the structure.

8. Final Works

- Install required ventilation, pumps, and MEP services.
- Remove any temporary access ramps, trench supports, and working platforms.
- Remove all temporary fencing, access routes, and protection measures.
- Remove monitoring equipment following sign-off.
- Conduct final structural inspection.

The final works ensure that all temporary supports and monitoring systems are safely removed only after the permanent basement structure is fully functional and stable. By installing the final MEP systems, removing trench supports, dismantling temporary access structures, and completing a final structural inspection, the engineer confirms that load paths have fully transferred to the new reinforced concrete basement box and that the building is performing as intended without residual movement or reliance on temporary works.

STRUCTURAL DESIGN

ASSUMPTIONS

The following assumptions have been used within the structural considerations:

- Existing structure is a traditional masonry build (16kN/m^3)
- Existing flooring is 150mm concrete slabs
- Existing roof is a traditional timber pitched roof
- 150kPa allowable ground bearing pressure (to be confirmed on site)

EXISTING LOADING

Based on our understanding of the current structure, we have taken the following as the unit loads for the as designed structure. Where the construction is unknown, we have taken the more conservative choice.

Original Roof

DL	Traditional timber pitched roof	0.90 kN/m^2
LL	Maintenance loading to BS 6399-3	0.75 kN/m^2

Original Floors

DL	150mm concrete floor slabs	3.75 kN/m^2
	Allowance for finishes	0.15 kN/m^2
	Allowance for partitions	0.60 kN/m^2
LL	Residential loading to BS 6399-3	1.50 kN/m^2

External and Internal Walls

DL	Traditional masonry cavity walls	3.2 kN/m/m height
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PROPOSED LOADING

The following loads are taken for the proposed conditions.

Proposed Roof

DL	Traditional timber pitched roof	0.90 kN/m^2
LL	Maintenance/snow loading to BS EN 1991-1-1	0.60 kN/m^2

Proposed Floors

No changes proposed to construction therefore consider under updated codes live loading

DL	150mm concrete floor slabs	3.75 kN/m^2
	Allowance for finishes	0.15 kN/m^2
LL	Residential loading to BS EN 1991-1-1	1.50 kN/m^2
	Allowance for partitions	0.60 kN/m^2

External and Internal Walls

DL	Traditional masonry cavity walls	3.2 kN/m/m height
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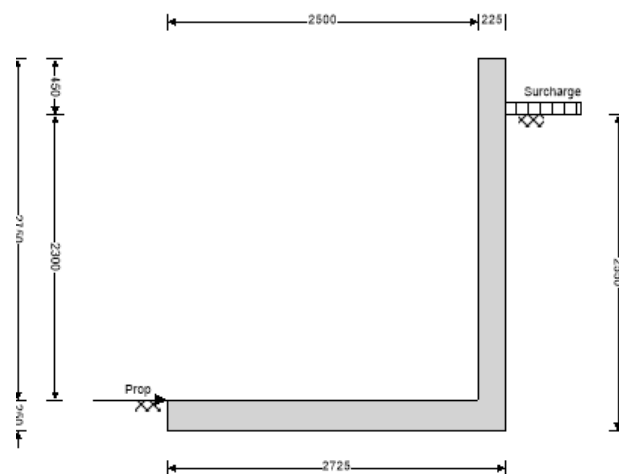
Structural analysis calculations were conducted on the key design elements for the proposal. The structural analysis software Tekla Tedds, with the support of verifying hand calculations, was used to perform the design of beams and walls. A brief summary of these calculations are below. Please refer to Appendix B for the full calculations.

Consider a 5-story residential building, loadings as above, sitting on a new mass concrete footing.

Assuming 150kPa allowable bearing pressure

,say 900mm width, depth to be min 300mm to allow for suitable distribution of load for eccentric footings. Final depth to bear into strata below proposed buildsups.

Consider a reinforced concrete retaining wall max 2.75m high retaining 2.3m of soil, sitting directly against the inside face external load bearing perimeter wall. The wall is considered propped in the permanent case by the basement slab. Surcharge taken conservatively as 10kPa.



Cube Consulting Engineers
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✓ Stability preview results					
		Capacity	Applied	F o S	
Overturning stability	kNm/m	59	32.1	1.839	✓
Bearing pressure	kN/m ²	184.4	15.5	11.865	✓

Figure 7 Perimeter Retaining Wall Calculation Summary

Landscape Retaining Walls

Consider a reinforced concrete retaining wall max 1.5m high retaining 1.5m of soil. The wall is considered propped in the permanent case by the basement slab. Surcharge taken conservatively as 10kPa.

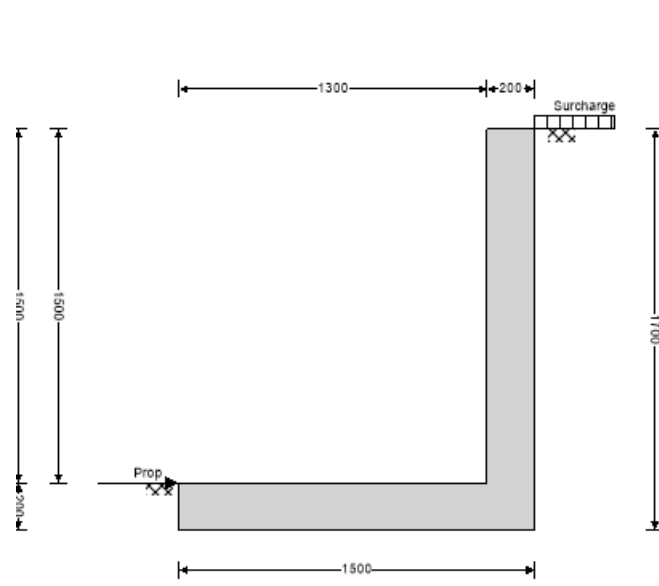


Figure 8 Landscape Retaining Wall Geometry

✓ Stability preview results					
		Capacity	Applied	F o S	
Overturning stability	kNm/m	16.1	12.2	1.326	✓
Bearing pressure	kN/m ²	100	19.7	5.086	✓

Figure 9 Landscape Retaining Wall Calculation Summary

Ground Floor Beams

Consider a steel beam spanning a maximum of 5.0m supporting load bearing internal wall. Worst case loading and span were considered in tandem.



Figure 10 Ground Floor Beam Calculation Geometry

Calculation results					
		Capacity Maximum Utilisation			
Bending moment (y-y)	kNm	843.7	804.2	0.953	✓
Shear force	kN	1305.4	643.4	0.493	✓
Deflection	mm	13.9	6.5	0.471	✓

Figure 11 Ground Floor Beam Calculation Summary

OUTLINE SPECIFICATION

Durability and corrosion

The design life of the proposed structure prior to significant maintenance is assumed to be 50 years.

New reinforced concrete elements are designed for the durability requirements of BS EN 1992. Concrete cover to reinforcement, maximum permitted crack widths and minimum specified water/cement ratios will be in accordance with the requirements of BS EN 1992.

The steel structural elements are designed for the durability requirements of BS EN 1993. The corrosion protection for the structural steelwork will be dependent on the location of the steel elements within the building. Any paint systems used for fire protection will be compatible with the corrosion protection system to the steelwork and are to be to the Architect's specification.

All timber is to be grade C24. External timber is to be Douglas Fir dry graded to C24 with preservative treatment to Architect's specification. Timber at roof level of the East extension to be protected with intumescent paint to achieve a fire performance of 60 minutes to the Architect's specification.

Movement and tolerances

Building tolerances are to be in accordance with steel and concrete specifications for the project in addition to the National Structural Steelwork Specification and National Structural Concrete Specifications. The permitted deviations will not exceed 10mm in all cases.

Steelwork deflections are generally in accordance with BS EN 1993-1-1:2005 and BS EN 1994-1-1:2004.

Concrete deflections are generally in accordance with BS EN 1992-1-1:2004.

Lateral deflection due to horizontal loading will generally be limited to a maximum of:

- height/300 at any one floor,
- height/500 over the full height of the building.
- <10mm where new structure connects to existing masonry walls.

If required, a finite limit to suit any updated cladding/glazing will have to be used.

Temperature and shrinkage

The effects of expansion and contraction due to maximum and minimum shade temperatures to BS EN 1991-1-5.

- Min. = -10 °C
- Max. = +30 °C

Where elements are exposed to the sun directly or under glass, further guidance should be sought.

Fire protection

The fire resistance period for the structure is assumed to be 60mins. Please refer to further guidance in the architect's information and Annex A of Part B of the Building Regulations.

Typically steel will be fire protected by boxing out. Where necessary steel frame elements will be protect by intumescent coating or encased in concrete to protect from fire.

Concrete is inherently fire resistant. The concrete cover to the reinforcement will be specified to suit the required fire resistance.

In general, exposed timber elements will be protected by designing elements for charring. This needs to be considered on a case by case basis.

Robustness

The following provisions for robustness will be made in accordance with Building Regulations Approved Document A3 Disproportionate Collapse and the ISructE 'Structural Robustness and Disproportionate Collapse in Buildings' guidance. The building is considered as Class 2b (Public building more than 2 storeys and less than 5000m² floor area per storey).

A risk assessment will be carried out to take into account any normal and abnormal hazards. Effective horizontal ties are required together with vertical ties in all supporting walls and columns. Consideration will be made by the notional removal of individual support members to ensure integrity of the building. Consideration will be given to vehicle impact loads where elements of the structure are located close to roads and taking into account the form of any protection offered as part of the landscaping scheme.

CDM RISKS

Foreseeable and unusual hazards and risks have been considered during the course of the structural design work as part of Construction Design and Management Regulations. Notes regarding the main risks have been noted below. Other risks have been highlighted on the relevant drawings. The Contractor's normal health and safety obligations will still apply.

Underpinning

The external perimeter underpinning presents risks associated with excavation adjacent to existing foundations while the property remains occupied. Key hazards include potential movement or settlement of the ground floor if temporary supports fail, trench collapse or slips in confined external working zones, accidental contact with underground services, and dust, noise, or vibration affecting residents. These risks are mitigated through hit-and-miss excavation, temporary shoring and propping, continuous structural monitoring, controlled access for plant and operatives, and dust and noise management measures, ensuring the building remains stable and occupants safe throughout the works. Contractor to develop sequencing and methodology with a temporary work engineer at an early stage.

Cranage

It is assumed at this stage the steel beams and timber roof structures will be craned into position. Any cranage is likely to required lifting over and adjacent to existing structures. The contractor will need to develop suitable method statements for this work.

Site access

The contractor will need to construct various access routes for operatives, plant and materials. Some of these routes are likely to require significant temporary structures, particularly for heavier loads. Contractor to develop sequencing and methodology with a temporary work engineer at an early stage.

STANDARD REFERENCES

The structure will be designed to the requirements of the following standards and associated references:

- BS EN 1991-1-1:2002 and the UK National Annex. General actions - self weight and imposed loads.
- BS EN 1991-1-3:2003 and the UK National Annex. General actions - snow loads.
- BS EN 1991-1-4:2005 and the UK National Annex. General actions - wind actions.
- BS EN 1991-1-6:2005 and the UK National Annex. General actions - actions during execution.
- BS EN 1992-1-1:2004 and the UK National Annex. Design of concrete structures.
- BS EN 1993-1-1:2005 and the UK National Annex. Design of steel structures.
- BS EN 1995-1-1:2004 and the UK National Annex. Design of timber structures.
- BS EN 1997-1:2004 and the UK National Annex. Geotechnical design.

BUILDING IMPACT ASSESSMENT

A Building Impact Assessment (BIA) has been undertaken to evaluate the potential effects of the proposed basement construction on the existing dwelling and adjacent structures. The full report can be found in the appendices to this document. A high-level summary is provided below.

GENERAL

The assessment considers the condition of the ground floor, the structural integrity of external walls, and the impact of external perimeter underpinning and trenching operations while the property remains occupied. Key factors such as load transfer, settlement risk, temporary works requirements, and ground conditions have been reviewed to ensure that the proposed methodology is feasible, safe, and compliant with relevant structural, civil and construction standards. The findings of the BIA inform the construction sequence, underpinning design, and monitoring strategy to mitigate any risk to the building and its residents during excavation and basement formation.

GEOLOGY AND GROUND CONDITIONS

BGS borehole records indicate that Made Ground in the vicinity has a variable thickness of up to 1 m below ground level, consisting of brick fragments, silty sand, and gravels. This stratum is considered unreliable as a founding material due to its unpredictable nature. Beneath the Made Ground, sand and gravels were encountered, underlain by London Clay, according to nearby BGS borehole logs. The basement is expected to be formed above groundwater; if any groundwater is encountered, it would likely flow around the basement within the Made Ground. Therefore, the proposed development is expected to have limited or no impact on the hydrogeology of the area or on the structural stability of surrounding buildings and infrastructure.

ENVIRONMENTAL AND PLANNING CONTEXT

The site is not located within an adopted greenbelt, and there are no areas of Ancient Woodland, Sites of Special Scientific Interest (SSSI), Local Nature Reserves, National Parks, Areas of Outstanding Natural Beauty (AONB), or other environmentally sensitive land uses nearby. Liaison with utilities owners and other infrastructure stakeholders will be undertaken at the detailed design stage to confirm the locations of potential assets and to discuss any further assessments required. The proposed basement will have a finished floor at approximately 2.75m below existing ground level and will result in the removal of Made Ground and the underlying sand and gravel layers. The basement and associated foundations are not expected to interfere with groundwater, and the design is unlikely to adversely affect the surrounding built or natural environment.

DESIGN AND LANDSCAPING CONSIDERATIONS

The design of the basement and associated structures will be of high quality and in keeping with the character of surrounding developments. Details of the proposed design will be submitted as part of the planning application and further refined during the detailed design stage. The basement will not impact any existing trees or remove soft landscaping, and the surrounding area will retain its green features. The site falls within Flood Zone 1, which indicates a low risk of flooding (less than 0.1%), and therefore the development is not considered to be at risk from extreme flooding.

SUSTAINABILITY AND LISTED BUILDING CONSIDERATIONS

Sustainable design principles will be incorporated into the planning application, including active and passive efficiency measures under the 'Be Lean' stage of the energy hierarchy to reduce energy consumption and associated CO₂ emissions. There are several listed buildings in close proximity to the site, and the impact of basement construction on these buildings will be assessed, focusing on movement,

vibration, and other non-structural issues such as noise. Preliminary structural solutions have been investigated based on currently available site information, and further ground investigations will be undertaken to refine the ground model, reduce uncertainty, and inform the detailed design.

CONCLUSION

In conclusion, the basement construction at Elm Court is unlikely to negatively impact the surrounding built or natural environment. The design philosophy and procedures set out in this assessment will form the basis for subsequent analysis and approvals required prior to commencing works on site. Further detailed investigations and liaison with relevant stakeholders will ensure that the development proceeds safely, sustainably, and in line with planning and regulatory requirements.

CONCLUSION

Based on preliminary calculations, the BIA and the proposed preliminary construction method it is feasible to progress with the proposed development while maintaining continuous occupancy, as the ground floor remains structurally intact throughout the works. The external underpinning and trench-in excavation strategy ensures that load paths are maintained, temporary works are manageable, and internal disruption is minimal. The approach is well suited for domestic settings with constrained internal space but sufficient external access.

Appendix A

Structural Documents

NOTES:

GENERAL

- DO NOT SCALE FROM THIS DRAWING. USE STATED DIMENSIONS ONLY.
- ALL SETTING OUT TO ARCHITECT'S SPECIFICATION
- ALL LEVELS IN METERS UNLESS NOTED OTHERWISE.
- ALL DIMENSIONS IN MILLIMETERS UNLESS NOTED OTHERWISE.
- ALL LEVELS IN METERS UNLESS NOTED OTHERWISE.

MATERIALS

- ALL MASS CONCRETE TO GRADE FND2 UNLESS NOTED OTHERWISE.
- ALL REINFORCED CONCRETE TO GRADE RC35/45 UNLESS NOTED OTHERWISE.
- ALL REINFORCEMENT TO BE GRADE B500 UNLESS NOTD OTHERWISE.

INDICATES 900mm WIDE x 500mm DEEP MASS CONCRETE UNDERPINNING CENTERED ON EXISTING CORBELL FOOTINGS. COMPLETED IN TYPICAL HIT AND MISS PATTERN. REFER TO NOTES BELOW.

EXISTING CORBEL TO BE CAREFULLY BROKEN OUT FOLLOWING COMPLETION OF UNDERPINNING

INDICATES 900mm WIDE x 500mm DEEP MASS CONCRETE ECCENTRIC UNDERPINNING. INSIDE FACE OF UNDERPINNING TO ALIGN WITH INSIDE FACE OF MASONRY. COMPLETED IN TYPICAL HIT AND MISS PATTERN. REFER TO NOTES BELOW.

INDICATIVE UNDERPINNING PATTERN. FINAL SEQUENCE TBC BY CONTRACTOR

REINFORCED CONCRETE RETAINING WALL CAST AGAINST INSIDE FACE OF MASONRY. 225mm THK STEM AND 250mm THK SLAB THICKENING

UNDERPINNING NOTES:
UNDERPINNING TO BE CARRIED OUT SEQUENTIALLY IN STAGES 1 TO 5. TO BE AGREED WITH CONTRACTOR

- TYPICAL PATTERN ALONG WALL TO BE 1, 5, 3, 2, 4, 1, 5.
- CARRY OUT UNDERPINNING IN NOT GREATER THAN 1m LONG SECTIONS
- NOT MORE THAN 25% IN LENGTH OF ANY EXISTING FOUNDATION / STRUCTURE TO BE UNSUPPORTED AT ANY ONE TIME.
- PINNING UP OF PREVIOUS BAY MUST BE CARRIED OUT PRIOR TO EXCAVATION OF ANY FURTHER BAY
- ALLOW 24 HOURS BETWEEN CASTING OF UNDERPINNING BLOCK AND PINNING UP.
- ANY WORKS ON ADJACENT BAYS MUST NOT BE CARRIED OUT WITHIN A 48 HOUR PERIOD.

LANDSCAPE RETAINING WALLS. 200mm STEM AND 200mm THK BASE TIED TO GROUND FLOOR SLAB. MAX HEIGHT 1.5m

LIGHTWELLS FORMED WITH 200mm THICK RC RETAINING WALLS AND BASE
WINDOW OPENINGS CAST INTO RETAINING WALL

REINFORCED CONCRETE RETAINING WALL CAST AGAINST INSIDE FACE OF MASONRY. 225mm THK STEM AND 250mm THK SLAB THICKENING
EXTENT OF SLAB THICKENING

BEAMS OVER BASEMENT OPENINGS INSTALLED PRIOR TO COMPLETION OF UNDERPINNING

900mm WIDE x 500mm DEEP MASS CONCRETE UNDERPINNING. REFER TO UNERPINNING PLAN FOR SETTING OUT AND SEQUENCING.

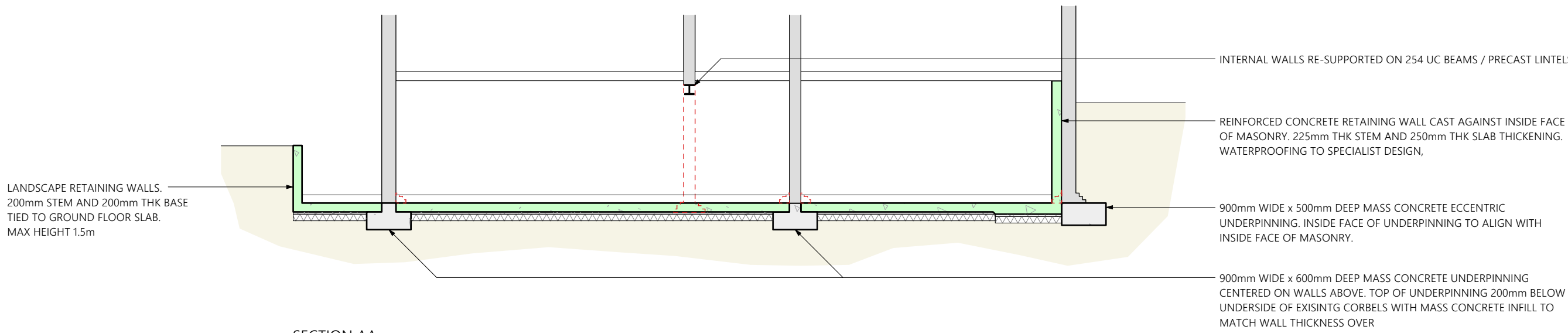
200mm THK REINFORCED CONCRETE GROUND BEARING BASEMENT FLOOR SLAB. CAST ON 50mm BLINDING AND 150mm HARDCORE

BEAM SCHEDULE

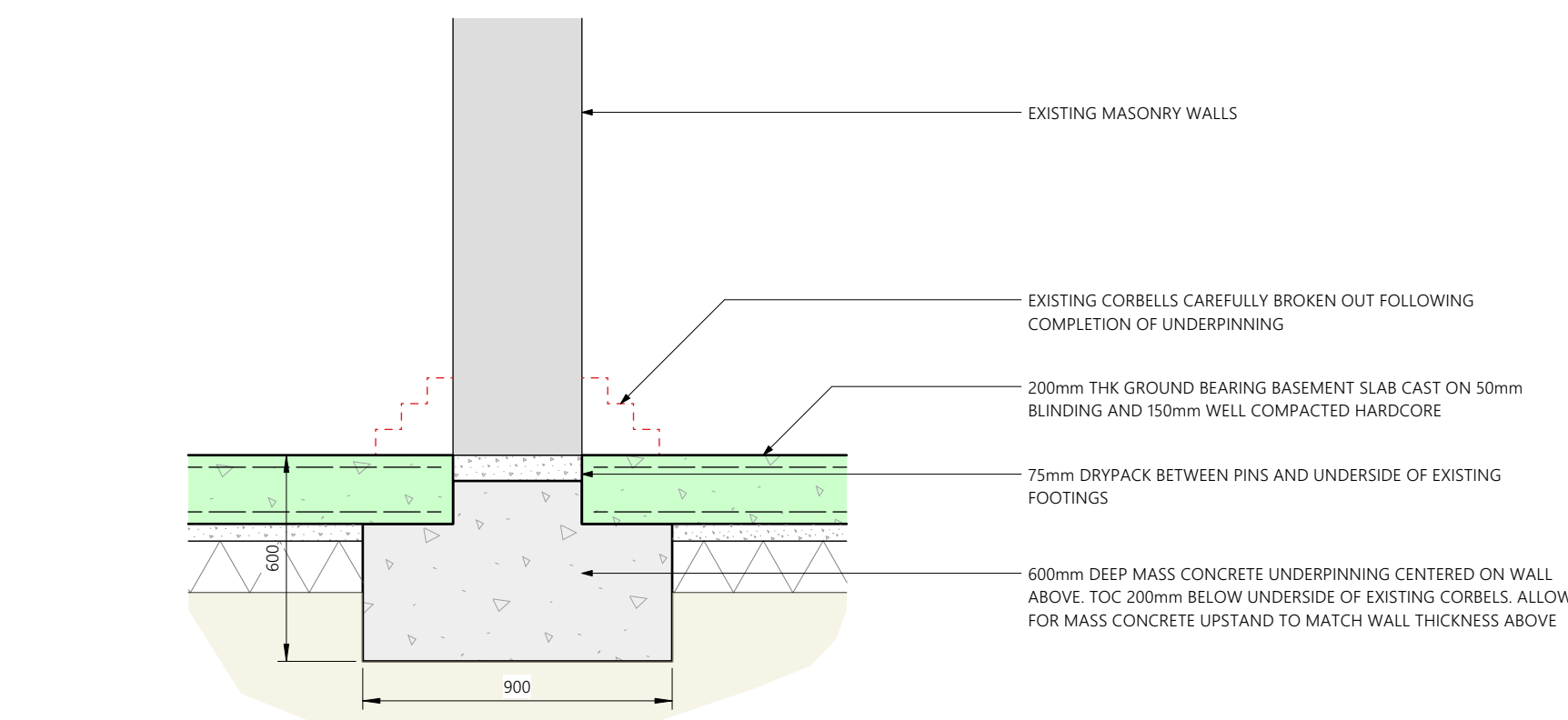
REF	BEAM
B1	254x254 UC
L1	240mm PRECAST LINTELS
L2	140mm PRECAST LINTEL TO INNER BLOCK
L3	CATNIC LINTEL TO FACING BRICKWORK

GA BASEMENT FINAL PLAN
1:50

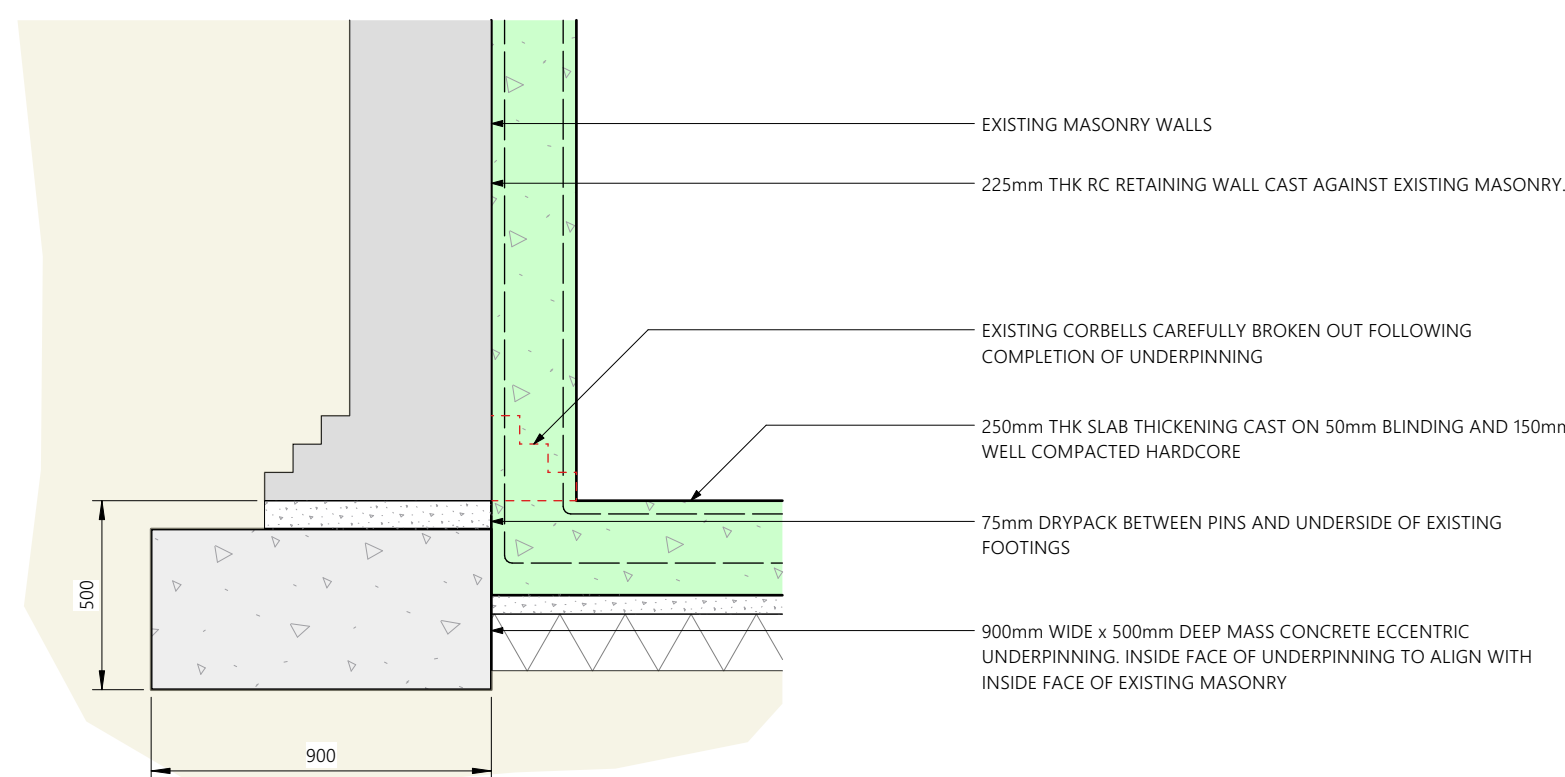
GA UNDERPINNING PLAN
1:50



AA SECTION AA
0/00 1:50



0.1 CONCENTRIC UNDERPINNING
0/00 1:20



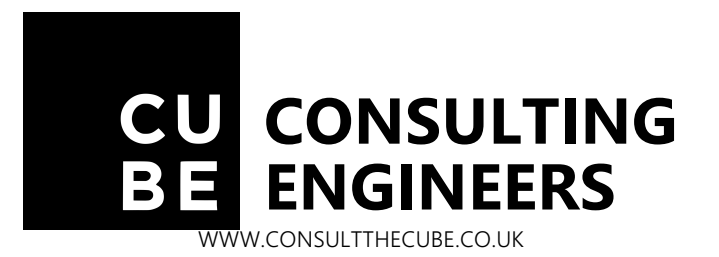
0.2 ECCENTRIC UNDERPINNING
0/00 1:20

P02	19/12/2025	ISSUED FOR PLANNING	HR	AP
P01	05/10/2025	ISSUED FOR PLANNING	HR	AP
REV	DATE	DESCRIPTION	DRN	APP

STATUS

WORK IN PROGRESS

PREPARED BY



CLIENT

RED CANNON DEVELOPMENTS

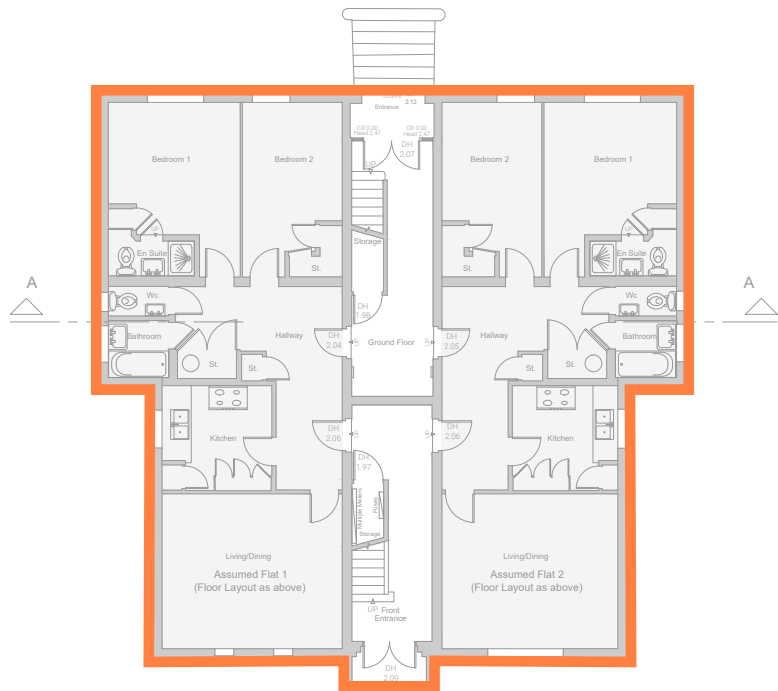
PROJECT

ELM COURT

DRAWING TITLE

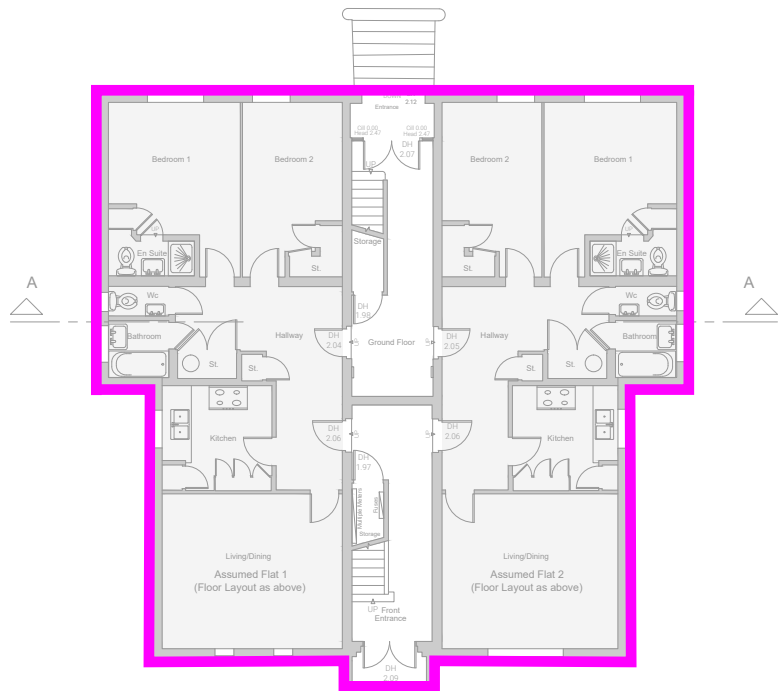
GA PLANS AND DETAILS
BASEMENT CONSTRUCTION

JOB NO.	DATE		SCALE	
1334	18/12/2025		VARIES	
DRN	DES	CHK	APP	
HR	JS	AP	AP	
DRAWING NUMBER			REV	
1334-S-DR-0100			P02	



STAGE 1: ENABLING AND PREPARATION WORKS

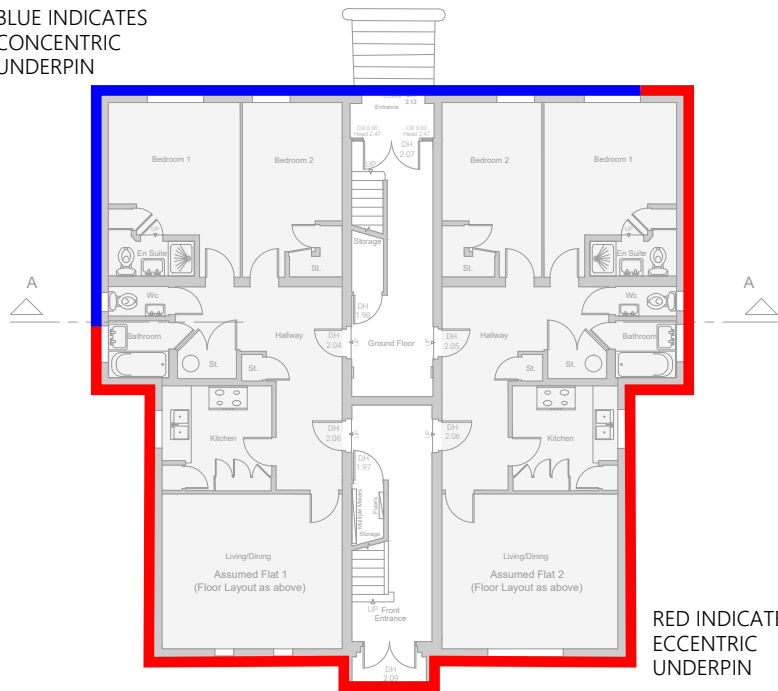
- INSTALL STRUCTURAL MONITORING TO ADJACENT STRUCTURES AND THE EXISTING BUILDING, REFER TO OUTLINE MONITORING REGIME FOR DETAILS.
- INSTALL ANY REQUIRED ENABLING WORKS (E.G. INTERNAL DUST SCREENS, ACOUSTIC BARRIERS, TEMPORARY EDGE PROTECTION) AND ENSURE SAFE ESCAPE ROUTES REMAIN USABLE FOR RESIDENTS AT ALL TIMES.
- DIVERT OR SUPPORT EXTERNAL DRAINAGE AND SERVICES THAT INTERFERE WITH UNDERPIN POSITIONS.



STAGE 2: CONTROLLED EXTERNAL LEVEL REDUCTION

- REDUCE EXTERNAL GROUND LEVELS IN CONTROLLED STAGES AROUND THE BUILDING PERIMETER.
- EXCAVATION TO BE LIMITED TO SHALLOW LIFTS AND TAKEN DOWN TO APPROXIMATELY 250mm ABOVE THE PROPOSED BASEMENT FFL.
- INSTALL TEMPORARY SHORING AND GROUND SUPPORT AS EXCAVATION PROGRESSES.

BLUE INDICATES
CONCENTRIC
UNDERPIN



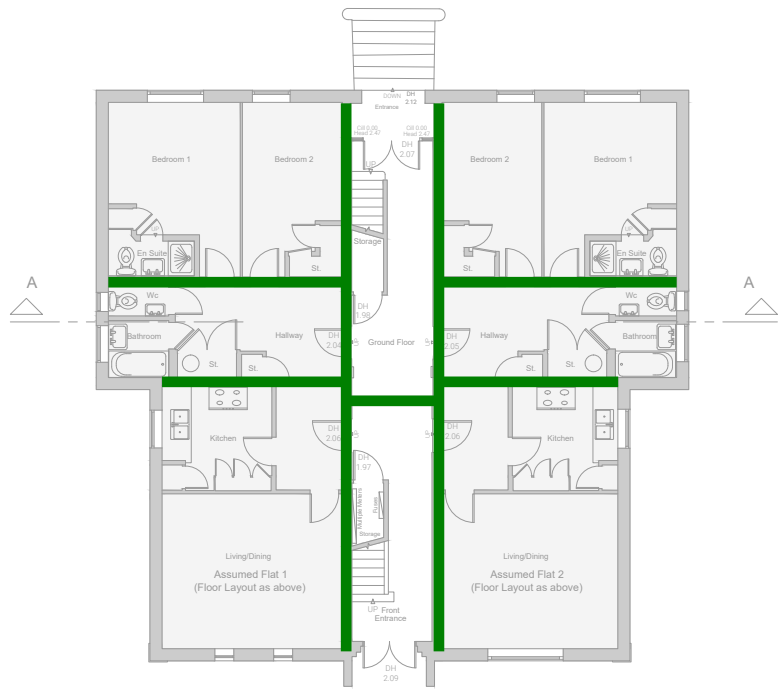
RED INDICATES
ECCENTRIC
UNDERPIN

STAGE 3: PERIMETER UNDERPINNING – HIT-AND-MISS

- EXCAVATE 1M LONG UNDERPIN PITS EXTERNALLY IN A HIT-AND-MISS PATTERN.
- MAINTAIN SAFE WORKING DEPTH.
- INSTALL TEMPORARY TRENCH SUPPORTS AND FAÇADE BRACING WHERE REQUIRED.
- CAST MASS CONCRETE UNDERPINS TO A MINIMUM OF 150mm BELOW PROPOSED BASEMENT SLAB SOFFIT.
- DRY PACK TO THE UNDERSIDE OF EXISTING WALLS AFTER CURING.
- ALLOW UNDERPINS TO ACHIEVE SPECIFIED STRENGTH BEFORE PROCEEDING TO ADJACENT SECTIONS.

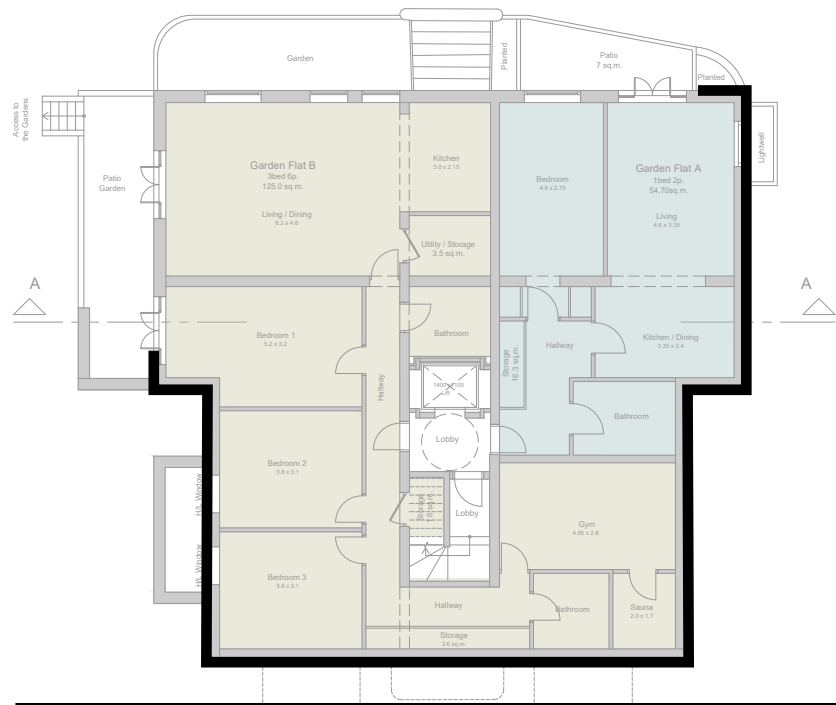
NOTES:

- THIS SEQUENCE IS FOR COMMENT ONLY.
- THE SEQUENCE SHOULD BE READ IN CONJUNCTION WITH ALL THE RELEVANT ARCHITECTURAL AND STRUCTURAL INFORMATION FOR THIS PROJECT.
- THE SEQUENCE IS INDICATIVE, AND THE FINAL CONSTRUCTION SEQUENCE WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.
- THE FINAL TEMPORARY WORKS STRATEGY WILL BE DEVELOPED BY OTHERS.
- THE FINAL SERVICES ROUTE IS UNKNOWN. ANY REQUIRED SERVICE CORRIDOR SHOULD BE REVIEWED WITH THE SERVICE SPECIALIST.
- REFER TO DRAWING 1334-S-DR-0400 FOR STAGED SECTIONS OF DIFFERENT UNDERPINNING CONDITIONS.



STAGE 4: TRENCH-IN BASEMENT EXCAVATION FROM OUTSIDE

- FORM A DEEP ACCESS TRENCH FROM ONE SIDE OR REAR OF THE PROPERTY TO FULL BASEMENT FORMATION LEVEL.
- PROGRESSIVELY EXCAVATE BENEATH THE EXISTING STRUCTURE FROM THE EXTERNAL TRENCH, WORKING INWARD UNDER CONTROLLED CONDITIONS.
- MAINTAIN TEMPORARY PROPPING AND SHORING TO SUPPORT THE UNDERSIDE OF THE EXISTING STRUCTURE AS EXCAVATION ADVANCES.
- REMOVE ALL SPOIL EXTERNALLY VIA THE TRENCH ACCESS.
- REPEAT STEP 3 FOR THE REQUIRED INTERNAL UNDERPINS. NOTE INSTALLATION OF UC BEAMS AS PER STRUCTURAL DRAWINGS PRIOR TO INTERNAL UNDERPINNING.



STAGE 5: BASEMENT CONSTRUCTION

- COMPLETE EXCAVATION ACROSS THE FULL BASEMENT FOOTPRINT TO THE FINAL SLAB FORMATION LEVEL.
- TRIM FORMATION AND PREPARE SUBGRADE.
- PREPARE FORMATION AND INSTALL BLINDING CONCRETE.
- INSTALL SUMP CHAMBER, DRAINAGE ROUTES, AND BELOW-GROUND SERVICES.
- COMPLETE WATERPROOFING AS PER THE WATERPROOFING STRATEGY.
- CAST REINFORCED CONCRETE WALL AND SLAB TO STRUCTURAL DRAWINGS.
- FORM ANY REQUIRED INTERNAL BASEMENT BEAMS, COLUMNS, AND WALLS ELEMENTS.
- ENSURE LATERAL RESTRAINT IS ACHIEVED BEFORE REMOVING TEMPORARY SUPPORTS.



STAGE 6: EXTERNAL BACKFILLING & REINSTATEMENT

- APPLY EXTERNAL WATERPROOFING TO BASEMENT WALLS AS PER THE WATERPROOFING STRATEGY.
- INSTALL DRAINAGE BLANKETS OR PERIMETER DRAINS IF REQUIRED.
- BACKFILL WITH CONTROLLED MATERIAL.
- REINSTATE PAVING, LANDSCAPING, AND EXTERNAL DRAINAGE ROUTES.
- INSTALL REQUIRED VENTILATION, PUMPS, AND MEP SERVICES.
- REMOVE ANY TEMPORARY ACCESS RAMPS, TRENCH SUPPORTS, AND WORKING PLATFORMS.
- REMOVE ALL TEMPORARY FENCING, ACCESS ROUTES, AND PROTECTION MEASURES.
- CONTINUE STRUCTURAL MONITORING UNTIL COMPLETION AND SUPPLY FINAL REPORT.

NOTES:

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- THE SEQUENCE IS INDICATIVE, AND THE FINAL CONSTRUCTION SEQUENCE WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.
- THE FINAL TEMPORARY WORKS STRATEGY WILL BE DEVELOPED BY OTHERS.
- THE FINAL SERVICES ROUTE IS UNKNOWN. ANY REQUIRED SERVICE CORRIDOR SHOULD BE REVIEWED WITH THE SERVICE SPECIALIST.
- REFER TO DRAWING 1334-S-DR-0400 FOR STAGED SECTIONS OF DIFFERENT UNDERPINNING CONDITIONS.

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PROJECT
Elm Court

SUBJECT
Indicative Sequence of Works Sketch

DOCUMENT REF
1334-S-SK 0001b_P02

BY
JS

DATE
19.12.25

Appendix B

Structural Calculations

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	Calcs for Back Wall				Start page no./Revision 1	
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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 2.9.24

Retaining wall details

Stem type	Cantilever
Stem height	$h_{\text{stem}} = 2750$ mm
Stem thickness	$t_{\text{stem}} = 225$ mm
Angle to rear face of stem	$\alpha = 90$ deg
Stem density	$\gamma_{\text{stem}} = 25$ kN/m ³
Toe length	$l_{\text{toe}} = 2500$ mm
Base thickness	$t_{\text{base}} = 250$ mm
Base density	$\gamma_{\text{base}} = 25$ kN/m ³
Height of retained soil	$h_{\text{ret}} = 2300$ mm
Angle of soil surface	$\beta = 0$ deg
Depth of cover	$d_{\text{cover}} = 0$ mm

Retained soil properties

Soil type	Medium dense well graded sand
Moist density	$\gamma_{\text{mr}} = 18$ kN/m ³
Saturated density	$\gamma_{\text{sr}} = 23$ kN/m ³
Characteristic effective shear resistance angle	$\phi'_{r,k} = 30$ deg
Characteristic wall friction angle	$\delta_{r,k} = 15$ deg

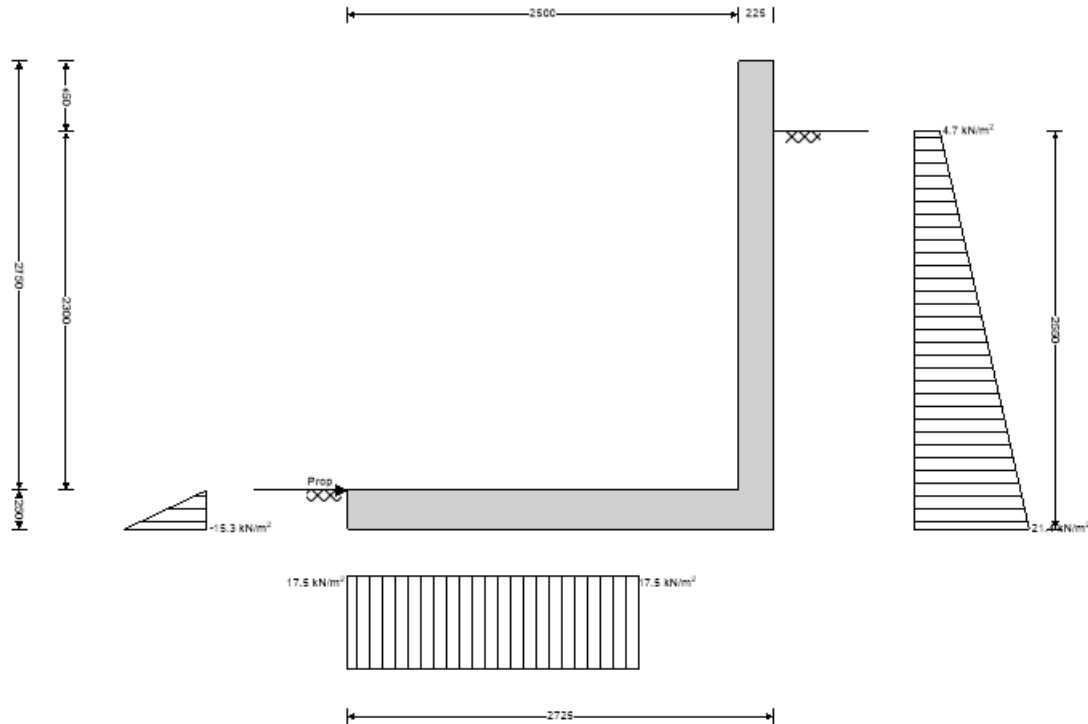
Base soil properties

Soil type	Medium dense well graded sand
Soil density	$\gamma_b = 18$ kN/m ³
Characteristic cohesion	$c'_{b,k} = 0$ kN/m ²
Characteristic effective shear resistance angle	$\phi'_{b,k} = 30$ deg
Characteristic wall friction angle	$\delta_{b,k} = 15$ deg
Characteristic base friction angle	$\delta_{bb,k} = 30$ deg

Loading details

Variable surcharge load	Surcharge _Q = 10 kN/m ²
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Project Elm Court				Job no. 1334	
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General arrangement - sketch pressures relate to bearing check

Calculate retaining wall geometry

Base length	$l_{base} = l_{toe} + t_{stem} = 2725 \text{ mm}$
Moist soil height	$h_{moist} = h_{soil} = 2300 \text{ mm}$
Length of surcharge load	$l_{sur} = l_{heel} = 0 \text{ mm}$
- Distance to vertical component	$x_{sur_v} = l_{base} - l_{heel} / 2 = 2725 \text{ mm}$
Effective height of wall	$h_{eff} = h_{base} + d_{cover} + h_{ret} = 2550 \text{ mm}$
- Distance to horizontal component	$x_{sur_h} = h_{eff} / 2 = 1275 \text{ mm}$
Area of wall stem	$A_{stem} = h_{stem} \times t_{stem} = 0.619 \text{ m}^2$
- Distance to vertical component	$x_{stem} = l_{toe} + t_{stem} / 2 = 2612 \text{ mm}$
Area of wall base	$A_{base} = l_{base} \times t_{base} = 0.681 \text{ m}^2$
- Distance to vertical component	$x_{base} = l_{base} / 2 = 1363 \text{ mm}$

Design approach 1

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

Partial factor set	A1
Permanent unfavourable action	$\gamma_G = 1.350$
Permanent favourable action	$\gamma_{Gf} = 1.000$
Variable unfavourable action	$\gamma_Q = 1.500$
Variable favourable action	$\gamma_{Qf} = 0.000$

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

Soil parameter set	M1
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Angle of shearing resistance

$$\gamma_{\phi'} = \mathbf{1.00}$$

Effective cohesion

$$\gamma_{c'} = \mathbf{1.00}$$

Weight density

$$\gamma_{\gamma} = \mathbf{1.00}$$

Retained soil properties

Design moist density

$$\gamma_{mr'} = \gamma_{mr} / \gamma_{\gamma} = \mathbf{18 \text{ kN/m}^3}$$

Design saturated density

$$\gamma_{sr'} = \gamma_{sr} / \gamma_{\gamma} = \mathbf{23 \text{ kN/m}^3}$$

Design effective shear resistance angle

$$\phi'_{r,d} = \text{atan}(\tan(\phi'_{r,k}) / \gamma_{\phi'}) = \mathbf{30 \text{ deg}}$$

Design wall friction angle

$$\delta_{r,d} = \text{atan}(\tan(\delta_{r,k}) / \gamma_{\phi'}) = \mathbf{15 \text{ deg}}$$

Base soil properties

Design soil density

$$\gamma_{b'} = \gamma_b / \gamma_{\gamma} = \mathbf{18 \text{ kN/m}^3}$$

Design effective shear resistance angle

$$\phi'_{b,d} = \text{atan}(\tan(\phi'_{b,k}) / \gamma_{\phi'}) = \mathbf{30 \text{ deg}}$$

Design wall friction angle

$$\delta_{b,d} = \text{atan}(\tan(\delta_{b,k}) / \gamma_{\phi'}) = \mathbf{15 \text{ deg}}$$

Design base friction angle

$$\delta_{bb,d} = \text{atan}(\tan(\delta_{bb,k}) / \gamma_{\phi'}) = \mathbf{30 \text{ deg}}$$

Design effective cohesion

$$c'_{b,d} = c'_{b,k} / \gamma_{c'} = \mathbf{0 \text{ kN/m}^2}$$

Using Coulomb theory

Active pressure coefficient

$$K_A = \sin(\alpha + \phi'_{r,d})^2 / (\sin(\alpha)^2 \times \sin(\alpha - \delta_{r,d}) \times [1 + \sqrt{[\sin(\phi'_{r,d} + \delta_{r,d}) \times \sin(\phi'_{r,d} - \beta) / (\sin(\alpha - \delta_{r,d}) \times \sin(\alpha + \beta))]}]^2) = \mathbf{0.301}$$

Passive pressure coefficient

$$K_P = \sin(90 - \phi'_{b,d})^2 / (\sin(90 + \delta_{b,d}) \times [1 - \sqrt{[\sin(\phi'_{b,d} + \delta_{b,d}) \times \sin(\phi'_{b,d}) / (\sin(90 + \delta_{b,d}))]}]^2) = \mathbf{4.977}$$

Overturning check

Vertical forces on wall

Wall stem

$$F_{\text{stem}} = \gamma_{Gf} \times A_{\text{stem}} \times \gamma_{\text{stem}} = \mathbf{15.5 \text{ kN/m}}$$

Wall base

$$F_{\text{base}} = \gamma_{Gf} \times A_{\text{base}} \times \gamma_{\text{base}} = \mathbf{17 \text{ kN/m}}$$

Total

$$F_{\text{total}_v} = F_{\text{stem}} + F_{\text{base}} = \mathbf{32.5 \text{ kN/m}}$$

Horizontal forces on wall

Surcharge load

$$F_{\text{sur}_h} = K_A \times \cos(\delta_{r,d}) \times \gamma_Q \times \text{Surcharge}_Q \times h_{\text{eff}} = \mathbf{11.1 \text{ kN/m}}$$

Moist retained soil

$$F_{\text{moist}_h} = \gamma_G \times K_A \times \cos(\delta_{r,d}) \times \gamma_{mr'} \times h_{\text{eff}}^2 / 2 = \mathbf{23 \text{ kN/m}}$$

Base soil

$$F_{\text{exc}_h} = -\gamma_{Gf} \times K_P \times \cos(\delta_{b,d}) \times \gamma_{b'} \times (h_{\text{pass}} + h_{\text{base}})^2 / 2 = \mathbf{-2.7 \text{ kN/m}}$$

Total

$$F_{\text{total}_h} = F_{\text{sur}_h} + F_{\text{moist}_h} + F_{\text{exc}_h} = \mathbf{31.4 \text{ kN/m}}$$

Overturning moments on wall

Surcharge load

$$M_{\text{sur}_OT} = F_{\text{sur}_h} \times X_{\text{sur}_h} = \mathbf{14.2 \text{ kNm/m}}$$

Moist retained soil

$$M_{\text{moist}_OT} = F_{\text{moist}_h} \times X_{\text{moist}_h} = \mathbf{19.6 \text{ kNm/m}}$$

Total

$$M_{\text{total}_OT} = M_{\text{sur}_OT} + M_{\text{moist}_OT} = \mathbf{33.8 \text{ kNm/m}}$$

Restoring moments on wall

Wall stem

$$M_{\text{stem}_R} = F_{\text{stem}} \times X_{\text{stem}} = \mathbf{40.4 \text{ kNm/m}}$$

Wall base

$$M_{\text{base}_R} = F_{\text{base}} \times X_{\text{base}} = \mathbf{23.2 \text{ kNm/m}}$$

Total

$$M_{\text{total}_R} = M_{\text{stem}_R} + M_{\text{base}_R} = \mathbf{63.6 \text{ kNm/m}}$$

Check stability against overturning

Factor of safety

$$FoS_{ot} = M_{\text{total}_R} / M_{\text{total}_OT} = \mathbf{1.885}$$

PASS - Maximum restoring moment is greater than overturning moment

Bearing pressure check

Vertical forces on wall

Wall stem

$$F_{\text{stem}} = \gamma_G \times A_{\text{stem}} \times \gamma_{\text{stem}} = \mathbf{20.9 \text{ kN/m}}$$

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Wall base

$$F_{base} = \gamma_G \times A_{base} \times \gamma_{base} = \mathbf{23 \text{ kN/m}}$$

Total

$$F_{total_v} = F_{stem} + F_{base} = \mathbf{43.9 \text{ kN/m}}$$

Horizontal forces on wall

Surcharge load

$$F_{sur_h} = K_A \times \cos(\delta_{r,d}) \times \gamma_Q \times \text{Surcharge}_Q \times h_{eff} = \mathbf{11.1 \text{ kN/m}}$$

Moist retained soil

$$F_{moist_h} = \gamma_G \times K_A \times \cos(\delta_{r,d}) \times \gamma_{mr'} \times h_{eff}^2 / 2 = \mathbf{23 \text{ kN/m}}$$

Base soil

$$F_{pass_h} = -\gamma_{Gf} \times K_P \times \cos(\delta_{b,d}) \times \gamma_{b'} \times (d_{cover} + h_{base})^2 / 2 = \mathbf{-2.7 \text{ kN/m}}$$

Total

$$F_{total_h} = F_{sur_h} + F_{moist_h} + F_{pass_h} = \mathbf{31.4 \text{ kN/m}}$$

Moments on wall

Wall stem

$$M_{stem} = F_{stem} \times X_{stem} = \mathbf{54.6 \text{ kNm/m}}$$

Wall base

$$M_{base} = F_{base} \times X_{base} = \mathbf{31.3 \text{ kNm/m}}$$

Surcharge load

$$M_{sur} = -F_{sur_h} \times X_{sur_h} = \mathbf{-14.2 \text{ kNm/m}}$$

Moist retained soil

$$M_{moist} = -F_{moist_h} \times X_{moist_h} = \mathbf{-19.6 \text{ kNm/m}}$$

Total

$$M_{total} = M_{stem} + M_{base} + M_{sur} + M_{moist} = \mathbf{52.1 \text{ kNm/m}}$$

Check bearing pressure

Propping force

$$F_{prop_base} = F_{total_h} = \mathbf{31.4 \text{ kN/m}}$$

Distance to reaction

$$\bar{x} = M_{total} / F_{total_v} = \mathbf{1188 \text{ mm}}$$

Eccentricity of reaction

$$e = \bar{x} - l_{base} / 2 = \mathbf{-174 \text{ mm}}$$

Loaded length of base

$$l_{load} = 2 \times \bar{x} = \mathbf{2376 \text{ mm}}$$

Bearing pressure at toe

$$q_{toe} = F_{total_v} / l_{load} = \mathbf{18.5 \text{ kN/m}^2}$$

Bearing pressure at heel

$$q_{heel} = \mathbf{0 \text{ kN/m}^2}$$

Effective overburden pressure

$$q = (t_{base} + d_{cover}) \times \gamma_{b'} = \mathbf{4.5 \text{ kN/m}^2}$$

Design effective overburden pressure

$$q' = q / \gamma_\gamma = \mathbf{4.5 \text{ kN/m}^2}$$

Bearing resistance factors

$$N_q = \text{Exp}(\pi \times \tan(\phi'_{b,d})) \times (\tan(45 \text{ deg} + \phi'_{b,d} / 2))^2 = \mathbf{18.401}$$

$$N_c = (N_q - 1) \times \cot(\phi'_{b,d}) = \mathbf{30.14}$$

$$N_\gamma = 2 \times (N_q - 1) \times \tan(\phi'_{b,d}) = \mathbf{20.093}$$

Foundation shape factors

$$S_q = \mathbf{1}$$

$$S_\gamma = \mathbf{1}$$

$$S_c = \mathbf{1}$$

Load inclination factors

$$H = F_{sur_h} + F_{moist_h} + F_{pass_h} - F_{prop_base} = \mathbf{0 \text{ kN/m}}$$

$$V = F_{total_v} = \mathbf{43.9 \text{ kN/m}}$$

$$m = \mathbf{2}$$

$$i_q = [1 - H / (V + l_{load} \times c'_{b,d} \times \cot(\phi'_{b,d}))]^m = \mathbf{1}$$

$$i_\gamma = [1 - H / (V + l_{load} \times c'_{b,d} \times \cot(\phi'_{b,d}))]^{(m+1)} = \mathbf{1}$$

$$i_c = i_q - (1 - i_q) / (N_c \times \tan(\phi'_{b,d})) = \mathbf{1}$$

Net ultimate bearing capacity

$$n_f = c'_{b,d} \times N_c \times S_c \times i_c + q' \times N_q \times S_q \times i_q + 0.5 \times \gamma_{b'} \times l_{load} \times N_\gamma \times S_\gamma \times i_\gamma = \mathbf{512.6 \text{ kN/m}^2}$$

Factor of safety

$$FoS_{bp} = n_f / \max(q_{toe}, q_{heel}) = \mathbf{27.761}$$

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

$$\gamma_G = \mathbf{1.000}$$

Permanent favourable action

$$\gamma_{Gf} = \mathbf{1.000}$$

Variable unfavourable action

$$\gamma_Q = \mathbf{1.300}$$

Variable favourable action

$$\gamma_{Qf} = \mathbf{0.000}$$

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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	$\gamma_{\gamma} = 1.00$

Retained soil properties

Design moist density	$\gamma_{mr}' = \gamma_{mr} / \gamma_{\gamma} = 18 \text{ kN/m}^3$
Design saturated density	$\gamma_{sr}' = \gamma_{sr} / \gamma_{\gamma} = 23 \text{ kN/m}^3$
Design effective shear resistance angle	$\phi'_{r,d} = \text{atan}(\tan(\phi'_{r,k}) / \gamma_{\phi'}) = 24.8 \text{ deg}$
Design wall friction angle	$\delta_{r,d} = \text{atan}(\tan(\delta_{r,k}) / \gamma_{\phi'}) = 12.1 \text{ deg}$

Base soil properties

Design soil density	$\gamma_b' = \gamma_b / \gamma_{\gamma} = 18 \text{ kN/m}^3$
Design effective shear resistance angle	$\phi'_{b,d} = \text{atan}(\tan(\phi'_{b,k}) / \gamma_{\phi'}) = 24.8 \text{ deg}$
Design wall friction angle	$\delta_{b,d} = \text{atan}(\tan(\delta_{b,k}) / \gamma_{\phi'}) = 12.1 \text{ deg}$
Design base friction angle	$\delta_{bb,d} = \text{atan}(\tan(\delta_{bb,k}) / \gamma_{\phi'}) = 24.8 \text{ deg}$
Design effective cohesion	$c'_{b,d} = c'_{b,k} / \gamma_{c'} = 0 \text{ kN/m}^2$

Using Coulomb theory

Active pressure coefficient	$K_A = \sin(\alpha + \phi'_{r,d})^2 / (\sin(\alpha)^2 \times \sin(\alpha - \delta_{r,d}) \times [1 + \sqrt{[\sin(\phi'_{r,d} + \delta_{r,d}) \times \sin(\phi'_{r,d} - \beta) / (\sin(\alpha - \delta_{r,d}) \times \sin(\alpha + \beta))]}]^2) = 0.371$
Passive pressure coefficient	$K_P = \sin(90 - \phi'_{b,d})^2 / (\sin(90 + \delta_{b,d}) \times [1 - \sqrt{[\sin(\phi'_{b,d} + \delta_{b,d}) \times \sin(\phi'_{b,d}) / (\sin(90 + \delta_{b,d}))]}]^2) = 3.473$

Overturning check

Vertical forces on wall

Wall stem	$F_{\text{stem}} = \gamma_{Gf} \times A_{\text{stem}} \times \gamma_{\text{stem}} = 15.5 \text{ kN/m}$
Wall base	$F_{\text{base}} = \gamma_{Gf} \times A_{\text{base}} \times \gamma_{\text{base}} = 17 \text{ kN/m}$
Total	$F_{\text{total}_v} = F_{\text{stem}} + F_{\text{base}} = 32.5 \text{ kN/m}$

Horizontal forces on wall

Surcharge load	$F_{\text{sur}_h} = K_A \times \cos(\delta_{r,d}) \times \gamma_Q \times \text{Surcharge}_Q \times h_{\text{eff}} = 12 \text{ kN/m}$
Moist retained soil	$F_{\text{moist}_h} = \gamma_G \times K_A \times \cos(\delta_{r,d}) \times \gamma_{mr}' \times h_{\text{eff}}^2 / 2 = 21.2 \text{ kN/m}$
Base soil	$F_{\text{exc}_h} = -\gamma_{Gf} \times K_P \times \cos(\delta_{b,d}) \times \gamma_b' \times (h_{\text{pass}} + h_{\text{base}})^2 / 2 = -1.9 \text{ kN/m}$
Total	$F_{\text{total}_h} = F_{\text{sur}_h} + F_{\text{moist}_h} + F_{\text{exc}_h} = 31.3 \text{ kN/m}$

Overturning moments on wall

Surcharge load	$M_{\text{sur}_OT} = F_{\text{sur}_h} \times X_{\text{sur}_h} = 15.3 \text{ kNm/m}$
Moist retained soil	$M_{\text{moist}_OT} = F_{\text{moist}_h} \times X_{\text{moist}_h} = 18 \text{ kNm/m}$
Total	$M_{\text{total}_OT} = M_{\text{sur}_OT} + M_{\text{moist}_OT} = 33.4 \text{ kNm/m}$

Restoring moments on wall

Wall stem	$M_{\text{stem}_R} = F_{\text{stem}} \times X_{\text{stem}} = 40.4 \text{ kNm/m}$
Wall base	$M_{\text{base}_R} = F_{\text{base}} \times X_{\text{base}} = 23.2 \text{ kNm/m}$
Total	$M_{\text{total}_R} = M_{\text{stem}_R} + M_{\text{base}_R} = 63.6 \text{ kNm/m}$

Check stability against overturning

Factor of safety	$FoS_{ot} = M_{\text{total}_R} / M_{\text{total}_OT} = 1.906$
------------------	---

PASS - Maximum restoring moment is greater than overturning moment

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Bearing pressure check

Vertical forces on wall

Wall stem

$$F_{\text{stem}} = \gamma_G \times A_{\text{stem}} \times \gamma_{\text{stem}} = \mathbf{15.5 \text{ kN/m}}$$

Wall base

$$F_{\text{base}} = \gamma_G \times A_{\text{base}} \times \gamma_{\text{base}} = \mathbf{17 \text{ kN/m}}$$

Total

$$F_{\text{total}_v} = F_{\text{stem}} + F_{\text{base}} = \mathbf{32.5 \text{ kN/m}}$$

Horizontal forces on wall

Surcharge load

$$F_{\text{sur}_h} = K_A \times \cos(\delta_{r,d}) \times \gamma_Q \times \text{Surcharge}_Q \times h_{\text{eff}} = \mathbf{12 \text{ kN/m}}$$

Moist retained soil

$$F_{\text{moist}_h} = \gamma_G \times K_A \times \cos(\delta_{r,d}) \times \gamma_{mr'} \times h_{\text{eff}}^2 / 2 = \mathbf{21.2 \text{ kN/m}}$$

Base soil

$$F_{\text{pass}_h} = -\gamma_{Gf} \times K_P \times \cos(\delta_{b,d}) \times \gamma_{b'} \times (d_{\text{cover}} + h_{\text{base}})^2 / 2 = \mathbf{-1.9 \text{ kN/m}}$$

Total

$$F_{\text{total}_h} = F_{\text{sur}_h} + F_{\text{moist}_h} + F_{\text{pass}_h} = \mathbf{31.3 \text{ kN/m}}$$

Moments on wall

Wall stem

$$M_{\text{stem}} = F_{\text{stem}} \times X_{\text{stem}} = \mathbf{40.4 \text{ kNm/m}}$$

Wall base

$$M_{\text{base}} = F_{\text{base}} \times X_{\text{base}} = \mathbf{23.2 \text{ kNm/m}}$$

Surcharge load

$$M_{\text{sur}} = -F_{\text{sur}_h} \times X_{\text{sur}_h} = \mathbf{-15.3 \text{ kNm/m}}$$

Moist retained soil

$$M_{\text{moist}} = -F_{\text{moist}_h} \times X_{\text{moist}_h} = \mathbf{-18 \text{ kNm/m}}$$

Total

$$M_{\text{total}} = M_{\text{stem}} + M_{\text{base}} + M_{\text{sur}} + M_{\text{moist}} = \mathbf{30.2 \text{ kNm/m}}$$

Check bearing pressure

Propping force

$$F_{\text{prop}_base} = F_{\text{total}_h} = \mathbf{31.3 \text{ kN/m}}$$

Distance to reaction

$$\bar{X} = M_{\text{total}} / F_{\text{total}_v} = \mathbf{931 \text{ mm}}$$

Eccentricity of reaction

$$e = \bar{X} - l_{\text{base}} / 2 = \mathbf{-432 \text{ mm}}$$

Loaded length of base

$$l_{\text{load}} = 2 \times \bar{X} = \mathbf{1861 \text{ mm}}$$

Bearing pressure at toe

$$q_{\text{toe}} = F_{\text{total}_v} / l_{\text{load}} = \mathbf{17.5 \text{ kN/m}^2}$$

Bearing pressure at heel

$$q_{\text{heel}} = \mathbf{0 \text{ kN/m}^2}$$

Effective overburden pressure

$$q = (t_{\text{base}} + d_{\text{cover}}) \times \gamma_{b'} = \mathbf{4.5 \text{ kN/m}^2}$$

Design effective overburden pressure

$$q' = q / \gamma_f = \mathbf{4.5 \text{ kN/m}^2}$$

Bearing resistance factors

$$N_q = \text{Exp}(\pi \times \tan(\phi'_{b,d})) \times (\tan(45 \text{ deg} + \phi'_{b,d} / 2))^2 = \mathbf{10.431}$$

$$N_c = (N_q - 1) \times \cot(\phi'_{b,d}) = \mathbf{20.418}$$

$$N_\gamma = 2 \times (N_q - 1) \times \tan(\phi'_{b,d}) = \mathbf{8.712}$$

Foundation shape factors

$$S_q = \mathbf{1}$$

$$S_\gamma = \mathbf{1}$$

$$S_c = \mathbf{1}$$

Load inclination factors

$$H = F_{\text{sur}_h} + F_{\text{moist}_h} + F_{\text{pass}_h} - F_{\text{prop}_base} = \mathbf{0 \text{ kN/m}}$$

$$V = F_{\text{total}_v} = \mathbf{32.5 \text{ kN/m}}$$

$$m = \mathbf{2}$$

$$i_q = [1 - H / (V + l_{\text{load}} \times c'_{b,d} \times \cot(\phi'_{b,d}))]^m = \mathbf{1}$$

$$i_\gamma = [1 - H / (V + l_{\text{load}} \times c'_{b,d} \times \cot(\phi'_{b,d}))]^{(m+1)} = \mathbf{1}$$

$$i_c = i_q - (1 - i_q) / (N_c \times \tan(\phi'_{b,d})) = \mathbf{1}$$

Net ultimate bearing capacity

$$n_f = c'_{b,d} \times N_c \times S_c \times i_c + q' \times N_q \times S_q \times i_q + 0.5 \times \gamma_{b'} \times l_{\text{load}} \times N_\gamma \times S_\gamma \times i_\gamma = \mathbf{192.9 \text{ kN/m}^2}$$

Factor of safety

$$FoS_{bp} = n_f / \max(q_{\text{toe}}, q_{\text{heel}}) = \mathbf{11.044}$$

PASS - Allowable bearing pressure exceeds maximum applied bearing pressure

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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 2.9.24

Retaining wall details

Stem type	Cantilever
Stem height	$h_{\text{stem}} = 1500 \text{ mm}$
Stem thickness	$t_{\text{stem}} = 200 \text{ mm}$
Angle to rear face of stem	$\alpha = 90 \text{ deg}$
Stem density	$\gamma_{\text{stem}} = 25 \text{ kN/m}^3$
Toe length	$l_{\text{toe}} = 1300 \text{ mm}$
Base thickness	$t_{\text{base}} = 200 \text{ mm}$
Base density	$\gamma_{\text{base}} = 25 \text{ kN/m}^3$
Height of retained soil	$h_{\text{ret}} = 1500 \text{ mm}$
Angle of soil surface	$\beta = 0 \text{ deg}$
Depth of cover	$d_{\text{cover}} = 0 \text{ mm}$

Retained soil properties

Soil type	Medium dense well graded sand
Moist density	$\gamma_{\text{mr}} = 18 \text{ kN/m}^3$
Saturated density	$\gamma_{\text{sr}} = 23 \text{ kN/m}^3$
Characteristic effective shear resistance angle	$\phi'_{r,k} = 30 \text{ deg}$
Characteristic wall friction angle	$\delta_{r,k} = 15 \text{ deg}$

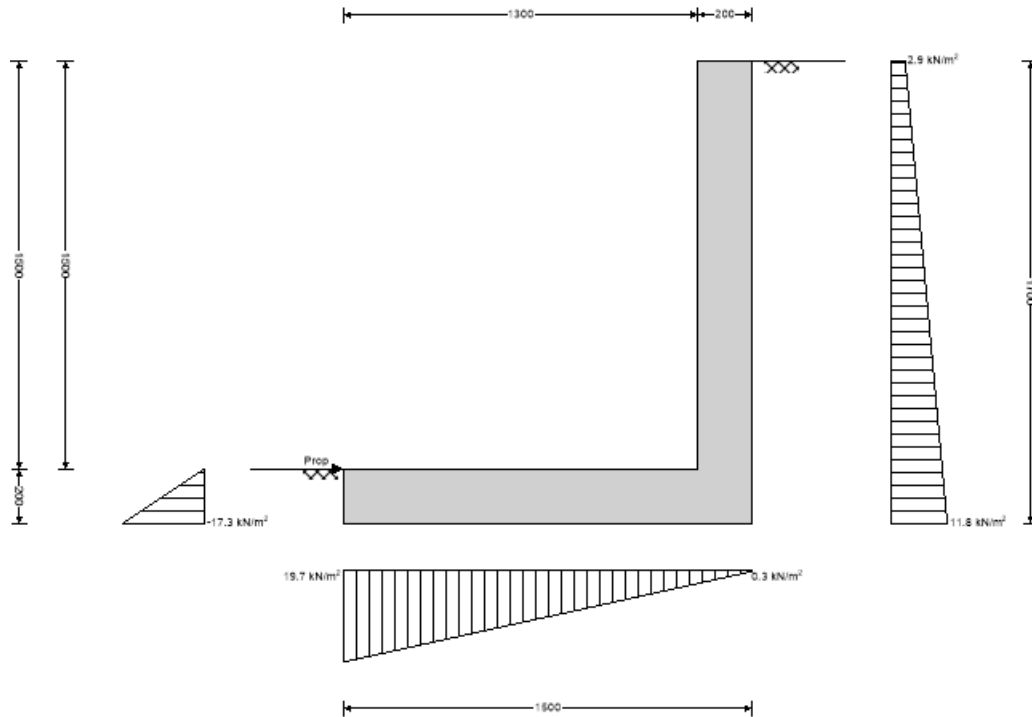
Base soil properties

Soil type	Medium dense well graded sand
Soil density	$\gamma_b = 18 \text{ kN/m}^3$
Characteristic effective shear resistance angle	$\phi'_{b,k} = 30 \text{ deg}$
Characteristic wall friction angle	$\delta_{b,k} = 15 \text{ deg}$
Characteristic base friction angle	$\delta_{bb,k} = 30 \text{ deg}$
Presumed bearing capacity	$P_{\text{bearing}} = 100 \text{ kN/m}^2$

Loading details

Variable surcharge load	Surcharge _Q = 10 kN/m ²
-------------------------	---

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General arrangement - sketch pressures relate to bearing check

Calculate retaining wall geometry

Base length

$$l_{base} = l_{toe} + t_{stem} = 1500 \text{ mm}$$

Moist soil height

$$h_{moist} = h_{soil} = 1500 \text{ mm}$$

Length of surcharge load

$$l_{sur} = l_{heel} = 0 \text{ mm}$$

- Distance to vertical component

$$x_{sur_v} = l_{base} - l_{heel} / 2 = 1500 \text{ mm}$$

Effective height of wall

$$h_{eff} = h_{base} + d_{cover} + h_{ret} = 1700 \text{ mm}$$

- Distance to horizontal component

$$x_{sur_h} = h_{eff} / 2 = 850 \text{ mm}$$

Area of wall stem

$$A_{stem} = h_{stem} \times t_{stem} = 0.3 \text{ m}^2$$

- Distance to vertical component

$$x_{stem} = l_{toe} + t_{stem} / 2 = 1400 \text{ mm}$$

Area of wall base

$$A_{base} = l_{base} \times t_{base} = 0.3 \text{ m}^2$$

- Distance to vertical component

$$x_{base} = l_{base} / 2 = 750 \text{ mm}$$

Using Coulomb theory

Active pressure coefficient

$$K_A = \sin(\alpha + \phi'_{r,k})^2 / (\sin(\alpha)^2 \times \sin(\alpha - \delta_{r,k}) \times [1 + \sqrt{[\sin(\phi'_{r,k} + \delta_{r,k}) \times \sin(\phi'_{r,k} - \beta) / (\sin(\alpha - \delta_{r,k}) \times \sin(\alpha + \beta))]}]) = 0.301$$

Passive pressure coefficient

$$K_P = \sin(90 - \phi'_{b,k})^2 / (\sin(90 + \delta_{b,k}) \times [1 - \sqrt{[\sin(\phi'_{b,k} + \delta_{b,k}) \times \sin(\phi'_{b,k} / (\sin(90 + \delta_{b,k}))]}]) = 4.977$$

Bearing pressure check

Vertical forces on wall

Wall stem

$$F_{stem} = A_{stem} \times \gamma_{stem} = 7.5 \text{ kN/m}$$

Wall base

$$F_{base} = A_{base} \times \gamma_{base} = 7.5 \text{ kN/m}$$

Total

$$F_{total_v} = F_{stem} + F_{base} = 15 \text{ kN/m}$$



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Horizontal forces on wall

Surcharge load

$$F_{sur_h} = K_A \times \cos(\delta_{r,k}) \times \text{Surcharge}_Q \times h_{eff} = \mathbf{4.9 \text{ kN/m}}$$

Moist retained soil

$$F_{moist_h} = K_A \times \cos(\delta_{r,k}) \times \gamma_{mr} \times h_{eff}^2 / 2 = \mathbf{7.6 \text{ kN/m}}$$

Base soil

$$F_{pass_h} = -K_P \times \cos(\delta_{b,k}) \times \gamma_b \times (d_{cover} + h_{base})^2 / 2 = \mathbf{-1.7 \text{ kN/m}}$$

Total

$$F_{total_h} = F_{sur_h} + F_{moist_h} + F_{pass_h} = \mathbf{10.8 \text{ kN/m}}$$

Moments on wall

Wall stem

$$M_{stem} = F_{stem} \times X_{stem} = \mathbf{10.5 \text{ kNm/m}}$$

Wall base

$$M_{base} = F_{base} \times X_{base} = \mathbf{5.6 \text{ kNm/m}}$$

Surcharge load

$$M_{sur} = -F_{sur_h} \times X_{sur_h} = \mathbf{-4.2 \text{ kNm/m}}$$

Moist retained soil

$$M_{moist} = -F_{moist_h} \times X_{moist_h} = \mathbf{-4.3 \text{ kNm/m}}$$

Total

$$M_{total} = M_{stem} + M_{base} + M_{sur} + M_{moist} = \mathbf{7.6 \text{ kNm/m}}$$

Check bearing pressure

Propping force

$$F_{prop_base} = F_{total_h} = \mathbf{10.8 \text{ kN/m}}$$

Distance to reaction

$$\bar{x} = M_{total} / F_{total_v} = \mathbf{508 \text{ mm}}$$

Eccentricity of reaction

$$e = \bar{x} - l_{base} / 2 = \mathbf{-242 \text{ mm}}$$

Loaded length of base

$$l_{load} = l_{base} = \mathbf{1500 \text{ mm}}$$

Bearing pressure at toe

$$q_{toe} = F_{total_v} / l_{base} \times (1 - 6 \times e / l_{base}) = \mathbf{19.7 \text{ kN/m}^2}$$

Bearing pressure at heel

$$q_{heel} = F_{total_v} / l_{base} \times (1 + 6 \times e / l_{base}) = \mathbf{0.3 \text{ kN/m}^2}$$

Factor of safety

$$FoS_{bp} = P_{bearing} / \max(q_{toe}, q_{heel}) = \mathbf{5.086}$$

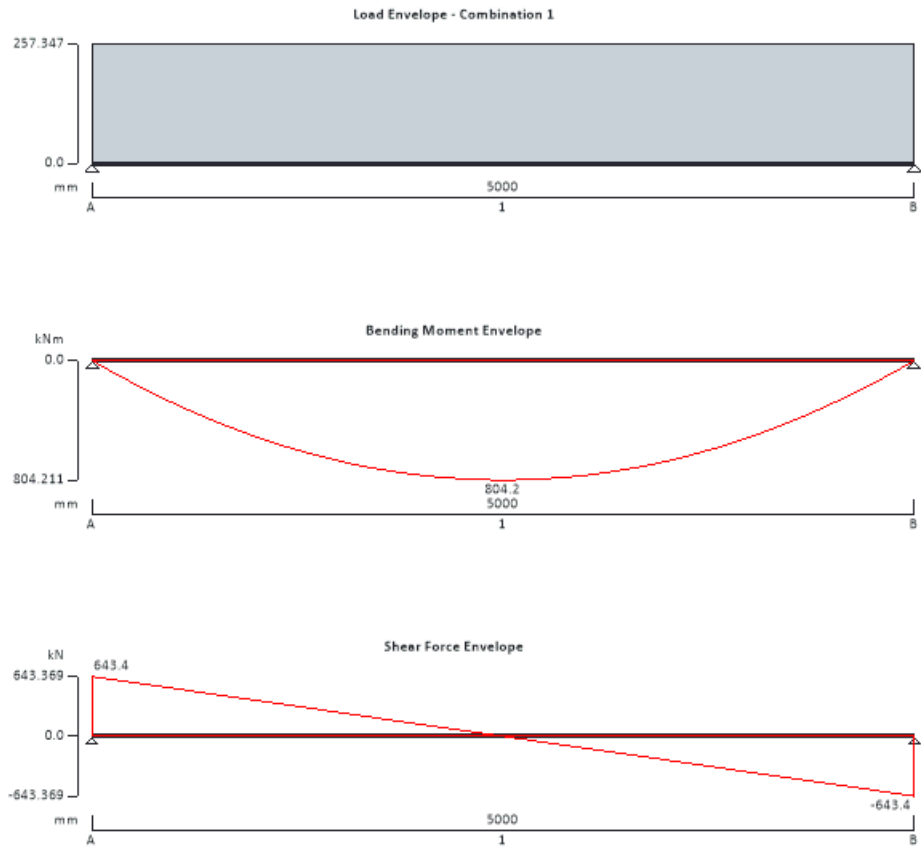
PASS - Allowable bearing pressure exceeds maximum applied bearing pressure

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STEEL BEAM ANALYSIS & DESIGN (EN1993-1-1:2005)

In accordance with EN1993-1-1:2005 incorporating Corrigenda February 2006 and April 2009 and the UK national annex

TEDDS calculation version 3.0.15



Support conditions

Support A	Vertically restrained Rotationally free
Support B	Vertically restrained Rotationally free

Applied loading

Beam loads	Permanent self weight of beam × 1 Permanent full UDL 38.4 kN/m Permanent full UDL 89.7 kN/m Variable full UDL 48.3 kN/m Variable full UDL 2.76 kN/m Permanent full UDL 4.14 kN/m
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Load combinations

Load combination 1	Support A	Permanent × 1.35 Variable × 1.50 Permanent × 1.35
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Support B

Variable $\times 1.50$
Permanent $\times 1.35$
Variable $\times 1.50$

Analysis results

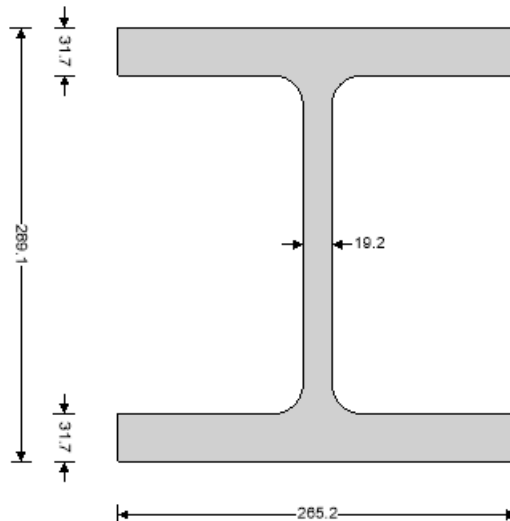
Maximum moment	$M_{\max} = 804.2 \text{ kNm}$	$M_{\min} = 0 \text{ kNm}$
Maximum shear	$V_{\max} = 643.4 \text{ kN}$	$V_{\min} = -643.4 \text{ kN}$
Deflection	$\delta_{\max} = 6.5 \text{ mm}$	$\delta_{\min} = 0 \text{ mm}$
Maximum reaction at support A	$R_{A_{\max}} = 643.4 \text{ kN}$	$R_{A_{\min}} = 643.4 \text{ kN}$
Unfactored permanent load reaction at support A	$R_{A_{\text{Permanent}}} = 334.7 \text{ kN}$	
Unfactored variable load reaction at support A	$R_{A_{\text{Variable}}} = 127.7 \text{ kN}$	
Maximum reaction at support B	$R_{B_{\max}} = 643.4 \text{ kN}$	$R_{B_{\min}} = 643.4 \text{ kN}$
Unfactored permanent load reaction at support B	$R_{B_{\text{Permanent}}} = 334.7 \text{ kN}$	
Unfactored variable load reaction at support B	$R_{B_{\text{Variable}}} = 127.7 \text{ kN}$	

Section details

Section type **UC 254x254x167 (British Steel Section Range 2022 (BS4-1))**
Steel grade **S355**

EN 10025-2:2004 - Hot rolled products of structural steels

Nominal thickness of element	$t = \max(t_f, t_w) = 31.7 \text{ mm}$
Nominal yield strength	$f_y = 345 \text{ N/mm}^2$
Nominal ultimate tensile strength	$f_u = 470 \text{ N/mm}^2$
Modulus of elasticity	$E = 210000 \text{ N/mm}^2$



Partial factors - Section 6.1

Resistance of cross-sections	$\gamma_{M0} = 1.00$
Resistance of members to instability	$\gamma_{M1} = 1.00$
Resistance of tensile members to fracture	$\gamma_{M2} = 1.10$

Lateral restraint

Span 1 has full lateral restraint

Effective length factors

Effective length factor in major axis	$K_y = 1.000$
Effective length factor in minor axis	$K_z = 1.000$

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Effective length factor for torsion

$$K_{LT,A} = 1.000$$

$$K_{LT,B} = 1.000$$

Classification of cross sections - Section 5.5

$$\varepsilon = \sqrt{[235 \text{ N/mm}^2 / f_y]} = 0.83$$

Internal compression parts subject to bending - Table 5.2 (sheet 1 of 3)

Width of section

$$c = d = 185.7 \text{ mm}$$

$$c / t_w = 11.7 \times \varepsilon \leq 72 \times \varepsilon \quad \text{Class 1}$$

Outstand flanges - Table 5.2 (sheet 2 of 3)

Width of section

$$c = (b - t_w - 2 \times r) / 2 = 103 \text{ mm}$$

$$c / t_f = 3.9 \times \varepsilon \leq 9 \times \varepsilon \quad \text{Class 1}$$

Section is class 1

Check shear - Section 6.2.6

Height of web

$$h_w = h - 2 \times t_f = 225.7 \text{ mm}$$

Shear area factor

$$\eta = 1.000$$

$$h_w / t_w < 72 \times \varepsilon / \eta$$

Shear buckling resistance can be ignored

Design shear force

$$V_{Ed} = \max(\text{abs}(V_{\max}), \text{abs}(V_{\min})) = 643.4 \text{ kN}$$

Shear area - cl 6.2.6(3)

$$A_v = \max(A - 2 \times b \times t_f + (t_w + 2 \times r) \times t_f, \eta \times h_w \times t_w) = 6553 \text{ mm}^2$$

Design shear resistance - cl 6.2.6(2)

$$V_{c,Rd} = V_{pl,Rd} = A_v \times (f_y / \sqrt{3}) / \gamma_{M0} = 1305.4 \text{ kN}$$

PASS - Design shear resistance exceeds design shear force

Check bending moment major (y-y) axis - Section 6.2.5

Design bending moment

$$M_{Ed} = \max(\text{abs}(M_{s1_max}), \text{abs}(M_{s1_min})) = 804.2 \text{ kNm}$$

Design bending resistance moment - eq 6.13

$$M_{c,Rd} = M_{pl,Rd} = W_{pl,y} \times f_y / \gamma_{M0} = 843.7 \text{ kNm}$$

PASS - Design bending resistance moment exceeds design bending moment

Check vertical deflection - Section 7.2.1

Consider deflection due to variable loads

Limiting deflection

$$\delta_{lim} = L_{s1} / 360 = 13.9 \text{ mm}$$

Maximum deflection span 1

$$\delta = \max(\text{abs}(\delta_{\max}), \text{abs}(\delta_{\min})) = 6.545 \text{ mm}$$

PASS - Maximum deflection does not exceed deflection limit

Appendix C

Basement Impact Assessment Report



Elm Court For Red Cannon Developments



BASEMENT IMPACT ASSESSMENT REPORT December 2025

Prepared by Cube/Earth Water GCE



EARTH WATER

Geotechnical Consulting Engineers

Client Name: Red Cannon Developments
Project Name: Elm Court, Cholmeley Park, London, N6 5EJ
Project No: 15734
Document No: 15734-EWGCE-01-XX-BIA-R-001

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with Cube/Earth Water GCE internal management procedures.

Issue	Date	Prepared by:	Checked by:	Approved by:
1	05/12/2025	AR/JS	AK/HR	AP
2	19/12/2025	AR/JS	AK/HR	AP

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Comments:

Issue 1 – First issue

Disclaimer

This report has been prepared by Cube/Earth Water GCE, with all reasonable skill, care, and diligence within the terms of the Contract (with the client), incorporation of our General Terms and Condition of Business and taking account of the resources developed to us by agreement with the Client.

We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above.

This report is confidential to the Client, and we accept no responsibility of whatsoever nature to any other third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at its own risk.

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- A. Proposed Development Drawings
- B. BGS Archive Borehole Logs

Non-Technical Summary

Cube/Earth Water GCE has been instructed by the Client, Red Cannon Developments, to prepare a Basement Impact Assessment (BIA), for Elm Court, Cholmeley Park, London. The postcode for the site is N6 5EJ.

The site sits within the administrative boundaries of the London Borough of Harringay (LBH) and is positioned within the Highgate area. The site is approximately square in plan and occupies an area of approximately 0.047 hectares. The centre of the site is located at National Grid Reference TQ 28836 87476.

The proposed development will comprise a single basement and five storeys above ground. The proposed foundation solution at the site is anticipated to be shallow or deep foundation, subject to a forthcoming detailed geotechnical design based on site-specific ground investigation on site.

The BGS boreholes indicate that Made Ground in the vicinity of the site has a variable thickness of up to 1m below ground level (bgl), comprising brick pieces, silty sandy, gravels etc. It is difficult to rely on this stratum as a founding material, due to its inherent unexpected nature. Sand and gravels were encountered below Made Ground, underlain by Claygate Member and London Clay within the BGS borehole log available within the close proximity of the site.

The site does not lie within an area of adopted greenbelt and there are no areas of adopted greenbelt recorded within the close proximity of the site boundary. There are no areas of Ancient Woodland, Sites of Special Scientific Interest (SSSI), Local Nature Reserves, National Parks, Areas of Outstanding Natural Beauty (AONB) or other sensitive land uses located in close proximity of the site.

Liaison with the utilities owners and other infrastructure stakeholders will be undertaken at detailed design stage to confirm locations of their potential assets. The requirements of any further assessments will then be discussed with the appropriate stakeholder.

The proposed development comprises a single storey basement with a finished floor at approximately 2.75m below existing ground level. The basement development will result in the removal of Made Ground, and Sand and Gravel layer. The formation of the basement and its associated foundations would not likely be located within groundwater. However, if any groundwater is encountered, it is expected to flow around the basement within the Made Ground. Therefore, the proposed development will have limited or no impact on the hydrogeology of the area and subsequent effect on the structural stability of nearby buildings and infrastructure.

The design of the basement and associated structures will be of high quality and in keeping with the character and appearance of the developments in the surrounding area. Details of the proposed development design will be submitted as part of the planning application. The details will be further developed during detailed design stage.

The proposed basement will not impact any existing trees. The basement will not remove any soft landscaping during its construction or decrease the amount of soft landscaping in the surrounding area.

The site falls within a Flood Zone 1 (low risk with less than a 0.1% risk of flooding) and is therefore not considered to be at risk of extreme flooding from rivers or seas without defences.

The planning application for the proposed development will incorporate a Sustainable Design, setting out the measures during the construction of and within the completed development to promote a sustainable design. Active and passive design efficiency measures under the 'Be Lean' stage of the energy hierarchy will be explored to reduce the development's energy consumption and associated CO₂ emissions.

There are a number of listed buildings present in the close proximity of the proposed development. The impact of the proposed basement construction on the adjacent/nearby buildings will be assessed and approvals will be secured if required. The assessment will be based principally on movement, vibration

and other non-structural issues such as noise limitation.

Structural solutions of basement construction have been investigated according to site information available at present. Preliminary information about ground conditions and related design parameters has been determined based on the available data. Further investigations will be undertaken in the next stage of design to obtain better resolution within the ground model and reduce uncertainty and hence conservatism related to statistical significance or coverage.

This report presents the basement impact assessment, which records the process undertaken to demonstrate the feasibility of the proposed subterranean development. The basement construction at the site is unlikely to impact on surrounding built and natural environment. As noted, the design philosophy and procedures set out will form the basis for the analysis and assessment works that may subsequently be required to secure the necessary third-party approvals prior to commencing works on site.

1. Introduction

1.1 Objectives

Cube/Earth Water GCE has been instructed by the Client, Red Cannon Developments, to prepare a Basement Impact Assessment (BIA), for Elm Court, Cholmeley Park, London. The postcode for the site is N6 5EJ.

The objective of this report is to outline the potential impacts of the basement of the proposed development on the surrounding environment. The site is located within the London Borough of Haringey (LBH). The LBH guidance documents include guidance on the basement impact assessment required for the planning. The report addresses the requirements laid down by the London Council (LC).

This report provides a summary of the work undertaken to date in assessing the impact of the proposed basement within the development scheme. The report also outlines the work that is required in order to achieve the necessary consents and the design methodology to be adopted in completing this work.

This information has been provided to be read with and form part of the planning application and responds to any requirements outlined by the LBH. The following relevant documents from the LBH have been reviewed.

- Planning application process
- Supplementary Planning Documents

Detailed construction drawings and supporting calculations will be prepared during subsequent design stages as information relating to the ground conditions is established, allowing the design to be finalised. Method statements for the excavations, construction sequence and temporary works will be developed by the Contractor, however design proposals with regards to sequencing have been outlined for information.

1.2 Site Location

The site sits within the administrative boundaries of the LBH and is positioned within the Highgate area. The site is approximately square in plan and occupies an area of approximately 0.047 hectares. The centre of the site is located at National Grid Reference TQ 28836 87476. The site location is shown in Figure 1 which is an aerial view of the existing building on site.



Figure 1: Site Location Plan (Courtesy of Google Maps)

1.3 Site Description

At the time of writing (December 2025), the site area is 0.047ha and comprises a four-storey dwelling without any basement.

1.4 Proposed Development

The proposed development will comprise a single basement and five storeys above ground.

The proposed redevelopment scheme is outlined in detail in the drawings presented in Appendix A.

The proposed foundation solution at the site is anticipated to be shallow or deep foundation, subject to a forthcoming detailed geotechnical design based on site-specific ground investigation on site.

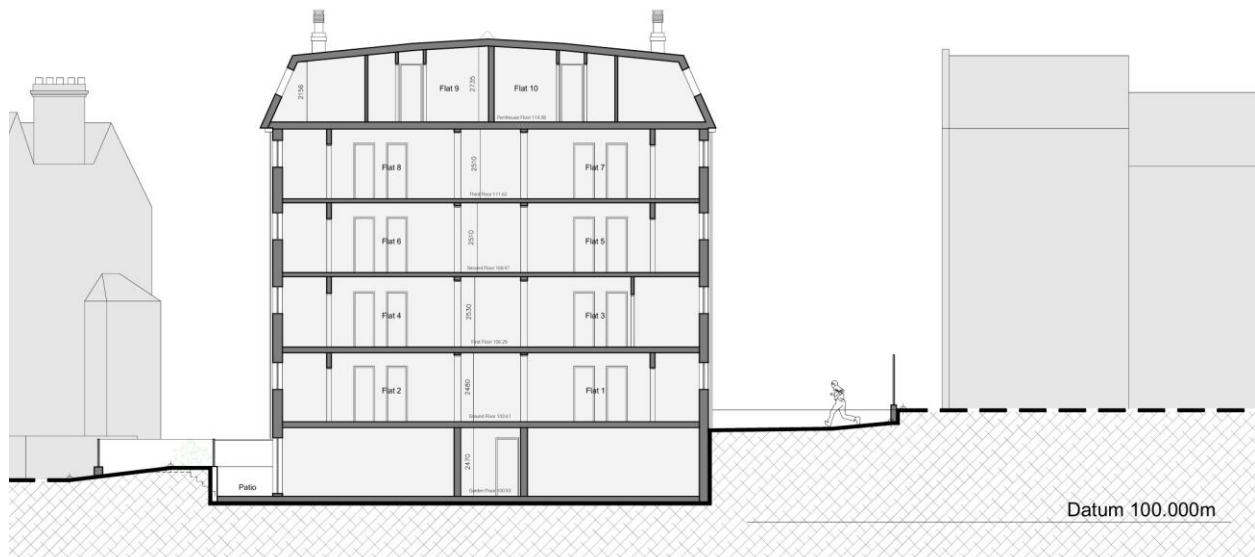


Figure 2: Proposed Elevations (Taken from Architect's proposed elevation drawing)

1.5 Limitations

This report is based upon information obtained from third party sources, together with observations from the site walkover. The third-party data has been accepted at face value and has not been independently verified. Earth Water GCE/Cube can therefore give no warranty, representation, or assurance as to the accuracy or completeness of such information.

This report has been prepared for the sole internal use and reliance of the Client, Red Cannon Developments, and shall not be relied upon by other parties without the express written authority of Cube/Earth Water GCEs. If an unauthorised third party comes into possession of this report, then they rely on it at their own risk.

2. Site Geology and Ground Conditions

2.1 Geology

Information on the underlying geology at the site has been obtained from the British Geological Survey (BGS) Sheet 256 for North London (scale: 1:50,000 dated 2006), the BGS Geological Map Viewer and the available information to supplement this study.

Within older urban areas, much of the surface has been partially or wholly disturbed by human activity and is known as Made Ground. The BGS boreholes indicate that Made Ground in the vicinity of the site has a variable thickness of up to 1m below ground level (bgl), comprising brick pieces, silty sandy, gravels etc. It is difficult to rely on this stratum as a founding material, due to its inherent unexpected nature.

Bagshot formation encountered below Made Ground, underlain by Claygate Member/London Clay within the BGS borehole log available within the close proximity of the site. The borehole log is attached in Appendix B of this report.

2.2 Hydrogeology and Hydrology

Within the London area generally Clay effectively divides London hydrology into two units: upper aquifer primarily formed by Pleistocene terrace deposits; and lower aquifer, primarily formed by Upper Chalk often in combination with the overlying Thanet Sands. The Environment Agency classifies aquifers as follows:

- A Principal Aquifer is defined as layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.
- A Secondary A Aquifer is defined as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
- A Secondary B Aquifer is defined as predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.
- A Secondary Undifferentiated (U) Aquifer is defined as having been assigned in cases where it has not been possible to attribute either category A or B to a rock type.
- Unproductive Strata have negligible permeability and are generally regarded as not containing groundwater in exploitable quantities. In these strata, the groundwater flows imperceptibly and requires consideration for the risk of slow degrading pollutants.

London Clay is classified as unproductive and should provide a natural barrier to prevent contaminants migrating to the deep Thanet Sands and Chalk Aquifers. A summary of the hydrogeological properties of the main geological units that are anticipated to underlie the site is shown in Table 1.

SOURCE PROTECTION ZONE

The EA have defined Source Protection Zones (SPZ's) for groundwater sources such as wells, boreholes and springs used for public drinking water supply.

The zones are defined by the EA as outlined below. The SPZ + is the distance travelled by groundwater from any point below the water table to the abstraction in 50 days for a particular area. It has a minimum radius of 50m.

The SPZ & is the distance travelled by groundwater from any point below the water table to the abstraction

in 400 days for a particular area. It has a minimum radius of 250m.

The site is not likely to be associated with a groundwater abstraction from the Chalk Aquifer.

GROUNDWATER

The cessation of abstraction from the chalk for industrial purposes after the mid-1960s caused groundwater levels to rise throughout the London basin. GARDIT (General Aquifer Research, Development and Investigation Team) was developed in order to minimise and ultimately halt the groundwater rise. The Environment Agency's view is that rising groundwater no longer poses a problem and underground infrastructure is no longer threatened by inundation.

Groundwater levels are subjected to variations caused by changes in the local drainage conditions and by seasonal effects. Typically, a perched water table sits on top of the relatively impermeable London Clay. Perched water levels can vary seasonally and are prone to rapid changes through heavy rain events on permeable surfaces, accidental events (such as burst water mains) and the introduction of new underground construction causing blockages within the path of natural perched water flow. Groundwater was observed within the BGS borehole log at approximately 3m bgl.

The groundwater conditions can be confirmed after site-specific ground investigations will be undertaken at detailed design stage.

Table 1: Summary of Environment Agency classification and anticipated aquifer

Strata	Hydrological Significance	Anticipated Aquifer Potential
Made Ground	Variable material that may contain some perched water	Variable
Bagshot Formation	Has potential to transmit significant quantities of water. Due to the underlying impermeable clay, it is likely to contain perched groundwater. This stratum is unlikely to be present on site.	Secondary (A)
London Clay	The London Clay is an aquitard and therefore will not contain significantly large quantities of groundwater.	Unproductive Stratum
Lambeth Group	The Lambeth Group is unlikely to contain significantly large quantities of groundwater, however the lower part of the stratum where the material has less clay content may be in hydraulic continuity with the lower layers	Unproductive Stratum
Thanet Sands	This stratum is highly permeable and is often in hydraulic continuity with the underlying Chalk	Principal Aquifer
Chalk	Chalk stratum contains large quantities of water and is often used for water abstraction	Principal Aquifer

2.3 Ground Stability

The potential ground stability hazards associated with the geology at the site have been summarised in Table 2.

Table 2: Ground Stability Risks

Ground Stability Issue	Risk Level
Collapsible Ground	Very Low
Compressible Ground	Medium

Ground Dissolution	Low
Landslide Ground Instability	Very Low
Running Sand	No hazard
Shrinking or Swelling Clay	Medium

2.4 Sensitive Land Uses

The site does not lie within an area of adopted greenbelt and there are no areas of adopted greenbelt recorded within the close proximity of the site boundary.

There are no areas of Ancient Woodland, Sites of Special Scientific Interest (SSSI), Local Nature Reserves, National Parks, Areas of Outstanding Natural Beauty (AONB) or other sensitive land uses located in close proximity of the site.

3. Basement Impact

3.1 Ground Investigation for Design

The use of the historical borehole archives, the British Geological Survey Maps along with the local experience in the area have been considered sufficient at this stage to suitably characterise likely ground conditions on-site and inform this assessment. Further intrusive ground investigations on-site will be undertaken following grant of planning permission to inform the detailed design.

3.2 Extent of Basement within Development Site

The proposed development will comprise a new building with a single level basement below part of its footprint. The development will cover the entirety of the site whereas, the proposed basement covers the majority of the proposed development's footprint. The location of the proposed basement is presented in Figure 3.



Figure 3: Proposed Basement Layout under Building Footprint (extract from Architect's drawing)

The basement will be constructed in such a manner as to minimise the impact construction will have on buildings and infrastructure in the immediate surrounding area.

The Construction Management Plan (CMP) will be developed during subsequent stages of design and planning of the works following the appointment of a main contractor, and will include amongst other items detailed consideration of:

- Noise and vibration
- Dust
- Visual impact
- Obstruction

- Bringing excavated spoil up to awaiting skips / vehicles
- Transporting the spoil away from site, using local roads
- Delivery of construction material to site
- Movement and vibration monitoring to be installed, and baseline readings taken over a period (to be agreed). All subsequent stages are to be undertaken with regular monitoring continuing.

3.3 Asset Protection

Liaison with the utilities owners and other stakeholders will be undertaken at detailed design stage to confirm locations of their potential assets. The requirements of any further assessments will then be discussed with appropriate stakeholder.

3.4 Impact on Groundwater

The proposed development comprises a single storey basement with a finished floor at approximately 2.75m below existing ground level.

The basement development will result in the removal of most of Made Ground. The formation of the basement and its associated foundations may not likely be located within groundwater. However, if any groundwater is encountered, it is expected to flow around the basement within the Made Ground/Sand and gravel layer. Therefore, the proposed development will have limited or no impact on the hydrogeology of the area and subsequent effect on the structural stability of nearby buildings and infrastructure.

3.5 Character and Appearance

The design of the basement and associated structures will be of high quality and in keeping with the character and appearance of the developments in the surrounding area. Details of the proposed development design will be submitted as part of the planning application. The details will be further developed during detailed design stage.

3.6 Impact on Trees

The proposed basement will not impact any existing trees. There are no known overriding arboricultural constraints which would prevent the proposed development from going ahead, subject to the protection measures and construction methodologies specified within this report being correctly implemented.

3.7 Landscaping, Biodiversity and Green Infrastructure

The proposed basement construction will not result in the loss of green infrastructure.

3.8 Flood Risk

The Environment Agency's Flood Map for Planning indicates that the site is located entirely in Flood Zone 1. Figure 4 shows the flood map for the proposed development area.

The site falls within a Flood Zone 1 (low risk with less than a 0.1% risk of flooding) and is therefore not considered to be at risk of extreme flooding from rivers or seas without defences. There are no watercourses within the site vicinity and therefore, the risk of flooding from these sources is considered to be low. The site is not recorded as benefitting from flood defences, and there are no flood water storage areas recorded within the site vicinity.

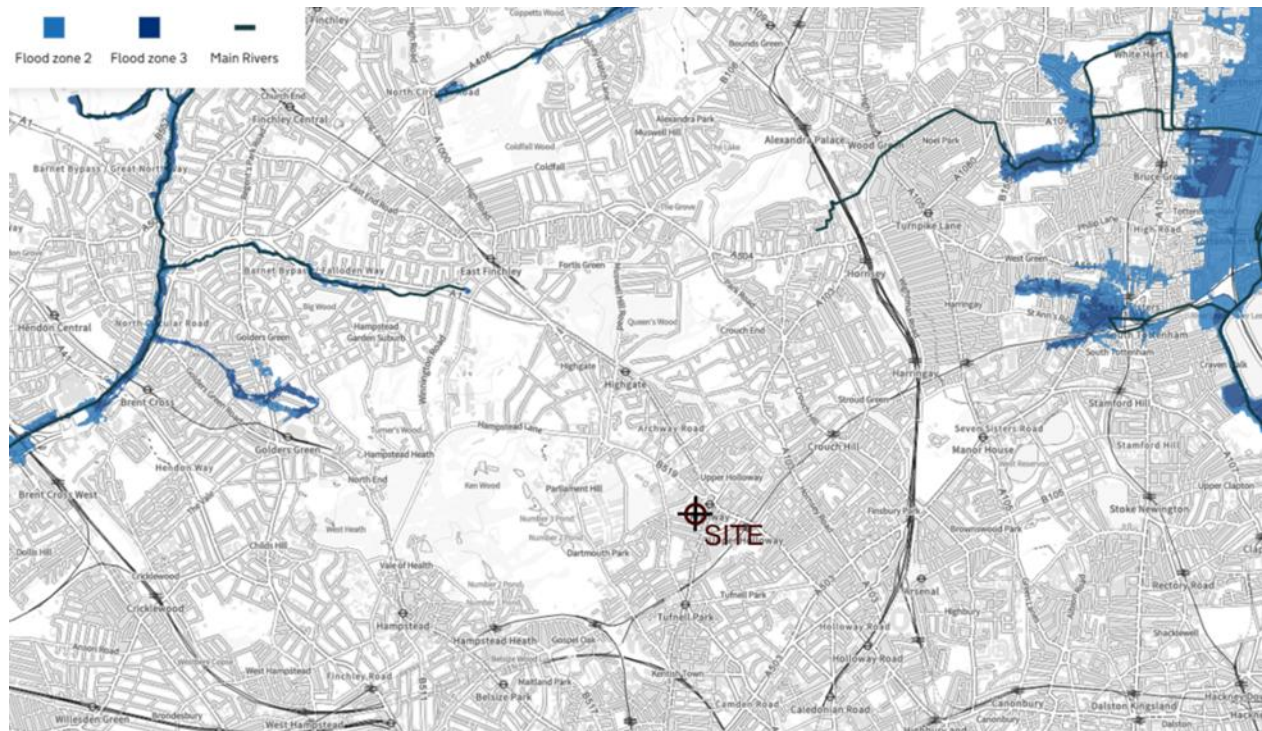


Figure 4: Flood Map for Proposed Development (extract EA flood map for planning)

3.9 Sustainable Design and Quality

The development will make best use of the site by maximising its efficiency through carefully considered layout and design and bringing up to date an ageing building. The new extensions will be built to modern standards, replacing old, thermally inefficient extensions.

3.10 Basement Development in Conservation Area

The site lies within the LBH's conservation area however, the site is outside the Archaeological Priority Area (APA).

The proposed development will not harm any historic assets, and any extension is subservient and in keeping. It will not affect the street scene of the Conservation area and should be allowed to provide better homes in the borough.

The APA map is presented in Figure 5.



Figure 5: LBH Archaeological Priority Area (extract from LBH maps)

3.11 Listed Buildings and Party Wall Approvals

The map showing the proposed development area and the presence of listed buildings in the vicinity of the site is shown in Figure 6. The map shows that there are no listed buildings within the close proximity of the proposed development site.

The impact of the proposed basement construction on the adjacent/nearby buildings will be assessed, and approvals will be secured if required. The assessment will be based principally on movement, vibration and other non-structural issues such as noise limitation.

A package of relevant drawings, calculations and reports shall be prepared for review by the third parties. Assumed temporary works designs shall be prepared prior to the Contractor completing the final design.

The ground movements from loading and unloading stages will be combined with those resulting from the retention system analysis as appropriate in order to develop predicted vertical and lateral ground movement contours. These movements will be used to assess the impact on the adjacent buildings. It is proposed to use the classification of visible damage to walls scheme as outlined in CIRIA C760 with reference to Burland et al 1977, Boscardin and Cording 1989. Subject to the approval relevant building control requirements, Damage Category 1 (Very Slight) shall be considered acceptable. Vibrations limits shall be defined in accordance with BS ISO 4866:2010, which addresses the recommended vibration limits for buildings. Reference will also be made to the related CIRIA Technical Note 142 Ground-borne vibrations arising from piling, in particular to chapter 5.

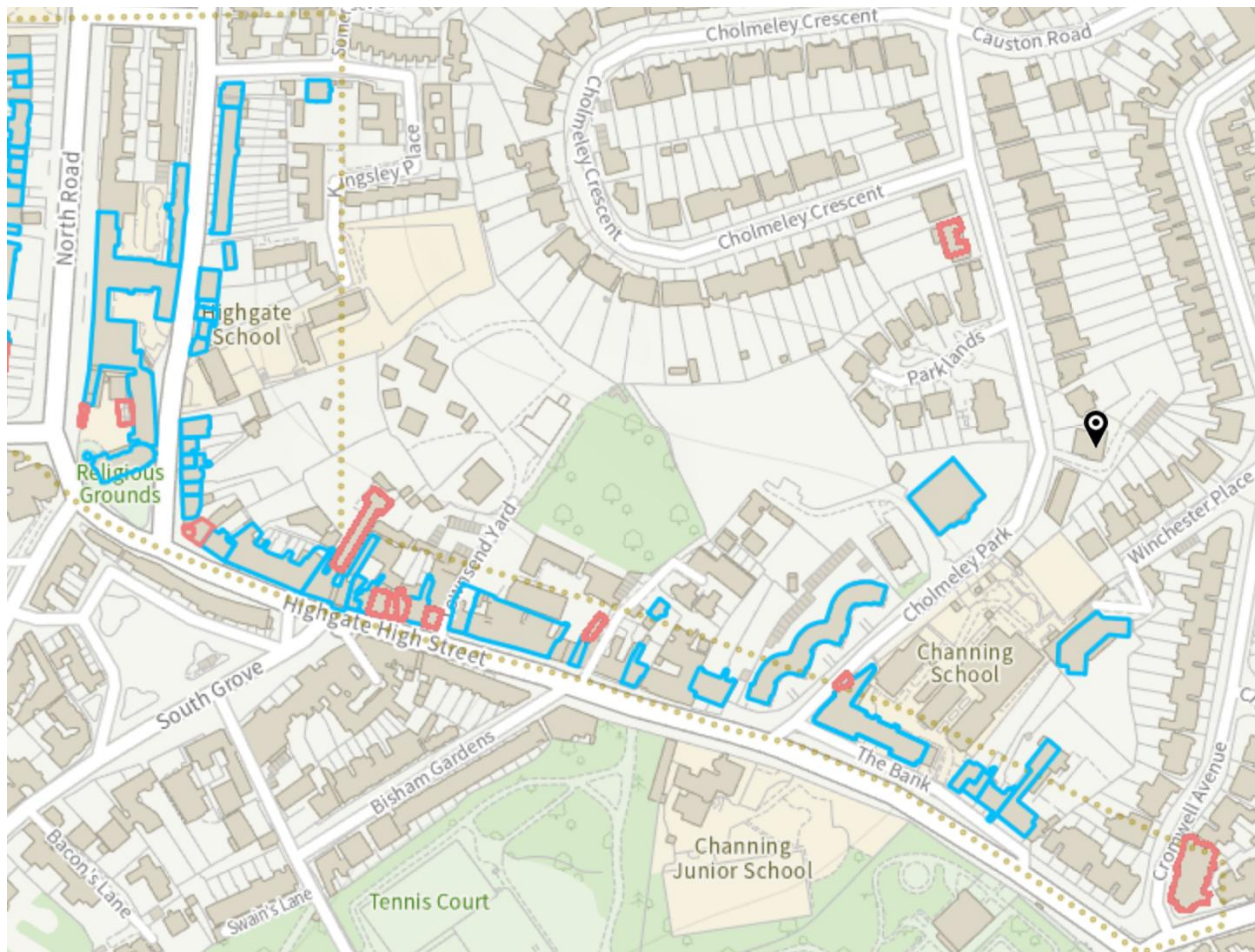


Figure 6: Listed Buildings Close to Proposed Development (extract from LBH maps)

4. Basement Construction

Structural solutions of basement construction have been investigated according to site information available at present. Preliminary information about ground conditions and related design parameters has been determined based on the available data. Further investigations will be undertaken in the next stage of design to obtain better resolution within the ground model and reduce uncertainty and hence conservatism related to statistical significance or coverage.

The typical depth of excavation beneath the existing ground level will be approximately 3.20m in the proposed single-level basement areas with a finished floor level to be at 2.75m bgl.

The following outline construction sequence has been proposed:

1. Controlled External Level Reduction

- Reduce external ground levels in controlled stages around the building perimeter.
- Excavation to be limited to shallow lifts and taken down to approximately 250mm above the proposed basement FFL.
- Install temporary shoring and ground support as excavation progresses.

2. Perimeter Underpinning – Hit-and-Miss

- Excavate 1m long underpin pits externally in a hit-and-miss pattern.
- Maintain safe working depth.
- Install temporary trench supports and façade bracing where required.
- Cast mass concrete underpins to a minimum of 150mm below proposed basement slab soffit.
- Dry-pack to the underside of existing walls after curing.
- Allow underpins to achieve specified strength before proceeding to adjacent sections.

3. Trench-In Basement Excavation from Outside

- Form a deep access trench from one side or rear of the property to full basement formation level.
- Progressively excavate beneath the existing structure from the external trench, working inward under controlled conditions.
- Maintain temporary propping and shoring to support the underside of the existing structure as excavation advances.
- Remove all spoil externally via the trench access.
- Repeat Step 3 for the required internal underpins.

4. Final Excavation to Slab Formation Level

- Complete excavation across the full basement footprint to the final slab formation level.
- Trim formation and prepare subgrade.
- Review monitoring data prior to proceeding.

5. Formation Preparation and Basement Wall & Slab Construction

- Prepare formation and install blinding concrete.
- Install sump chamber, drainage routes, and below-ground services.
- Complete waterproofing as per the waterproofing strategy.
- Cast reinforced concrete wall and slab to structural drawings.
- Form any required internal basement beams, columns, and walls elements.
- Ensure lateral restraint is achieved before removing temporary supports.

6. External Backfilling and Reinstatement

- Apply external waterproofing to basement walls as per the waterproofing strategy.
- Install drainage blankets or perimeter drains if required.
- Backfill with controlled material.
- Reinstatement paving, landscaping, and external drainage routes.

7. Final Works

- Install required ventilation, pumps, and MEP services.
- Remove any temporary access ramps, trench supports, and working platforms.
- Remove all temporary fencing, access routes, and protection measures.
- Remove monitoring equipment following sign-off.
- Conduct final structural inspection.

5. Design Standards

5.1 Stage 1

A preliminary assessment of the structure and its intended use, its apparent physical condition and its strength, including simple calculations where necessary. If this check is not satisfied immediately, it may be required to undertake further investigations. For this stage of assessment, it is assumed that checking the model using a working stress method will be adequate. This will generally be undertaken according to the code current at the time of construction.

5.2 Stage 2

If the structure cannot be verified on the basis of a Stage 1 analysis, a more detailed assessment is to be carried out checking the strength, capacity and deflections of the structure. Conventional limit state calculations are to be used during these checks. Necessary allowances for the material quality and manufacturing defects shall be made, especially where these vary from the assumptions inherent within the formulation of the codes of practice (e.g. buckling curves for steel elements). Loadings may be assessed in accordance with CP3 (1952). If these checks are not satisfied, then a further, more in-depth analysis is required.

5.3 Stage 3

This final most intensive analysis should be based on the best knowledge of loads and material strengths that can practically be obtained. This more precise knowledge may justify a reduction in the factors of safety used in the calculations.

Since March 2010 Eurocodes and their associated National Annexes (providing country-specific design parameters), have superseded British Standards as the principal design codes for structural elements in the United Kingdom. Reference will be made to British Standards and other technical guidance where topics are not adequately addressed in the Eurocodes. It is of note that while no longer current, the superseded British Standards generally remain cited within UK Building Regulations.

The following codes and design guides will be used principally in preparing the structural design for the project. For the sake of brevity National Annexes are not listed

Eurocode 0: Basis of structural design

BS EN 1990:2002.

Eurocode 1: Actions on structures

BS EN 1991-1-1:2002, BS EN 1991-1-2:2002, BS EN 1991-1-3:2003, BS EN 1991-1-4:2005, BS EN 1991-1-2:2003, BS EN 1991-1-6:2005 and BS EN 1991-1-7:2006, (BS EN 1991-3:2006).

Eurocode 2: Design of concrete structures

BS EN 1992-1-1:2004 and BS EN 1992-1-2:2004, (BS EN 1992-3:2006).

Eurocode 3: Design of steel structures

BS EN 1993-1-1:2005, BS EN 1993-1-3:2006, BS EN 1993-1-4:2006, BS EN 1993-1-5:2006, BS EN 1993-1-7:2007, BS EN 1993-1-8:2005, BS EN 1993-1-10:2005, BS EN 1993-1-11:2006, BS EN 1993-5:2007 and BS EN 1993-6:2007.

Eurocode 6: Design of masonry structures

BS EN 1996-1-1:2005, BS EN 1996-1-2:2005, BS EN 1996-1-2:2006 and BS EN 1996-1-3:2006.

Eurocode 7: Geotechnical design

BS EN 1997-1:2004, BS EN 1997-2:2007.

BS8102 2009 Protection of below ground structures against water from the ground.

CIRIA C760 Guidance on embedded retaining walls design.

Building Regulations: all relevant sections, including Approved documents A & B concerning structure and fire safety.

6. Closing Remarks

This report presents the basement impact assessment, which records the process undertaken to demonstrate the feasibility of the proposed subterranean development. The basement construction at the site is unlikely to impact on surrounding built and natural environment. As noted, the design philosophy and procedures set out will form the basis for the analysis and assessment works that may subsequently be required to secure the necessary third-party approvals prior to commencing works on site.



APPENDICES

A. Proposed Development Drawings



GENERAL NOTES

- All dimensions noted are in mm.
- All dimensions to be checked and verified by the contractor before commencement of any item of work on site.
- Architectural drawings must always be read in conjunction with all other relevant services drawings and contract documents. Any discrepancies should be reported to the architect and the engineer for clarification and verification.

REVISION

Rev.	Description	Date

0

1m

2m

3m

4m

0

5ft

10ft

N

PROJECT DETAILS

Project Name & Address

Elm Court
Cholmeley Park London N6 5EJ

DRAWING DETAILS

Drawing Title

PROPOSED GARDEN
FLOOR PLAN

Drawing No.

P.15

Rev.

Scale

1:50 at A2

Date

October 2025

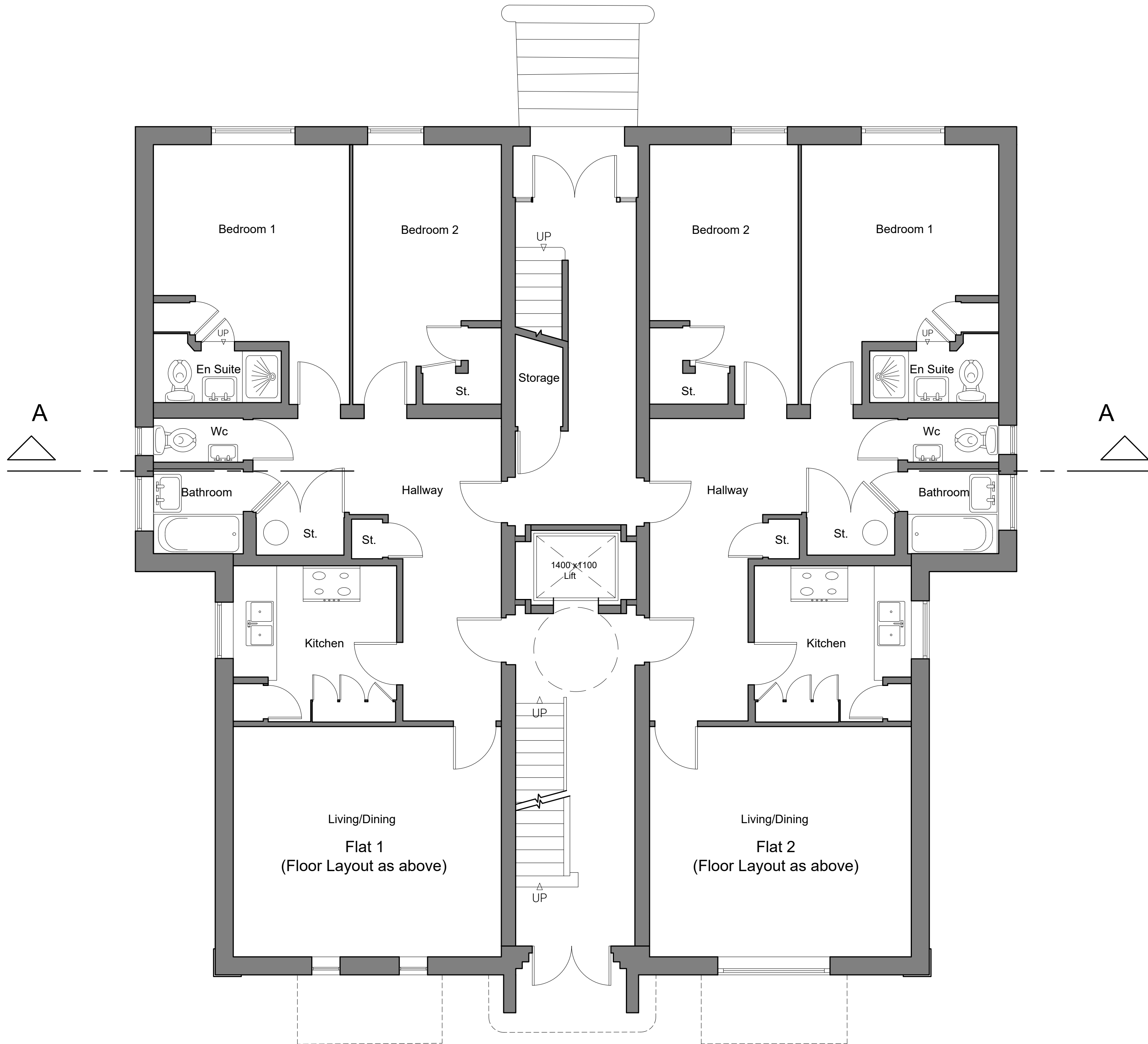
Author

Aggeliki Lymperopoulou

E: aglympero@gmail.com A: 382 Kenton Road - HA3 8DP

WORK IN PROGRESS.

architecture . design .

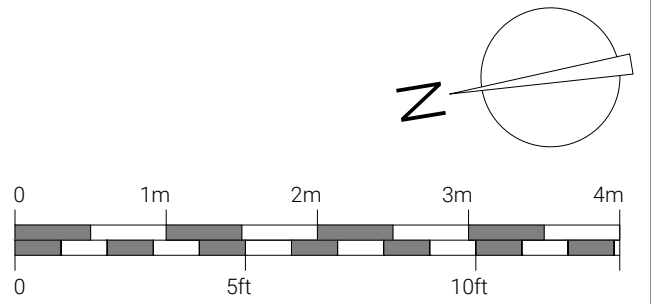


GENERAL NOTES

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REVISION

Rev.	Description	Date



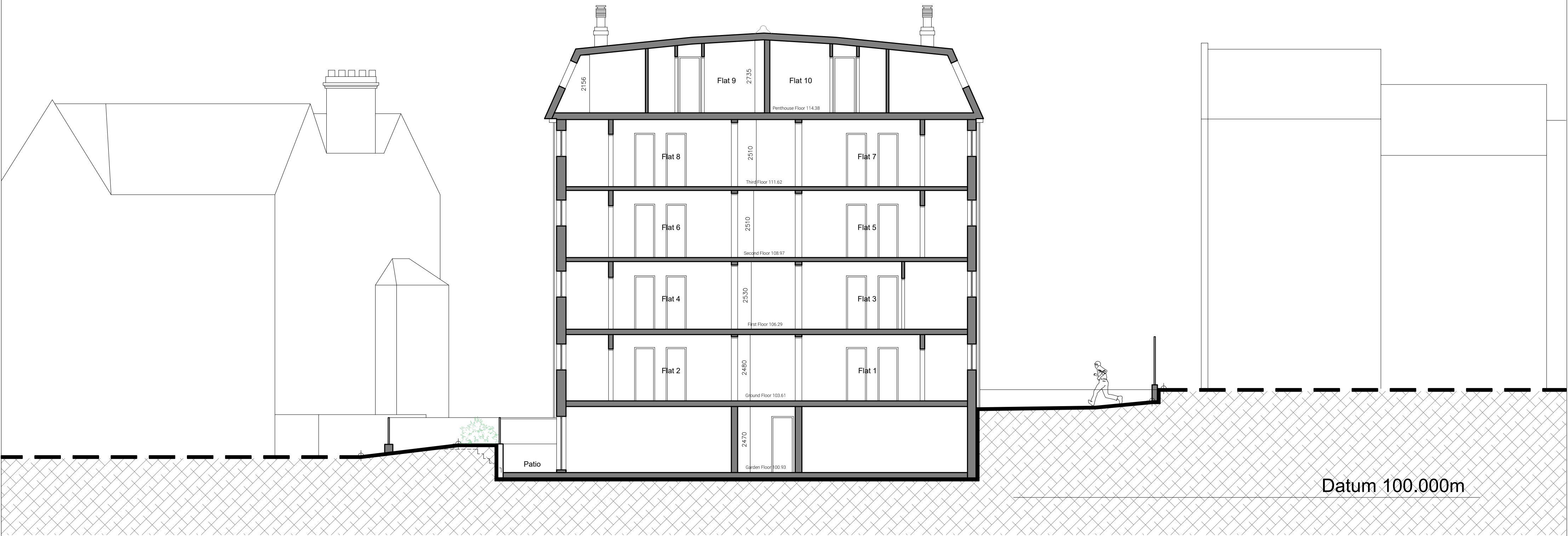
PROJECT DETAILS

Project Name & Address
Elm Court
Cholmeley Park London N6 5EJ

DRAWING DETAILS

Drawing Title	Drawing No.
PROPOSED GROUND FLOOR PLAN	P.16
	Rev.

Scale 1:50 at A2
Date October 2025
Author Aggeliki Lymperopoulou



GENERAL NOTES

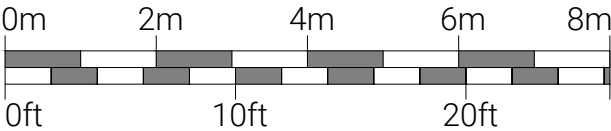
- All dimensions noted are in mm.
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REVISION

Rev.	Description	Date
A	Internal, External & Annotation Amendments	10/25

DRAWING DETAILS

Drawing Title PROPOSED SECTION A - A'	Drawing No. P.09	Scale 1:100 at A2
	Rev. A	Date June 2024
	Author Aggeliki Lymperopoulou	
Project Name & Address Elm Court Cholmeley Park London N6 5EJ		E: aglympero@gmail.com A: 382 Kenton Road - HA3 8DP
PROJECT DETAILS		 WORK IN PROGRESS. architecture . design .





GENERAL NOTES

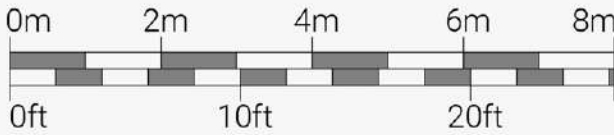
- All dimensions noted are in mm.
- All dimensions to be checked and verified by the contractor before commencement of any item of work on site.
- Architectural drawings must always be read in conjunction with all other relevant services drawings and contract documents. Any discrepancies should be reported to the architect and the engineer for clarification and verification.

REVISION

Rev.	Description	Date
A	Internal, External & Annotation Amendments	10/25

DRAWING DETAILS

Drawing Title	Drawing No.	Scale
PROPOSED FRONT ELEVATION	P.10	1:100 at A2
	Rev. A	Date June 2024
	Author Aggeliki Lymperopoulou	
PROJECT DETAILS		E: aglympo@gmail.com A: 382 Kenton Road - HA3 8DP
Project Name & Address		
Elm Court Cholmeley Park London N6 5EJ		





GENERAL NOTES

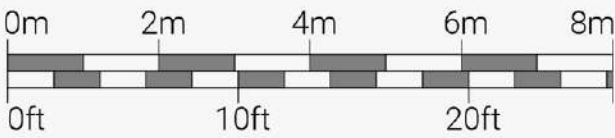
- All dimensions noted are in mm.
- All dimensions to be checked and verified by the contractor before commencement of any item of work on site.
- Architectural drawings must always be read in conjunction with all other relevant services drawings and contract documents. Any discrepancies should be reported to the architect and the engineer for clarification and verification.

REVISION

Rev.	Description	Date
A	Internal, External & Annotation Amendments	10/25

DRAWING DETAILS

Drawing Title	Drawing No.	Scale
PROPOSED REAR ELEVATION	P.11	1:100 at A2
	Rev. A	Date June 2024
	Author Aggeliki Lympieropoulou	
PROJECT DETAILS		E: aglympiero@gmail.com A: 382 Kenton Road - HA3 8DP
Project Name & Address		 WORK IN PROGRESS . architecture + design .
Elm Court Cholmeley Park London N6 5EJ		





B. BGS Archive Borehole Logs

Position	Revised Depth (m)
BH 1	1.5
TP 1	1.8
TP 2	1.3

RECORD OF BOREHOLE 1

NGR: 2880 8744

OD + 106.07m

APPENDIX
JOB NO 5351607
MADE BY p.r.
DATE MADE 29.1.96.

DAILY PROGRESS	DEPTH TO WATER	DEPTHS OF CASING	SAMPLES		LEG- END	DEPTH	REDUCED LEVEL	DESCRIPTION OF STRATA
			FROM	TO				
	m	m	m	m		m		
								GROUND LEVEL 11.34 m Datum
						0.07	11.47	MADEGROUND (Tarmacadam)
		NONE	0.30	0.60	B			MADEGROUND (soft brown clayey silty sand with bricks and gravel)
		NONE	0.75	1.20	U(102)	0.75	10.79	
13.12.85	Nil.	1.00						Medium dense yellowish brown slightly clayey silty fine SAND.
16.12.85		1.00	1.25		D			
		1.30	1.30	1.75	B	1.30	10.24	
	Nil.	1.30	1.35	1.75	C(18)			Medium dense yellowish brown slightly clayey silty fine SAND with occasional subrounded gravel.
						2.00	9.54	
	Nil.	1.90	2.00	2.45	U(102)			
			2.50		D			
			2.65		D			
	Nil.	1.90	2.65	2.95	S(10)			
			3.00		D			
			3.20	3.26	N			
								Soft to firm yellowish brown and grey mottled silty sandy CLAY with lenses of silty fine sand, some ironstained surfaces at lower levels.
	Nil.	3.20	4.00	4.45	U(102)			
14.50		3.20	4.50		D			
			3.20	4.65	D			
	Nil.	3.20	4.65	4.95	S(9)			
			5.50	5.50	5.95	U(102)		
			6.00		M			
16.00		5.50	6.00		D			
			5.50	6.15	D			
			5.50	6.15	6.45	S(16)	6.60	4.94
			6.50	6.60	D			
	Nil.	6.70	6.70	7.15	U(102)			
			7.20		D			
			7.25		D			
16.12.85	Nil.	6.70	7.35	7.65	S(16)			Firm to stiff dark greyish brown silty sandy CLAY
17.12.85	7.10							
			7.35	8.20	8.65	U(102)		
			8.70		D			
			8.95		D			
	Nil.	7.35	8.95	9.15	S(23)	9.70	2.84	
		8.70						
								Firm dark greyish brown silty sandy CLAY with bands of greenish grey clayey silty sand.
			7.35	9.70	10.15	U(102)		

REMARKS

- Water struck at 4.50m rose to 3.26m in 30 mins inflow sealed at 5.0m.
- Water struck at 6.00m rose to 5.40m in 10 mins inflow sealed at 6.7m.
- Water struck at 8.70m did not rise.
- Water struck at 10.20m rose to 9.20m in 1hr. inflow sealed at 13.30m.
- Water level observation tube installed to 5m.
Gravel filter material from 5.0m to 3.50m.
Grout (bentonite/cement) 15.00m to 5.50m and 3.50m to 1.00m.
Bentonite grout 5.50m to 3.0m.
Cementite 1.00m to G.L.
- Water level in observation tube 18.12.85 16.30hrs 4.30m.
- Ground levels relative to site datum M.W.B. stopcock cover in road opposite Cromwell Lodge given arbitrary value 10.00m.

TYPE OF BORING

Light cable percussive

DIAMETER OF BORING

200 mm. to 15.20m.

CASING TUBES

200 mm to 14.70m.

BOREHOLE 1



RECORD OF BOREHOLE

NGR : 2880 8744

OD + 106.07 m

APPENDIX
JOB NO
MADE BY
DATE MADE

DAILY PROGRESS	DEPTH TO WATER	DEPTHS OF CASING	SAMPLES			LEG- END	DEPTH	REDUCED LEVEL	DESCRIPTION OF STRATA
			DEPTH		TYPE				
			FROM	TO					
	m	m	m	m			m		GROUND LEVEL
	10.20		10.20		D		10.20	1.34	(as above)
			10.35		D				
	9.70	7.35	10.35	10.65	S(17)				
		7.35	11.20	11.65	U(102)				
			11.70		D				
			11.85		D				
	9.70	7.35	11.85	12.15	S(13)				Still dark brownish grey very silty sandy CLAY with numerous lenses of silty fine sand.
		7.35	12.70	13.15	U(102)				
			13.20		D				
			13.35		D				
	10.00	7.35	13.35	13.65	S(22)				
			13.30	14.20	U(102)		14.20	-2.66	
			14.70		D				
			14.85		D				Still dark grey very silty sandy CLAY
	Nil.	13.30	14.85	15.15	S(24)				
17.12.95	14.70	13.30					15.20	-3.66	
18.12.85	9.20	13.30							Bottom of borehole.

REMARKS

TYPE OF BORING

DIAMETER OF BORING

CASING TUBES

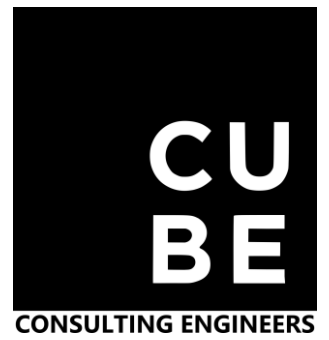
BOREHOLE



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