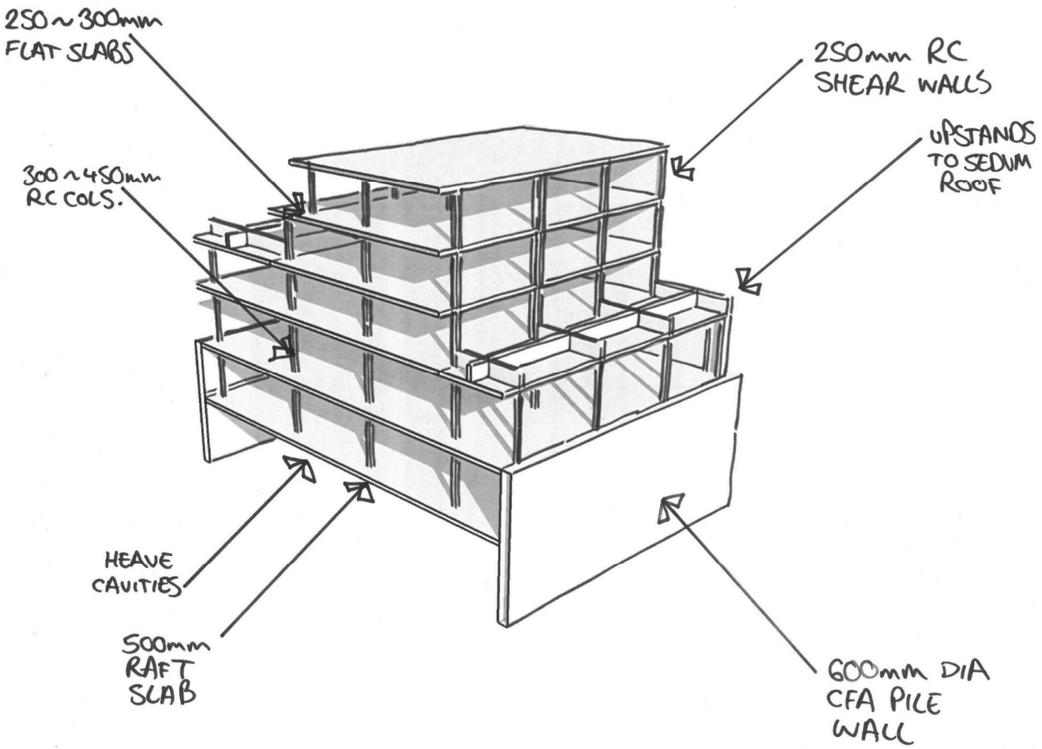
7 Proposed Structure

7.1 Overview

The proposed scheme involves the demolition of the existing building and internal foundations with the exception of the south party wall which will need to be retained. Once this is complete the retaining walls will be constructed and the basement excavated.

Refer to Appendix A for further details of the proposed structure.



Concept Perspective Illustration of Proposed Structure with Cut

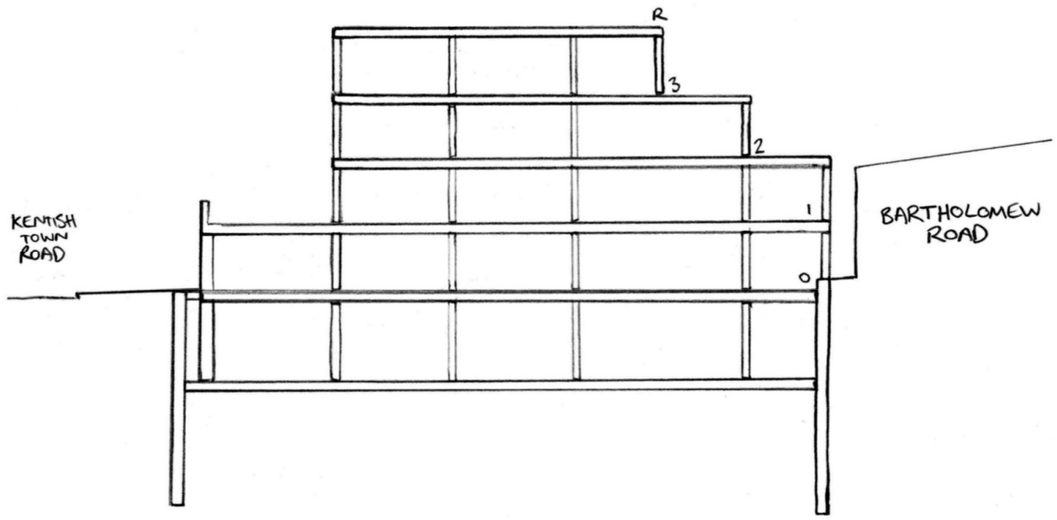
7.2 Superstructure

The proposed superstructure will be an insitu reinforced concrete flat slab frame with slab depths ranging from 250mm to 300mm built in the conventional sequence of works.

Transfer slabs will be utilised to account for irregular alignments of support positions which become more regular as the forces approach the basement raft/spread footing.

The development has a proposed average load of 15kN/m2 per suspended floor, and 25kN/m2 for the basement raft/spread footing. This will lead to an anticipated total structural weight of between 60kN/m2 and 110kN/m2.

The ground floor slab will act as a rigid diaphragm to restrain the top of the retaining walls and transfer lateral earth pressures from each retaining wall to the opposing side. Where lightwells are required at this level, props will be required to ensure the retaining walls are sufficiently stiff to prevent appreciable movement.



Proposed Section X-X

7.3 Substructure

7.3.1 Assumptions

The following assumptions have been made during the design of the substructure of the building:

- The site investigation data obtained and collated by GEA Ltd in Appendix E is representative of the ground conditions beneath the footprint of the existing building.
- The basement level will be within the London Clay
- The formation level of the main basement will be below the water table
- The basement will be Class 3 in accordance with BS8102
- Final temporary works design will be finalised by the contractor

7.3.2 Basement Raft Slab or Spread Footing

Given the ground conditions, shape and form of the building it is proposed to found the building on a raft slab, which will be tied into the piled perimeter walls. At this stage it is envisaged this will be in the order of 500mm thick. As there is a risk of heave in the ground it is possible to include heave cavities in appropriate locations within the raft slab, or found the building on spread footings which is unified by a suspended slab as recommended within the GEA report (Appendix E). The exact design of the ground bearing element will be further developed during the detailed stage.

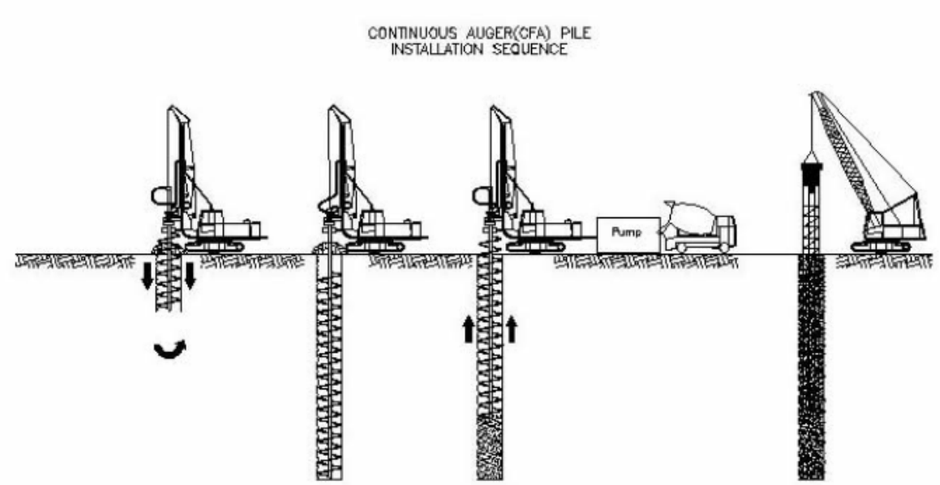
The 5.1 m deep excavation of the basement will result in a unloading of approximately 90 kN/m2 and the removal of the existing structure will further unload the ground by 45kN/m2. The P-Disp analysis indicates that, by the time the basement construction is complete and prior to the building completion, around 25 mm to 30 mm of heave is likely to have taken place at the centre of the proposed excavation, reducing to between 10 mm to 15 mm at the edges. Following completion of the basement and building construction, less than 5 mm of further movement is predicted due to the new building loads. To confirm this a full ground movement analysis has been undertaken which has assessed the effects of the new development on existing/surrounding buildings paying particular regard to the effects of the demolition of the existing building.

7.3.3 Basement Perimeter Walls

Given the nature and location of the site, it will not be possible to construct the basement using an open cut excavation. It is therefore proposed to construct the majority of the basement using a piled retaining wall. It is proposed to form the basement walls using a bored pile wall (using continuous flight auger (CFA) piles).

7.3.4 Continuous flight auger (CFA) piles

CFA piles (see figure below) are a common and efficient method of installing a piled wall. In addition, the CFA piling technique is almost vibration free and one of the quietest forms of piling, making it ideal for environmentally sensitive and built up residential areas. Adopting this approach will keep construction phase vibration to the practical minimum.



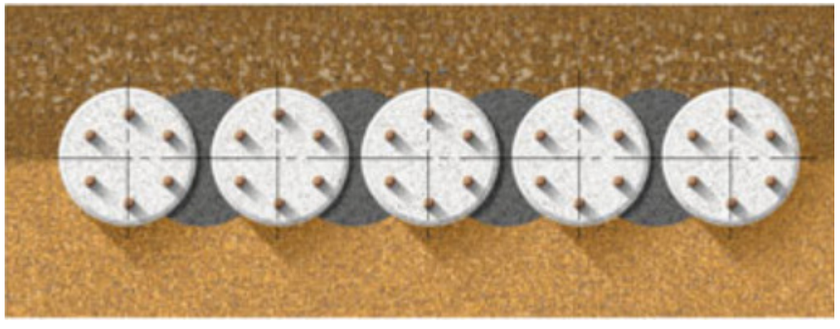
1. The hollow-stemmed Continuous Flight Auger is drilled into the ground by means of the drive-head.

2. The auger is drilled down to the founding level

3. The concrete / grout is pumped down the hollow-stemmed flight as the latter is gradually withdrawn.

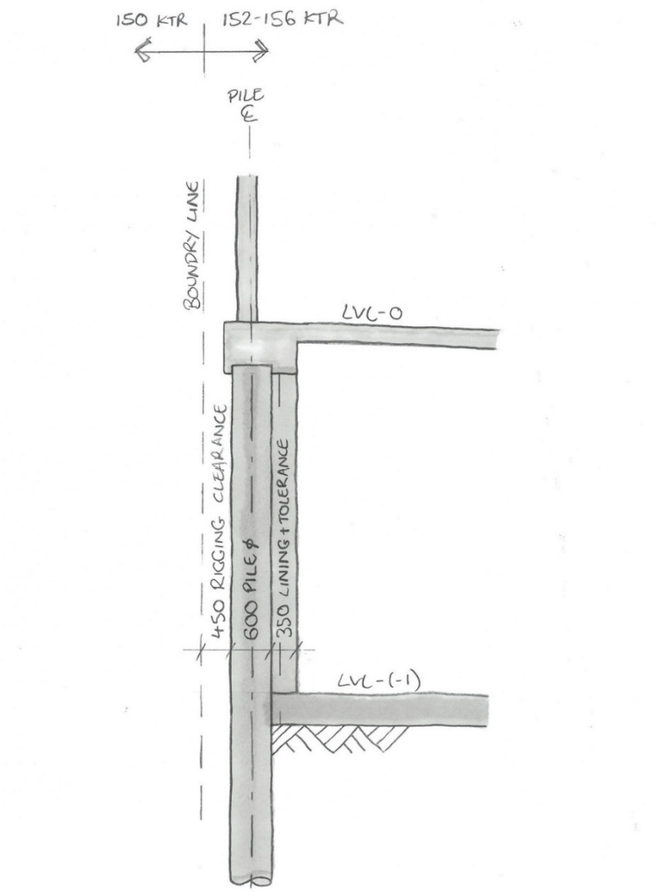
4. The steel reinforcing cage is lowered into the wet concrete / grout in the pile shaft until it is at the correct level

The retaining wall will be a secant piled wall, which will resist the surcharge pressures from surrounding buildings and earth. The pile diameter is likely to be 600 diameter secant piles.



7.3.5 Basement Retaining Walls Adjacent to Party Wall Lines

Basement walls adjacent to Party Walls will be constructed in a manner that adequately supports and minimises settlements. This provides a robust boundary during construction and excavation of the basement, while also keeping noise and vibration to a practical minimum on sensitive party wall boundaries. The walls will be propped during construction, to keep ground movements within agreed limits.



SECTION THROUGH RETAINING WALL SHOWING OFFSETS

7.3.5.1 Basement Grade

The basement will be grade 3 to BS8102 (see table 1 below), consequently the secant bored pile wall then be lined with a reinforced concrete wall to provide a flat surface for fixing of the drained cavity layer. The drained cavity protection would be provided by means of non load-bearing block walls around the full basement perimeter and a traditional raised screed across the lowest floor. A pump will then be connected to the drained cavity layer to remove any small amounts of water that leak through the primary concrete waterproofing shell.

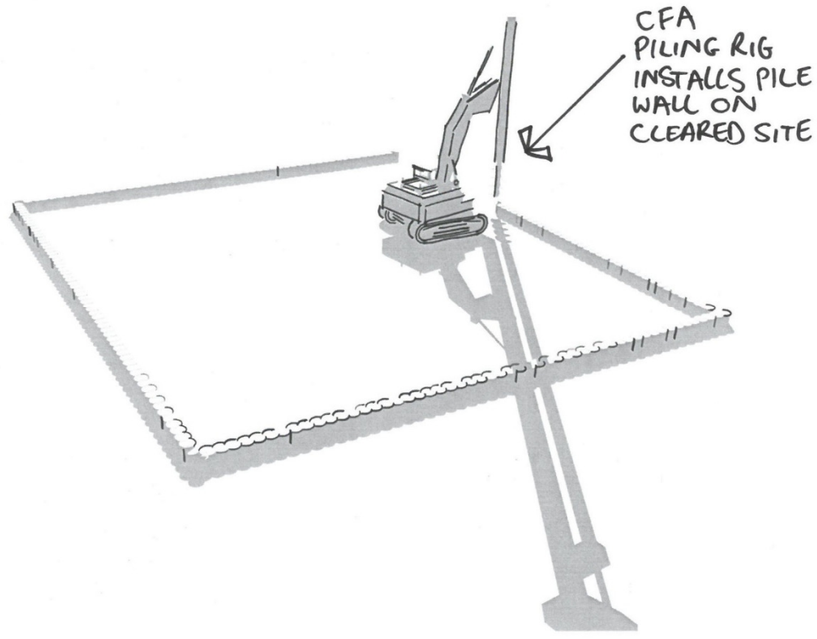
Grade	Example of use of structure	Performance level
1	Car parking; plant rooms (excluding electrical equipment); workshops	Some seepage and damp areas tolerable, dependent on the intended use B) Local drainage might be necessary to deal with seepage
2	Plant rooms and workshops requiring a drier environment (than Grade 1); storage areas	No water penetration acceptable Damp areas tolerable; ventilation might be required
3	Ventilated residential and commercial areas, including offices, restaurants etc.; leisure centres	No water penetration acceptable Ventilation, dehumidification or air conditioning necessary, appropriate to the intended use

Table 1 – Basement Grading from BS8102

To achieve this level of waterproofing it is recommended that the lining wall is to be fully tanked, and a drainage cavity be installed, however other appropriate methods can also be considered.

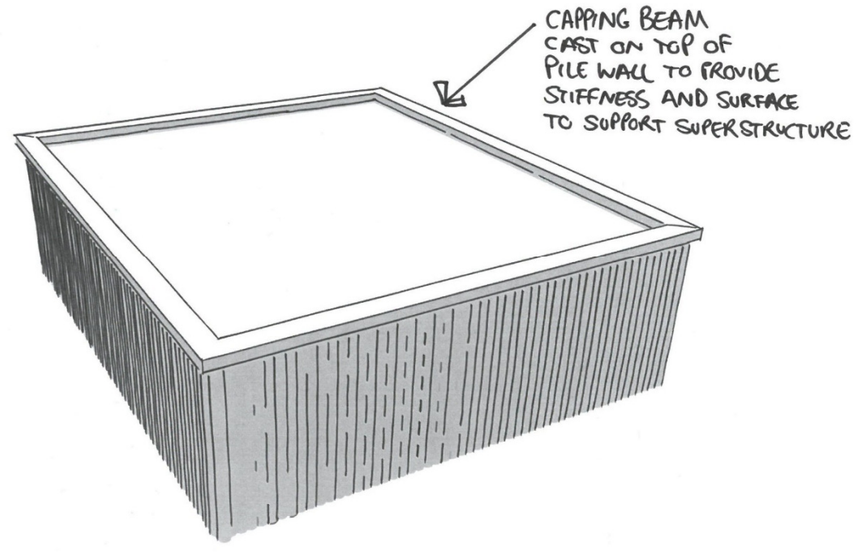
8 Outline CFA Basement Construction Sequence

Prior to works commencing, schedules of condition will be carried out to the adjoining properties as part of the Party Wall process. The monitoring regime will be agreed including precise monitoring of targets affixed to adjoining structures. Initial readings will be taken prior to works commencing, and then at agreed intervals going forward. The monitoring readings will be compared with 'trigger levels' at which further investigations or mitigation measures will be implemented. Once this is complete the works will commence with demolition of the existing building and installation of the guidewall.



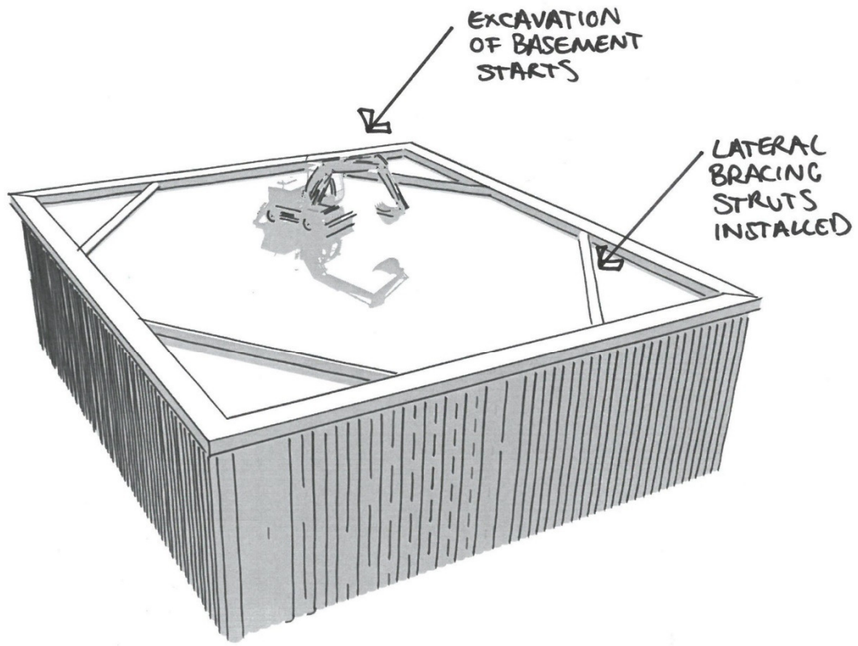
8.1 Pile Wall Installation

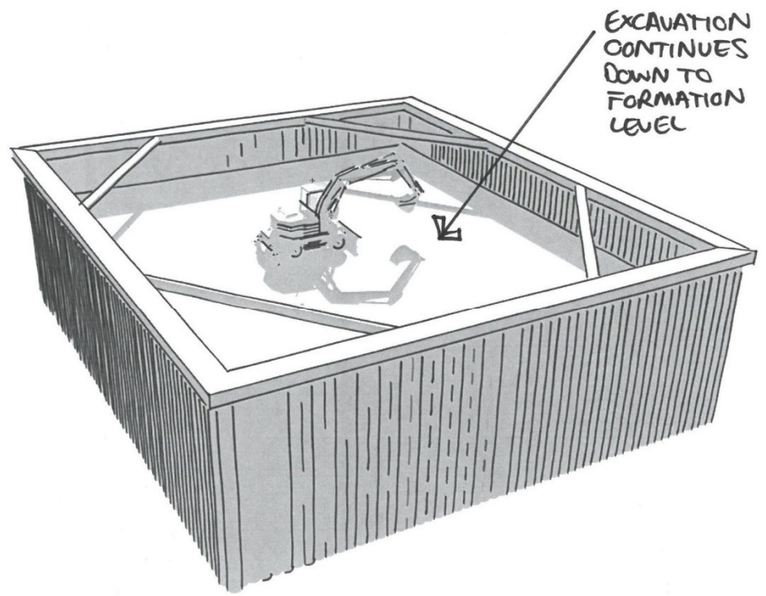
- After the demolition has been completed, the party wall stabilised, and the site has been cleared the piling rig will be brought on site
- The CFA rig will drill to the forming level, pump concrete/grout is pumped down the hollow-stemmed flight as the latter is gradually withdrawn, then the steel reinforcing cage is lowered into the wet concrete / grout in the pile shaft until it is at the correct level



8.2 Casting of the Capping Beam

- Once the pile wall is fully installed the soil around the top of the pile wall can be excavated to allow the formwork for the capping beam to be built.
- Reinforcement cages are built within the formwork and connected to the starter bars protruding from the top of the piles.
- The concrete is poured and allowed to cure.



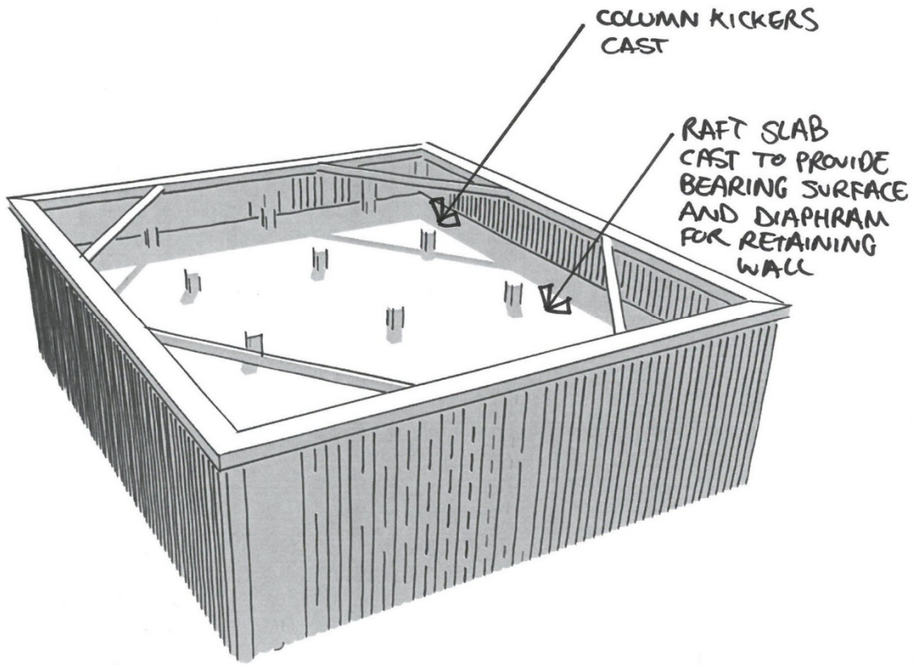


8.3 Installation of Props

- Once the capping beam has reached adequate strength the connection between the beam and props is prepared
- Soil is excavated to allow the props to be installed diagonally between each adjacent side of the capping beam at third points along its length.
- The props or struts are lifted into place and fastened to the capping beam

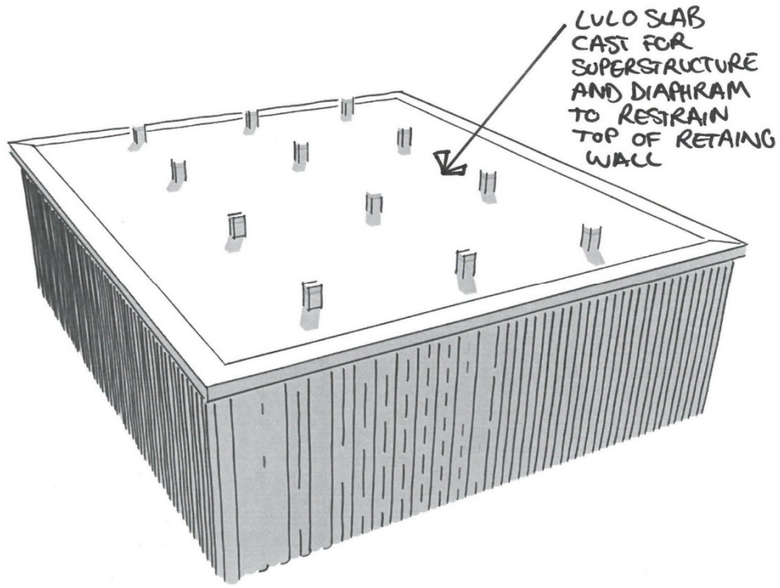
8.4 Main Excavation

- Once the retaining wall is fully self- stabilised by the props the main excavation can begin
- The soil within the pile walls is excavated down to the formation level of the basement raft, with the soil being transported offsite during low traffic periods.



8.5 Casting of the Raft and Kickers

- Once the main excavation has been completed and the surface of the base of the excavation prepared with hardcore, drainage, waterproofing, insulation, and heave cavities, the concrete raft can be cast.
- Starter bars for the columns and walls are positioned along with the kickers to provide a surface for the column formwork to built-up against.
- Preparation is made for the waterproofing of the pile wall and building up of the lining wall.



8.6 Lining wall and LVL0 Diaphragm Floor

- Once the raft has gained sufficient strength the rebar for the columns is installed and shuttered before the concrete is poured.
- Formwork for the LVL0 slab is erected and reinforcement is installed.
- The LVL0 slab is poured and allowed to cure before the rest of the superstructure is erected.

9 Likely Ground Movements

The key construction activities that will result in ground movement during the works are:

1. Demolition
2. Installation of Retaining wall
3. Excavation
4. Construction of new building

The amount of ground movement caused by these activities relates to the ground conditions, together with the care and sequence with which the works are carried out. This analysis is based on the sequence of construction described previously, should the Contractor propose to carry out the works in a different sequence to that assumed in our design then a further assessment of the predicted movement will be required, and the proposal only accepted if there is no significant change to the scale of predicted movement.

All projects which involve an appreciable level of excavation will cause a degree of movement and the GEA analysis has helped to quantify this for the project. Generally, the ground behind the retaining wall will tend to move vertically down and horizontally toward the excavation on all sides. The maximum predicted movements are illustrated below.

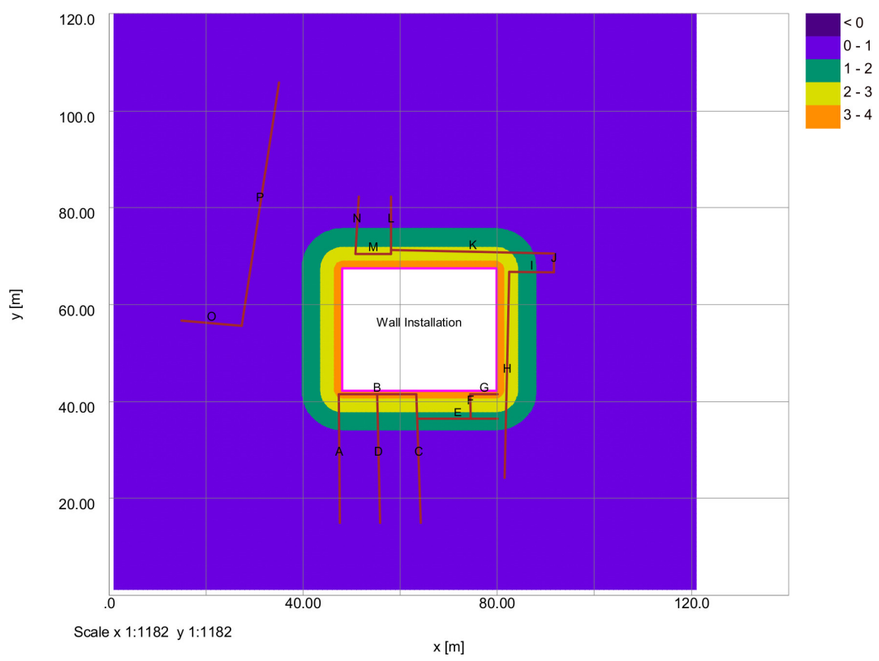
The results predicted have resulted from a carefully considered iterative process, with the design and assumed sequence of construction has been developed to help to reduce the amount of overall movement.

The maximum movements predicted for both installation of the wall and excavation are 6-7mm vertical settlement and 11-12mm horizontal ground movement. This is likely to occur behind the piled retaining wall midway between the front and the rear excavation, the amount of movement will reduce with distance away from the excavation.

The analysis has shown that some minor ground movement is likely to occur under the adjacent properties:

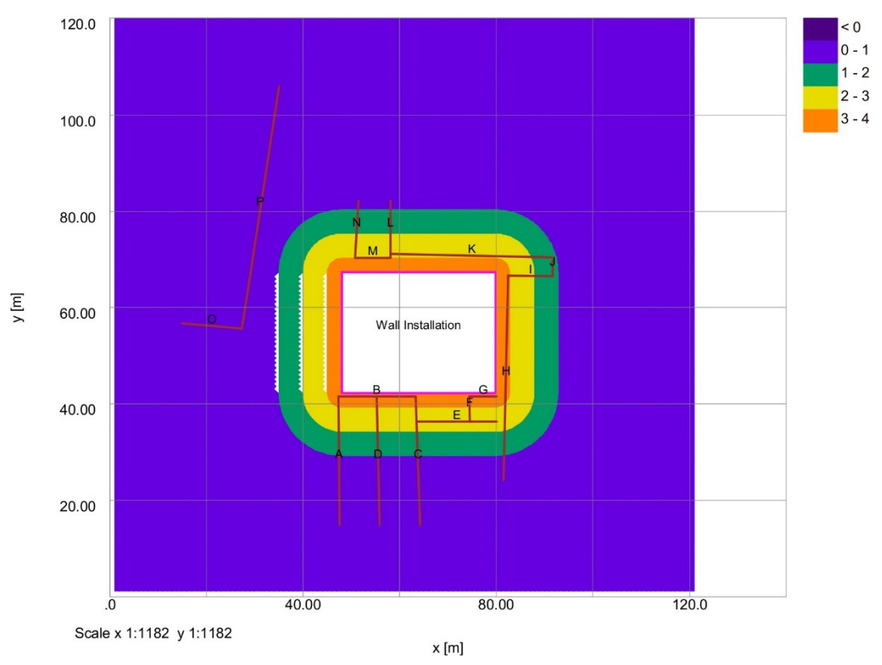
- 150 Kentish Town Road
- 158-160 Kentish Town Road
- 2a Bartholomew Road

Horizontal Displacement Contours: Grid 1 (level 0.000m) Interval 1mm



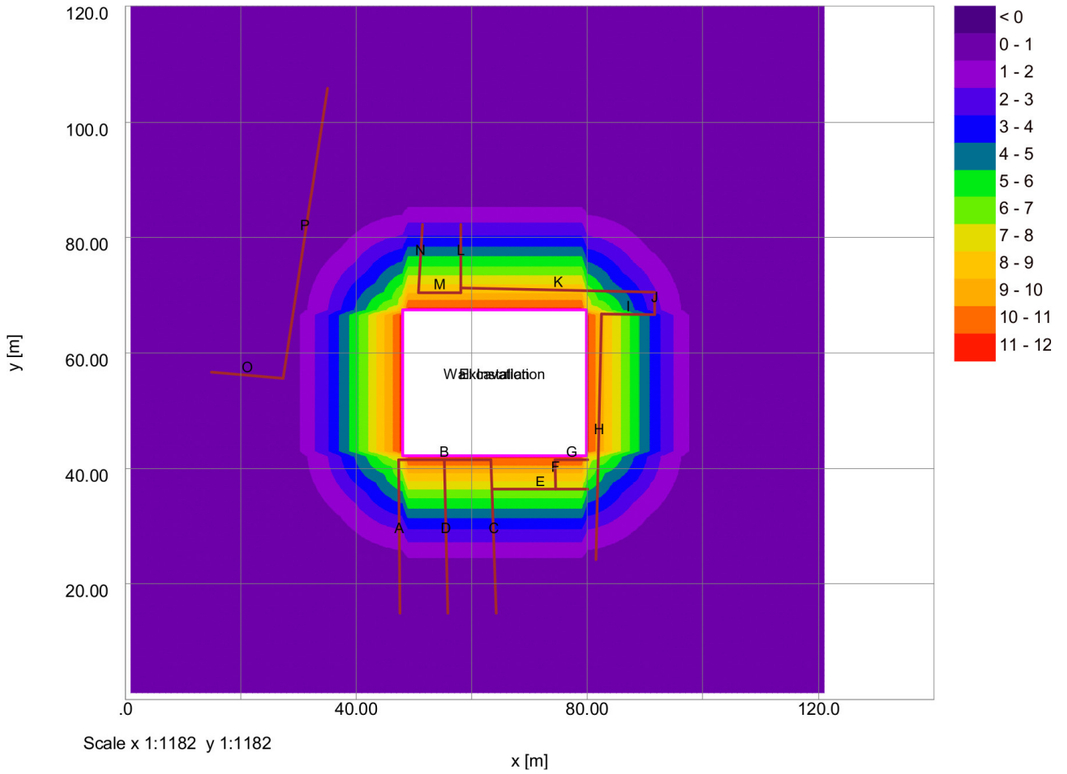
Horizontal Displacement after Install of Wall

Vertical Settlement Contours: Grid 1 (level 0.000m) (Interval 1mm)



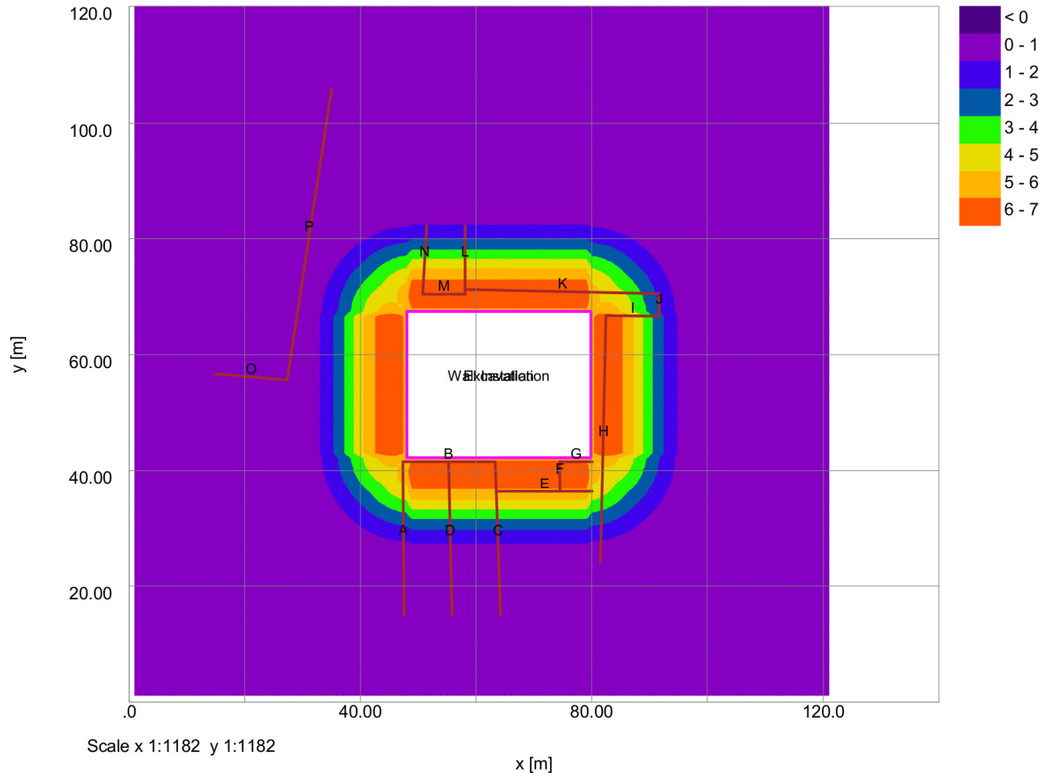
Vertical Displacement after Install of Wall

Horizontal Displacement Contours: Grid 1 (level 0.000m) Interval 1mm



Horizontal Displacement after Excavation

Vertical Settlement Contours: Grid 1 (level 0.000m) (Interval 1mm)



Vertical Displacement after Excavation

10 Discussion of Predicted Ground Movements and Potential Damage

10.1 Discussion

The Contractor will be made aware of the care he needs to take in carrying out the works and how the likely movements depend on the sequence of works. Should the Contractor propose to carry out the works in a different sequence to that assumed in our design then a further assessment of the predicted movement will be required, and the proposal only accepted if there is no significant change to the scale of predicted movement.

GEA's analysis has shown that the likely maximum ground movement will be of the order of 6-7mm vertically downwards and 11-12mm horizontally toward the basement, this maximum movement is likely to occur behind the piled retaining walls to the basement. The amount of movement will then reduce with distance away from the new basement. These ground movements will extend under the adjoining properties along Kentish Town Road and Bartholomew Road. The cracks which are predicted within the GEA report (Appendix F) show that most walls will fall within the 0 - Negligible and 1 - Very Slight categories as measured against the Burland Scale (table can be seen on the left) with 3 walls walling within the 2 - Slight category.

Whilst these movements are small, the differential movement across the width of the adjoin properties could lead to cracks appearing in the walls and in the finishes. As explained in this report the scale of movement predicted could lead to hairline cracks in the walls, though many of the adjoining buildings appear to have a lime based mortar in their brickwork walls and this may be able to take up this small movement without cracking. Finishes to floors, walls, and ceilings however can be more susceptible to cracking as a result of this movement, especially brittle finishes. The Contractor will be required to carry out detailed monitoring of the adjoin properties to record ground movements, and take action should the movement not be as expected. Trigger levels have been set to identify limits on monitored results and to define actions if these limits are reached. The traffic light approach will be adopted with green, amber, and red trigger levels set. The new structure is designed to be self-stabilising and independent of party walls to 150 Kentish Town Road while providing support and lateral restraint.

To mitigate these risks, permanent tying of these walls prior to the basement works has been proposed. In accordance with CPG4, all structures that are classified as Very Slight (category one) and above are to be receive appropriate mitigation measures to be agreed with the contractor when appointed.

10.2 Mitigation Measures

Measures to mitigate potential damage as a result of ground movements include:

1. CFA bored piles to limit ground disturbance and vibration.
2. Large diameter piles to increase stiffness of the retaining wall and limit deflection
3. Propping of the retaining wall during construction to limit deflection
4. Temporary works to ensure stability of existing structures.
5. Movement monitoring and trigger levels

Category of damage	Description of typical damage	Approximate crack width (mm)	Limiting tensile strain ε_{lim} (per cent)
0 Negligible	Hairline cracks of less than about 0.1 mm are classed as negligible	<0.1	0.0-0.05
1 Very slight	Fine cracks that can easily be treated during normal decoration. Perhaps isolated slight fracture in building. Cracks in external brickwork visible on inspection	<1	0.05-0.075
2 Slight	Cracks easily filled. Redecoration probably required. Several slight fractures showing inside of building. Cracks are visible externally and some repointing may be required externally to ensure weathertightness. Doors and windows may stick slightly.	<5	0.075-0.15
3 Moderate	The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable lining. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Service pipes may fracture. Weathertightness often impaired.	5-15 or a number of cracks > 3	0.15-0.3
4 Severe	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Windows and frames distorted, floor sloping noticeably. Walls leaning or bulging noticeably, some loss of bearing in beams. Service pipes disrupted.	15-25 but also depends on number of cracks	>0.3
5 Very severe	This requires a major repair involving partial or complete rebuilding. Beams lose bearings, walls lean badly and require shoring. Windows broken with distortion, Danger of instability.	Usually > 25 but depends on number of cracks	

Damage Category Chart (CIRIA C580)

11 Proposed Monitoring of Movements

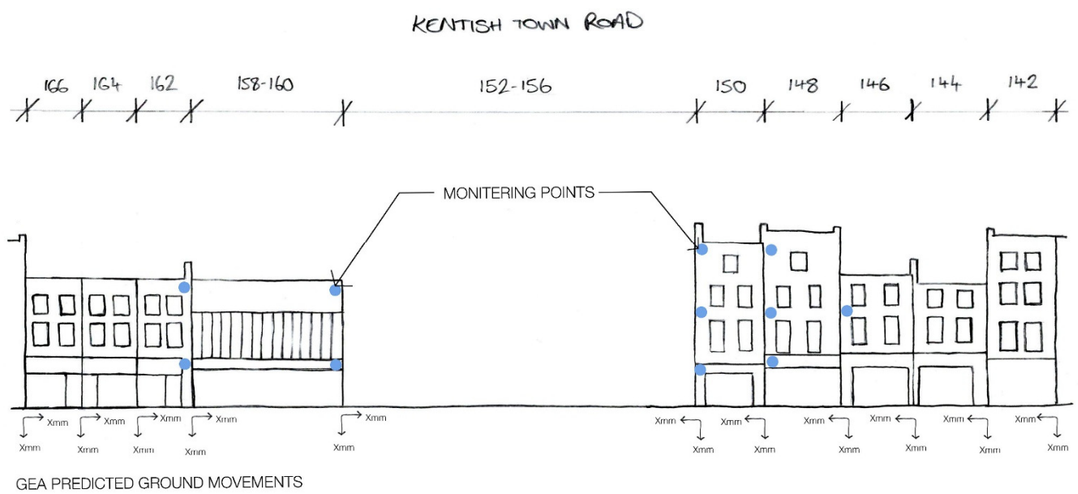
As part of the proposed works the Contractor will be required to carry out monitoring of the adjoining buildings as a check on the actual ground movements during construction. This monitoring is to include the proposals illustrated here which aim to monitor the movement of the adjoining buildings no. 148. 150, 158-160, 162 on Kentish Town Road and 2a Bartholomew Road.

The monitoring is proposed to start before the main demolition works commence to help establish the baseline and record pre-construction activities.

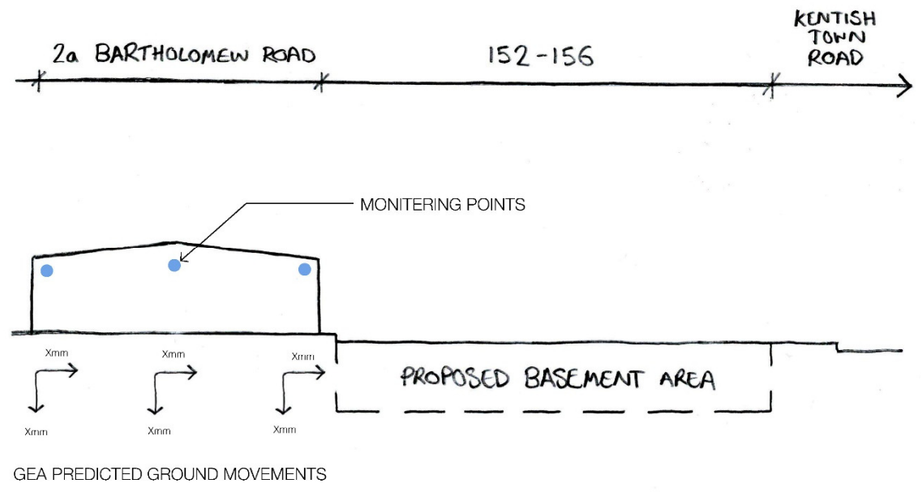
During the works the monitoring will be aimed at recording the building movements on a regular twice weekly basis (reduced frequency as appropriate) to gauge whether the movements taking place are within the predicted and expected limits. Monitoring results are to be forwarded to the deign team for comment as soon as they are available.

If the monitoring shows that the movement exceed, or look likely to exceed, the expected figure, action will need to be taken by the Contractor to bring them under control as discussed later in the section on Trigger levels.

The proposal could involve stopping the works onsite though this is unlikely if the Contractor is proceeding carefully and diligently with the construction. All of this including an action plan for what to do if appears excessive will need to be agreed with the Contractor and reflected in their method statement.



West Elevation along Kentish Town Road



North Elevation

12 Movement Trigger Levels

12.1 Movement Trigger Levels

12.1.1 Trigger levels will be used to identify limits on the monitored results and to confirm/identify actions if these levels are reached. The traffic light system will be adopted, with green, amber and red trigger levels set.

12.1.2 The setting of appropriate trigger levels is to consider the following factors:

- The amount of predicted movement
- Accuracy of the monitoring equipment
- Normal/ preconstruction movements of the buildings
- Likely damage resulting from the predicted movement.

12.1.3 The amount of movement predicted has been assessed by the GEA, and the damage resulting from these movements has also form part of their assessment. The piling specifications will give performance specifications for the piles and temporary works, which limit movements and damage criteria to appropriate levels for the type and age of buildings surrounding the site.

12.1.4 The accuracy of the monitoring equipment for reading horizontal and vertical movements is to be limited to +/- 2mm.

12.1.5 The impact of normal movements of a building, such as thermal movements will need to be judged during the monitoring. The extent of this will need to be assessed during the early stages of the monitoring. To this end trigger levels will be set at monitoring points close to the ground where the effects of thermal movements are reduced.

12.1.6 Proposed trigger levels

The below values are based on surveying tolerances of +/-2mm.

Suggested Trigger Levels to be Agreed				
	At Competition of Excavation		At Competition of Basement	
Alert Level	Vertical	Horizontal	Vertical	Horizontal
Green	3	3	6	10
Amber	4	4	7	11
Red	5	5	10	14

The proposed Red trigger levels exceed the predicted ground movements as the results of the GEA analysis have shown that the predicted movements represent the low side of the Slight damage category, should the predicted movements be exceeded by a small amount during the works, the damage category should not change and no structural remedial works would be required.

12.1.7 Actions to be taken by the design team and the contractor if these trigger levels are reached are summarised in the table below:

Actions		
Alert Level	Design Team	Contractor
Green	Continue to review monitoring as normal	Continue work as programmed and monitor as normal
Amber	a) Review monitoring results with contractor b) Review contractors amber action plan c) Make comments on contractors proposals and discuss with CA	Contractor to implement amber level action plan. This should include the following: a) Recheck monitoring to confirm readings b) Review method of working and highlight any activity relating to measured movements c) Propose revised methodology in to reduce trend in increasing movements d) Agree revised proposals wit CA prior to implementing. e) Increase frequency of monitoring
Red	a) Review monitoring results with contractor b) Review contractors red level action plan c) Make comments on contractor's proposals and discuss with CA d) Carry out condition survey with PW surveyor on affected buildings.	Contractor to implement his red level action plan. This should include the following: a) Stop work b) Recheck monitoring to confirm readings c) Install additional temporary works where required. d) Submit new methodology/ proposals to stop further movements. e) Agree revised proposals with CA prior to implementing f) Increase frequency of monitoring

13 Other Structural Works to the Party Walls

13.1 General

Other structural works to the party wall to no.150 Kentish Town Road include:

1. Making good of the masonry party wall where existing structure built into the wall is removed.
2. Fixing/supporting of temporary works to the party wall
3. Casting the proposed reinforced concrete structure along party walls.

13.2 Making Good of Masonry Party Wall

Parts of the existing structure are built into party walls along the boundary between 152-156 and 150 Kentish Town Road, this includes:

1. Brickwork internal walls
2. Timber floors
3. Steel beams
4. Various fixings

As part of the proposal all of the above existing structure will be removed and the masonry made good to Architects details.

13.3 Fixing/Support of Temporary Works

If internal ties are not possible, external temporary works will be provided to the party wall.

Where feasible we have avoided fixing into party wall, but in order to provide lateral support to the party wall some fixing and temporary shoring will be necessary.

In some locations these fixings into the party wall will be simple resin anchor bolts and where necessary concrete padstones will be cast into the brickwork to help spread loads, avoiding overstressing of the brickwork.

Temporary works drawings will be issued to the contractor carrying out the works for his information. The contractor however will be responsible for the preparation of his own proposals for temporary works for which he will remain solely responsible. The contractor's proposals shall be submitted to the contract administrator for comment prior to the commencement of the works on site, and may be different to those assumed by the Parmarbrook.

13.4 Casting the Proposed Reinforced Concrete Structure Along Party Walls.

Where new reinforced concrete structure is to be cast adjacent to the party walls, a 500mm void is to be left between proposed and existing structure with discrete areas of lateral restraint provided to ensure constructability.

Whilst casting the structure close to the existing structure, care must be taken that the formwork is fully self-supporting and does not exert any pressure on existing structural elements. The Contractor will be required to adopt an approach and put forward proposals to the Contract Administrator for comment prior to commencement of the works.

14 Stability of Surrounding Buildings

14.1 Temporary Works/Phasing

The following assumptions have been made during the design of the substructure of the building:

- Final design of temporary works and construction phasing will need to be developed further by the appointed contractor and following further opening up works on site.
- Method Statements of the proposed demolition and sequencing of the temporary propping will need to agreed prior to commencement of all works, to ensure proposals do not adversely impact the structure of the retained buildings.

14.1.1 Stability of Surrounding Buildings

Stability of the surrounding buildings will be ensured both during the demolition phase and during the construction phase. This will be achieved through the following measures:

- A full ground movement analysis has been carried out by GEA, this has assessed the effect of the works. This analysis will inform the design and phasing of the works, so that a suitable temporary works design and sequence can be installed to limit damage to surrounding properties.
- All works will be carried out in an agreed sequence, working to a method statement approved by all parties.
- Movement monitoring will be installed to all surrounding properties, so that actual movements during demolition and construction can be monitored with appropriate trigger levels and precautionary measures adopted.

14.1.2 Lateral Ties Within Floors and Walls

Our recommendation is that lateral ties will be installed within 150 Kentish Town Road to tie the party wall back to the spine and apposing wall, this will ensure the party wall remains fully tied in and permanently more stable, while avoiding significant temporary works. The Client would need to negotiate the works with the adjoining owner. Alternatively, external shoring will be provided to ensure stability during this phase which would consist of an external steel frame which is supported by thrust blocks and fastened to the party wall be means of resin anchors or similar. The final details of these works are to be the responsibility of the Contractor.

14.1.3 Summary

The predicted ground movements shown in the report do not present a significant global stability issue for the neighbouring buildings as the maximum damage category calculated is 2 – Slight as measured against the Burland scale, small ground movements which may take place as a result of the works will be closely monitored and appropriate action be taken should larger than anticipated movements be observed. Temporary shoring or tying will be provided as a mitigation measure and any necessary remedial work will be undertaken.

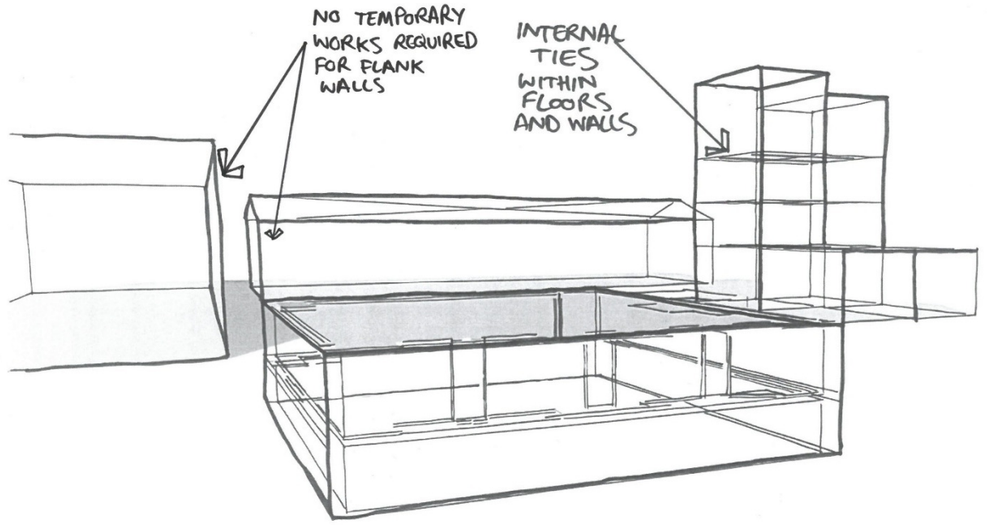


Illustration of Temporary Works Locations

15 Site Management

At the planning stage an early indication of the systems and processes which will be undertaken by the main contractor can be outlined. The processes ensure that the preparatory and construction work is well planned and executed, and care is taken to minimise the impacts on the surrounding environment.

15.1 General

The Contractor is expected to minimise the impact of the construction activities on the surrounding area and follow industry best practice guidelines. There are a number of mitigation measures which are listed below.

15.1.1 Airborne Pollutants Mitigation Measures

1. In dry periods the works can be damped down to reduce dust
2. Ensuring all materials are properly contained or covered with secured sheeting
3. Inclusion of physical barriers
4. Appropriate ground covering.
5. Avoid cutting down of materials where possible.

15.1.2 Noise Disruption Mitigation Measures

1. Strict adherence to site working hours
2. Avoid deliveries during peak traffic times
3. Utilise sound reduction equipment for plant

15.2 Demolition

The environmental impact of the demolition process will be reduced with a series of mitigation measures:

1. Solid site hording will be erected prior to any works to minimise dust and noise pollution, and provide security for the site.
2. Encapsulating scaffolding maintained 2m above working level
3. Demolition materials will be removed from site on a daily basis to reduce the amount of material which can generate airborne pollutants at any one time.
4. The pavement will be washed down at the end of each day with any significant amounts of particulate matter being removed as it occurs.
5. Broken out material shall we watered to reduce airborne particulates.
6. Dust monitoring
7. Traffic Monitoring with controlled, planned, and staggered deliveries/removals

15.3 Excavation

A detailed method statement will be produced by the Contractor/Subcontractor for the excavation works which will detail the measures used to provide an excavation that is stable, safe, and minimises environmental impact.

1. Solid site hording will be erected prior to any works to minimise dust and noise pollution, and provide security for the site.

15.4 Recycling, Reuse, and Disposal

Any opportunity to recycle or reuse materials made available during the demolition phase will be taken, this will include:

1. Recycles/Reuse of stock bricks, steel beams, and timbers as appropriate.
2. Separating of waste materials onsite to facilitate recycling, materials will then be taken to recycling stations where records will be produced by the recycling stations.
3. Ensuring that all Duty of Care requirements are complied with.
4. The contractor will ensure that the site is kept free from build-up of materials which are to be removed from site

16 Below Ground Drainage

The proposed development will incorporate a new surface water and foul water drainage network to serve the development. This will outfall to the existing Public Sewers running in the adjacent Highway, utilising the existing connection where possible.

Due to the proposed basement a foul water pump is required to serve this level and any foul water runs which cannot be served by gravity. This pump will incorporate 24hour storage as required by Building Regulations Part H. The outfall main from this pump will then connect to the gravity connection to the Public Sewer.

A CCTV survey will be carried out to ascertain the line and condition of the existing connection with any proposed mitigation measures carried out as part of the works.

Surface water from the proposed development will be routed to this existing connection also. A green roof will be incorporated into the development to promote the use of SUDS within the site and reduce peak run-off rates during storm events. Due to space limitations and the existing soil properties, infiltration of surface water to the ground is not proposed. This will ensure that there is no impact on groundwater sources in the area.

The impermeable area of the site will not be increased as a result of the proposed development. In this regard, the peak run-off rates from the site will not increase. The inclusion of a green roof will ensure that run-off rates are actually reduced for the majority of storm events. This is in line with London Plan and Thames Water policy and ensure that there is no adverse effect on the receiving infrastructure.

A Section 106 application will be made to Thames Water for consent to connect to their Public Sewers via the existing connection (if possible).

The drainage for this site is not connected to any adjacent property and as stated above has its own induvial connection to the public sewers.

17 Assessment of Flood Risk

17.1 Flood Risk Sources

Potential sources of flooding that could pose a risk to a site are presented below in Table 1.0.

Flood Source	Mechanism	Site Impact
Tidal/fluvial (River Thames)	Extreme flood water levels which result in overtopping/breach of river defences	Flood waters entering buildings via thresholds and other openings. Flooding of external areas etc.
Surface Water Run-off from Heavy Storm Events	Surcharging/inundating of existing drainage networks with overland flows to site.	Flood water entering site from adjacent highways/paved areas. Affecting basements and/or external areas
Groundwater	Rising groundwater within underlying aquifers	Rising groundwater levels could affect basements if pathway available.
Drainage Systems	Blockages within site drainage systems. Inadequate capacity	Backing up into site of surface/foul water flows. Risk to basements and low lying areas

Table 1.0 Flood Risk Sources

17.2 Tidal/Fluvial Flooding

As highlighted by the Environment Agency (EA) flood map shown in **Figure 1**, the site is located outside Tidal/Fluvial Flood Risk Areas in Flood Zone 1. Sites within Flood Zone 1 are classified as lands at risk from flood event less than the 1 in 1000 year event (less than 0.1% annual probability of flooding each year).

In this regard the risk to the development posed by the Tidal/Fluvial is considered low. The development will not affect flood plain storage or capacity and does not hinder or intercept Tidal/Fluvial floodwater paths. Therefore, the development site would not increase the risk from Tidal/Fluvial flooding to other sites within the area also.

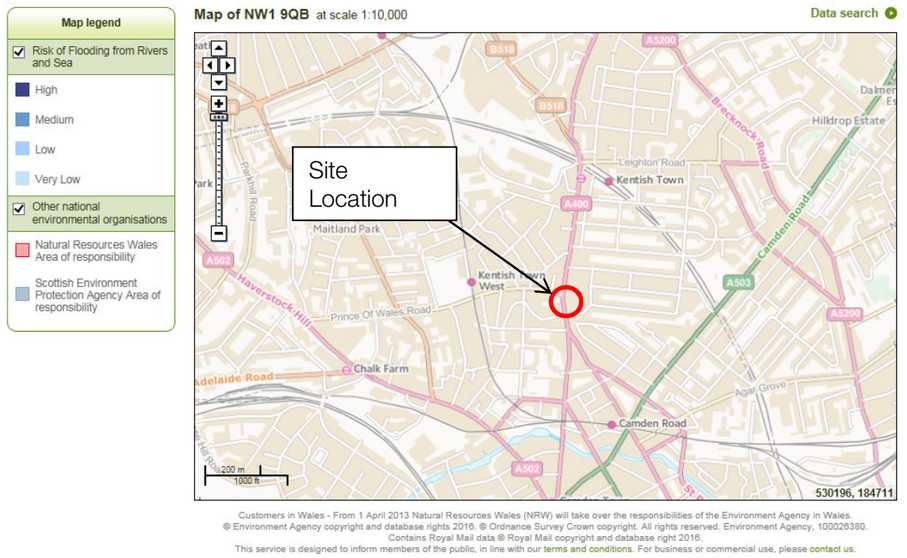


Figure 1.0 EA Tidal/Fluvial Flood Risk Zone Map

17.3 Mitigation Measures

As the site is shown to be at low risk of flooding due to Tidal/Fluvial sources, and does not increase the flood risk elsewhere there are no mitigation measures proposed.

17.4 Surface Water Flooding

A review of the LB of Camden Strategic Flood Risk Assessment (SFRA) indicates that the site is not located within a 'Local Flood Risk Zone'. However, the site is located within a Critical Drainage Area and the SFRA states that:

"There have been two major flooding incidents recorded in recent history in Camden, taking place in 1975 and 2002.The 1975 was the heaviest and most concentrated rainfall event since records began for this part of Camden, with 150mm falling in two and a half hours. The drainage capacity of drain pipes, road gullies and sewers was unable to cope with the volume of surface water runoff involved. The 2002 flood was less severe but still saw 60mm fall in just under an hour during the evening of 7 August 2002. This rainfall event had a 1% chance of happening in any year or 1 in 100 year return period."

Figure 2, below indicates that Kentish Town Road was affected by the 1975 flood but not the 2002 flood. The above would suggest that the local infrastructure in close proximity to the proposed site has been designed to cope with a 1:100yr storm event and hence should not be subject to unacceptable risk of flooding from surface water. Furthermore EA data shown in **Figure 3**, shows that parts of Kentish Town Road in close proximity to the proposed site are at low risk from surface water flooding, if flooding were to occur as a result of an extreme storm it is highly likely that any flood water will be contained within the kerb upstands of the highways and should not have an effect on the proposed site. Furthermore, Thames Water asset records show that there is a storm relief sewer present on Kentish Town Road. The sewer has most likely been implemented as a mitigation measure to help reduce the risk of surface water flooding within the local area.