22 Park Drive,

SW14 8RD

Structural Impact Assessment and Basement Impact Assessment

Job number:	223298
Revision:	P2
Status:	Planning
Date:	August 2024

18.10.23	P1	ISSUED FOR PLANNING	
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Qualification			MEng CEng MIStructE
signature:			

Contents

1.0 Non-technical Summary

Structural Design Studio Limited were appointed by the Client, to advise on the structural implications of constructing a single storey basement beneath the rear of the main house and a new rear extension. The following report has been prepared to help ensure that the structures on both the site and neighbouring sites are safeguarded during the works.

The report provides information in accordance with the advice provided in the London Borough of Richmond Upon Thames' Planning Advice Note (PAN) "Good Practice Guide on Basement Developments" (dated May 2015).

A desktop study of the site has been completed to establish the site's history and a risk-based interpretation used to inform the onsite testing. Two separate site-specific ground investigations comprising of boreholes and trial pits were carried out. The initial investigation was completed on 3rd October 2022 by Risk Management Ltd to find out the profile of the foundations of 22 Park Drive and the neighbouring houses. The second investigation was completed on 6th June 2023 by Risk Management Ltd to confirm soil and groundwater conditions. The results of these investigations have been used to inform the structural scheme design of the proposed basement, in accordance with the PAN "Good Practice Guide on Basement Developments".

A Flood Risk Assessment was completed by FPS Environmental dated September 2023. This report has also been used to inform the structural scheme design of the proposed basement, in accordance with the PAN "Good Practice Guide on Basement Developments".

This report supports the conclusion that should the works be completed by a competent contractor, the basement extension can be constructed without any significant adverse effect on the property, neighbouring properties, groundwater, surface water or on the stability of the adjoining ground.

Based on our current knowledge of the building and calculations, if the works are carried out in accordance with our proposed design then the likelihood of damage to the property should be limited to Category 1 as set out in CIRIA report C580. As the property is semi-detached the likelihood of damage to the neighbouring properties should be limited to Category 1 as set out in CIRIA report C580.

2.0 Description of Existing Buildings and Site

The existing building at 22 Park Drive is a two-storey semi-detached house located in East Sheen within the London Borough of Richmond Upon Thames.

22 Park Drive, Front Elevation (Client photo, 15/10/2023)

The main house is square on plan with single frontage onto Park Drive. There is a single storey garage to the side. It is bounded by No.20 Park Drive and No.24 Park Drive to the north and south respectively.

No.22 Park Drive is not a listed building and is also not classified as a 'Building of Townscape merit.'

The earliest map studied dated 1933 showing the existing building having been developed along with those surrounding it. We understand from the electoral role that the building is likely to have been constructed in around 1925.

The building appears to be in reasonable condition and is traditionally constructed with timber roof and floors supported on load bearing internal and perimeter walls. The floors are assumed to span between the perimeter walls and the load bearing spine walls in the centre of the building.

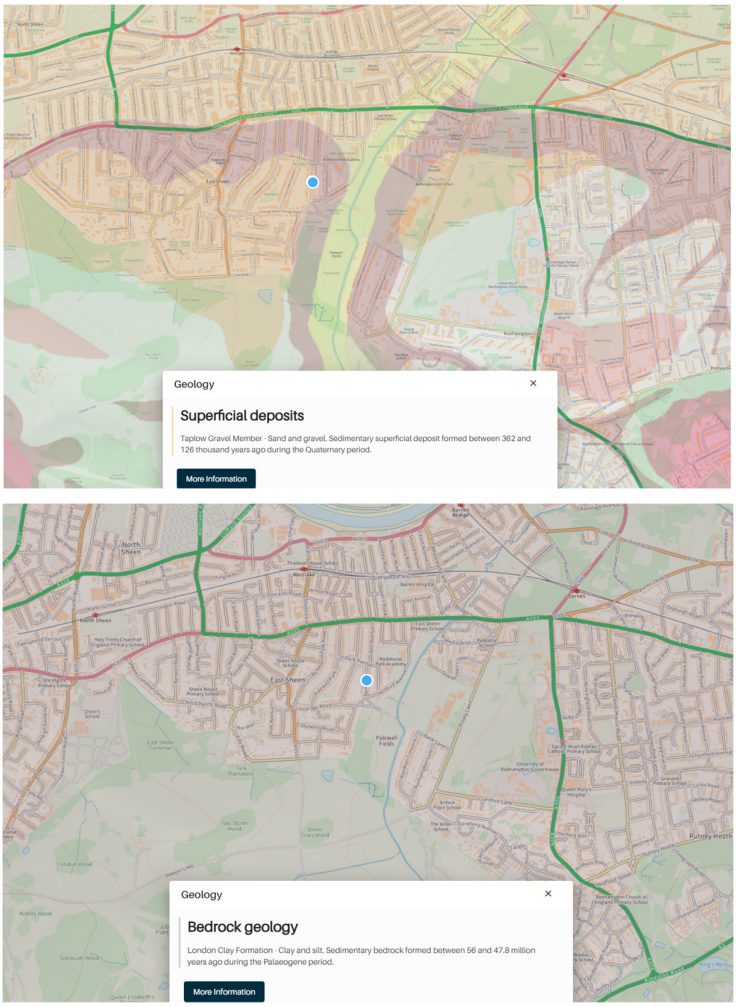
The overall stability of the buildings appears to be provided by the cellular layout of the masonry walls and diaphragm action of the timber floors at each level.

Access is gained to the site from the front of the property via Park Drive.

Prior to works commencing on site, a CCTV survey will be required to determine the location, size and condition of the existing drainage network. The survey should continue through to the connections to the public sewer network to prove connectivity.

3.0 Ground Conditions

The maps available from the British Geological Survey indicate that the site lies directly on top of superficial deposits of sands and gravels (Taplow Gravel Member) with London Clay forming the bedrock beneath.



Excerpt of Geology of Britain Viewer (British Geological Survey, 25/9/2023)

There are no historic borehole records within close proximity of the property.

An initial site-specific soil investigation was carried out by RML on 3rd October 2022, which comprised of 1No. borehole (DIS1) and 3no. trial pits and a further site investigation was carried out on the 6th June 2023 which compromised of 1No. borehole (see Appendix C for borehole and trial pit logs). The information gathered was consistent with the ground conditions and water levels noted in the geological maps above.

In the initial report RML 8267, DS1 showed Made Ground to a depth of 0.5m, then clayey sand to about 1m, some gravel and sandy clay to a depth of 1.6m, with silty sand and gravel down to 2m where the borehole was terminated.

Three trial pits were dug as part of the initial report. TP1 was dug against the flank wall of no. 20 Park Drive and this showed the house to be founded on concrete strip foundations which were approximately 1.13m deep (1.63m below existing ground floor FFL). TP2 was dug against the rear wall of the main house of no. 22 and found a strip foundation which had an underside of approximately 1.05m below existing ground level (1.26m below existing ground floor FFL). TP3 was dug against the extension to no. 24 and found a strip foundation which had an underside of approximately 1.54m below existing ground level (1.75m below existing ground floor FFL).

In the second report RML 8515, BH1 stated that Made Ground was observed down to 0.4m, then orange-brown silty clay to a depth of 1m, then some gravels with silty sand observed down to 3.3m, with silty London Clay continuing onwards to the 6m depth at which the borehole was terminated. Groundwater was encountered at 2.4m

below ground level within the borehole during the investigation and on a separate visit on 14th June 2023 groundwater rose to 2.04m. Further monitoring visits were undertaken on 2nd October 2023, 17th February 2024, 22nd April 2024, 26th June 2024 and 30th July 2024 which showed the ground water level at 2.40m, 2.23m, 2.28m, 2.35m and 2.39m below ground level. The presence of water in the future could be subject to seasonal variation.

4.0 Desk Study Summary and Observations

The results of our desk study are as summarised below;

- The site is located within Flood zone 1 which means it has a low probability of flooding from rivers and the sea. It is also considered to be at 'very low risk' of flooding due to surface water, as shown on the latest Environment Agency Flood Maps (reference; www.environmentagency.gov.uk).
- According to Richmond's SFRA map Park Drive is located within an area which has 75% or more susceptibility to groundwater flooding. As such a screening assessment and Basement Impact Assessment needs to be completed.
- The site is not located within one of Richmond's throughflow catchment areas.
- Public Sewer records are to be obtained from Thames Water to determine whether there are any Thames Water assets located within the proposed site.
- The site lies approximately 2.4km away from London Underground infrastructure (District and Overground Lines) and 660m away from the mainline train, as such any works at No22 Park Drive will not affect the railway lines.
- There are no records of historical bomb damage to the properties on Park Drive during World War II. (Reference, The LCC London Bomb Damage Maps 1939-1945, LTS).

5.0 Proposed Alterations

The proposed works involve the construction of a new basement beneath the footprint of a new single storey rear extension and the rear of the existing main house. The proposed basement will have a head height of approximately 2.4m. There is also a re-configuration of the internal partition walls at ground and first floor level.

A set of proposed structural scheme drawings can be seen in Appendix A.

L-shaped reinforced concrete underpins will be used to form all perimeter walls to the proposed basement box.

Vertical loads from the superstructure perimeter will be transferred to the ground by the RC edge thickenings to the basement slab.

The reinforced concrete underpins will be designed to act as a propped cantilevers, supporting the surcharge from the soil and neighbouring buildings. A reinforced concrete slab is proposed at ground floor level which will provide a permanent prop to the underpins at the top.

A suspended reinforced concrete slab will be constructed at basement level to provide permanent propping to the bases of the underpins. The suspended slab is also proposed to deal with any heave from the underlying Clay.

The groundwater level will be monitored as part of the site specific ground investigation by STM, via a borehole using standpipes. Water is likely to be encountered at approximately 2-2.4m below existing ground level. Therefore some localised dewatering is likely to be required during the construction of the basement. If groundwater is experienced during excavation, suitable control of any inflows would be achieved using sump pumping and appropriate filters should be used to avoid the migration of fines. A detailed method statement for this process will need to be prepared by the Contractor for comment by all relevant parties including party wall surveyors and their engineers.

Trial underpins will be dug when the contractor first starts on site to confirm the stability of the soil and to further investigate the presence of any groundwater inflows.

6.0 Basement Waterproofing

The basement waterproofing will be the responsibility of the Contractor.

We assume that the reinforced concrete retaining walls and basement slabs will be cast using water resistant concrete to form an initial barrier with an internal drained cavity system as a primary barrier against possible water ingress. As part of the system, any water that seeps through will be collected in a sump to be pumped up to high level where it will drain under gravity into the main drainage system.

7.0 Party Wall Matters

The proposed works development falls within the scope of the Party Walls Act 1996. Procedures under the act will be dealt with in full by the Employers Party Wall Surveyor. The Party Wall Surveyor will prepare and serve necessary notices under the provisions of the Act and agree Party Wall awards. The Contractor will be required to provide the Party Wall Surveyor with appropriate drawings, method statements and other relevant information covering the works that are notifiable under the Act. The resolution of matters under the Act and provisions of the Party Wall Awards will protect the interests of the owners.

The proposed works on the site of No.22 Park Drive will be developed so as not to inhibit any works on the adjoining properties. This will be verified by the Surveyors as part of the process under the Act.

8.0 Hydrological Statement Summary

The borehole record produced by RML indicates that ground water is likely to be encountered during the excavation. Arup's Subterranean Development Scoping Study (para 5.1), June 2008, notes that the impact of subterranean development on groundwater flows is negligible as groundwater flows will find an alternative route if blocked by a subterranean structure.

A Flood Risk Assessment has been undertaken by FPS Environmental. This FRA report concludes that the proposed development is suitable for the location proposed, is unlikely to place additional persons at risk of flooding and is unlikely to increase flood risk elsewhere through the loss of floodplain storage, impedance of flood flows or increase in surface water run-off.

9.0 Impacts on Proposed Below Ground Drainage

A CCTV survey of the drainage on the site will be completed to confirm the size and condition of the existing drainage prior to works commencing on site. It is proposed to maintain gravity connections at ground floor level and above, where possible. The new drainage at basement level will be routed to a submersible pumping station which will pump waste directly to the outfalls. A non-return valve will be installed to protect against sewer surcharging.

A cavity drain system will be incorporated into the design to provide the second means of defence against water ingress. The waterproofing will be to a specialist design.

Thames Water Public Sewer Records will also be procured to ensure there are no Thames Water assets within the boundary of the property.

10.0 Ground Movement

Should the works be completed by a competent contractor, the proposed basement construction should be constructed without any significant adverse effect on the property, neighbouring properties, or on the stability of the adjoining ground.

Based on our current knowledge of the building, if the works are carried out in accordance with our proposed design, then the likelihood of damage to the property and neighbouring should be limited to being no greater than Category 1 ' Very Slight' (as defined on the Burland Scale), as set out in CIRIA report C580. As the property is

semi-detached and the works are being completed remotely from the adjoining properties then the likelihood of damage to the neighbouring properties should be limited to Category 1 as set out in CIRIA report C580.

The above damage category is within the acceptable range set out in the London Borough of Richmond Upon Thames' Planning Advice Note (PAN) "Good Practice Guide on Basement Developments" (dated May 2015).

In order to mitigate the risk of Category 1 'Very Slight' damage to the surrounding properties, the temporary works installed during the works will be designed to support the surcharge from the soil and surrounding buildings.

If deemed necessary and in agreement through the Party Wall process ground movement monitoring system may also be installed to the neighbouring properties No.20 and No.24, with trigger values set to allow the works to be controlled appropriately in the event of ground movement occurring (as outlined in section 14.0).

With the implementation of these mitigation measures, any damage caused to the property and surrounding properties should be limited to Category 1 at worst.

11.0 Screening

As part of this Structural Impact Assessment a screening process has been undertaken. FPS Environmental have undertaken a flood risk assessment and the below screening assessment is based on these results. This report is included within the appendix of this report.

11.1 Subterranean Screening Assessment

Question	Response	Details
1. Does the recorded water table extend above the base of the proposed subsurface structure?	**Yes**	The ground water level was measured at between 2 and 2.4m below ground level. The proposed excavation level for the new basement is approximately 3m below ground level
2. Is the proposed subsurface development structure within 100m of a watercourse or spring line?	**No**	Reference FRA - The Beverley Brook, designated as an EA Main River, flows in a north easterly direction approximately 230m to the east of the site. The Beverley Brook confluences with the River Thames, also a designated EA Main River approximately 2.8km north-east of the site. There is nothing noted about a watercourse within 100m of a watercourse.
3. Are infiltration methods proposed as part of the site's drainage strategy?	**Yes**	Reference FRA – the development should utilise SuDS where appropriate
4. Does the proposed excavation during the construction phase extend below the local water table level or spring line (if applicable)?	**Yes**	The ground water level was measured at between 2 and 2.4m below ground level. The proposed excavation level for the new basement is approximately 3m below ground level
5. Is the most shallow geological strata at the site London Clay?	**No**	The most shallow geological strata on the site is silty sand of the Taplow gravel member with London Clay as the bedrock geology
6. Is the site underlain by an aquifer and/or permeable geology?	**Yes**	The DEFRA online maps and online SFRA map tool indicated that the site was located on Secondary A Aquifer associated with the Kempton Park Gravel Member, underlain by Unproductive Strata associated with the London Clay Formation.

The above assessment has identified the following potential issues that need to be assessed.

Q1 *Does the recorded water table extend above the base of the proposed subsurface structure?*

Q3 *Are infiltration methods proposed as part of the site's drainage strategy?*

Q4 *Does the proposed excavation during the construction phase extend below the local water table level or spring line (if applicable)?*

Q6 *Is the site underlain by an aquifer and/or permeable geology?*

The other potential concerns considered within the screening process have been demonstrated to be not applicable or not significant when applied to the proposed development.

11.2 Land Stability Screening Assessment

Question	Response	Details
1. Does the site or neighbouring area topography include slopes that are greater than 7 degrees?	**No**	The largest slope on the site is measured at approximately 6 degrees.
2. Will changes to the site's topography result in slopes that are greater than 7 degrees.	**No**	The proposed basement is under the existing building and extension and there are no proposals to change the slope of the site's topography.
3. Will the proposed subsurface structure extend significantly deeper underground compared to the foundations of the neighbouring properties?	**Yes**	The neighbouring properties have foundations of 1.1m deep at no. 20 Park Drive and 1.5m deep at no. 24 Park Drive. The proposed basement excavation will be approximately 3m below ground level therefore the new basement will be approximately 1.5m below no. 24 foundations and 1.9m below foundations at no. 20.
4. Will the implementation of the proposed subsurface structure require any trees to be felled or uprooted?	**No**	No trees are to be felled as part of the proposed works.
5. Has the ground at the site been previously worked?	**No**	The property was constructed in approximately 1925 and there is no evidence that the site has been previously worked.
6. Is the site within the vicinity of any tunnels or railway line?	**No**	There are no known tunnels beneath the site or railway lines nearby.

The above assessment has identified the following potential issues that need to be assessed.

Q3 *Will the proposed subsurface structure extend significantly deeper underground compared to the foundations of the neighbouring properties?*

The other potential concerns considered within the screening process have been demonstrated to be not applicable or not significant when applied to the proposed development.

11.3 Flood Risk and Drainage Screening Assessment

Question	Response	Details
1. Will the proposed subsurface development result in a change in impermeable area coverage on the site?	**Yes**	The proposed development will result in an increase in impermeable area within the site and a surface water drainage design will therefore need to be developed to ensure there is no increase in surface water run-off from the site.
2. Will the proposed subsurface development impact the flow profile of throughflow, surface water or groundwater to downstream areas?	**No**	A flood risk assessment has been completed by FPS Environmental which concludes that the proposed works are unlikely to increase flood risk elsewhere through the loss of floodplain storage, impedance of flood flows or increase in surface water run-off. It also concludes that it is unlikely to place additional persons at risk of flooding.
3. Will the proposed subsurface development increase throughflow or groundwater flood risk to neighbouring properties?	**No**	A flood risk assessment has been completed by FPS Environmental which concludes that the proposed works are unlikely to increase flood risk elsewhere through the loss of floodplain storage, impedance of flood flows or increase in surface water run-off. It also concludes that it is unlikely to place additional persons at risk of flooding.

The above assessment has identified the following potential issues that need to be assessed.

Q1 Will the proposed subsurface development result in a change in impermeable area coverage on the site?

The other potential concerns considered within the screening process have been demonstrated to be not applicable or not significant when applied to the proposed development.

12.0 Scoping

The following issues have been brought forward from the Screening process for further assessment:

Does the recorded water table extend above the base of the proposed subsurface structure?

Potential Impact: Groundwater would be encountered during the construction which could cause issues with the construction. The basement box would impede groundwater flows.

Discussion: The borehole record produced by RML indicates that ground water is likely to be encountered during the excavation. Arup's Subterranean Development Scoping Study (para 5.1), June 2008, notes that the impact of subterranean development on groundwater flows is negligible as groundwater flows will find an alternative route if blocked by a subterranean structure.

The groundwater was observed above the basement founding depth. Dewatering from sumps introduced into the floor of the excavation will be required to ensure that the groundwater is controlled during the excavation. The advice of a reputable dewatering company should be sought. Suitable filters should be used to avoid the migration of fines.

Are infiltration methods proposed as part of the site's drainage strategy?

Potential Impact: The amount of hardstanding is proposed to increase and therefore the permeable area is reducing which could lead to higher surface water flows.

Discussion: Reference Flood risk assessment where SuDS are proposed. The principles of sustainable urban drainage system (SUDS) and the requirements of the London Plan Policy 5.13 Sustainable Drainage should be applied to reduce the risk of flooding from surface water ponding and collection associated with the construction of the basement. In accordance with the London Plan Policy 5.13 Sustainable Drainage the surface water run-off should be managed as close to its source as possible in line with the following drainage hierarchy:

• Rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation);

• Rainwater infiltration to ground at or close to source;

• Rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens);

• Rainwater discharge direct to a watercourse (unless not appropriate);

• Controlled rainwater discharge to a surface water sewer or drain;

• Controlled rainwater discharge to a combined sewer.

Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation.

Does the proposed excavation during the construction phase extend below the local water table level or spring line (if applicable)?

Potential Impact: Groundwater would be encountered during the construction which could cause issues with the construction. The basement box would impede groundwater flows.

Discussion: The borehole record produced by RML indicates that ground water is likely to be encountered during the excavation. Arup's Subterranean Development Scoping Study (para 5.1), June 2008, notes that the impact of subterranean development on groundwater flows is negligible as groundwater flows will find an alternative route if blocked by a subterranean structure.

The groundwater was observed above the basement founding depth. Dewatering from sumps introduced into the floor of the excavation will be required to ensure that the groundwater is controlled during the excavation. The advice of a reputable dewatering company should be sought. Suitable filters should be used to avoid the migration of fines.

Is the site underlain by an aquifer and/or permeable geology?

Potential Impact: Groundwater would be encountered during the construction which could cause issues with the construction. The basement box would impede groundwater flows.

Discussion: The borehole record produced by RML indicates that ground water is likely to be encountered during the excavation. Arup's Subterranean Development Scoping Study (para 5.1), June 2008, notes that the impact of subterranean development on groundwater flows is negligible as groundwater flows will find an alternative route if blocked by a subterranean structure.

The groundwater was observed above the basement founding depth. Dewatering from sumps introduced into the floor of the excavation will be required to ensure that the groundwater is controlled during the excavation. The advice of a reputable dewatering company should be sought. Suitable filters should be used to avoid the migration of fines.

Will the proposed subsurface structure extend significantly deeper underground compared to the foundations of the neighbouring properties?

Potential Impact: Basement excavation could destabilise the neighbouring properties

Discussion: The basement will be designed to support the loads from the neighbouring structures behind the retaining walls. The underpins will be propped at the base by the new concrete slab to resist any global sliding and at the top with the new concrete slab to prevent overturning. Best practices must be adopted for the construction of the basement and the temporary works should account for the additional forces from the neighbouring buildings. The underpinning will be completed in maximum 1m sections to avoid undermining any of the neighbouring foundations and to ensure that stability of these structures are maintained at all times. If granted as part of the party wall awards, the neighbouring foundations can be mass concrete underpinned to the level of the new basement to ensure safeguarding of the structures during the works.

Movement monitoring will be installed on both neighbouring properties and monitored regularly during the construction of the basement so that any issues can be detected and resolved at an early stage.

It is assumed that the below sequence of works are taken into account in the eventual design and construction of the proposed works. If the works noted above are properly undertaken by suitably qualified contractors, these works should pose no significant threat to the structural stability of the house or the adjoining properties. Based on our current knowledge of the building, if the works are carried out in this manner then the likelihood of damage to the adjacent

properties should be limited to Category 2 as set out in CIRIA report C580.

Will the proposed subsurface development result in a change in impermeable area coverage on the site?

Potential Impact: The amount of hardstanding is proposed to increase and therefore the permeable area is reducing which could lead to higher surface water flows.

Discussion: Reference Flood risk assessment where SuDS are proposed. The principles of sustainable urban drainage system (SUDS) and the requirements of the London Plan Policy 5.13 Sustainable Drainage should be applied to reduce the risk of flooding from surface water ponding and collection associated with the construction of the basement. In accordance with the London Plan Policy 5.13 Sustainable Drainage the surface water run-off should be managed as close to its source as possible in line with the following drainage hierarchy:

• Rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation);

• Rainwater infiltration to ground at or close to source;

• Rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens);

• Rainwater discharge direct to a watercourse (unless not appropriate);

• Controlled rainwater discharge to a surface water sewer or drain;

• Controlled rainwater discharge to a combined sewer.

Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity, and recreation.

We understand that the SuDS proposal is to use water butts at the front of the house and use large water butts as a rainwater harvesting system for the garden. All excess rainwater run-off

from the rear will go into an attenuation style system towards the back of the garden. Apart from a small patio the remainder of the garden will be kept as soft landscaping. The roof of the shed at the back of the garden has been designed to have a green living roof completed after the works.

13.0 Conclusions

It is intended that the above measures and sequence of works are adopted for the eventual design and construction of the proposed works.

Detailed method statements and calculations for the enabling and temporary works will need to be prepared by the Contractor for comment by all relevant parties including Party Wall surveyors and their engineers. The Contractor will need to ensure that adequate supervision and monitoring is provided throughout the works particularly during the excavation and demolition stages. A specification and indication of monitoring requirements is given in section 14.0.

To this end, SDS Ltd. will have an on-going role during the works on site to monitor that the works are being carried out generally in accordance with our design and specification. This role will typically involve fortnightly site visits during the main structural works. A written site report will be provided to the design team, Contractor and Party Wall Surveyor.

14.0 Construction Method Statement (to be read in conjunction with drawings in Appendix A)

Some of the issues that affect the sequence of works on this project are:

- The stability of the main house structures;
- The stability of adjoining and adjacent buildings;
- Forming sensible access onto the site to minimise disruption to the neighbouring residents; and
- Providing a safe working environment.

The proposed works involve the construction of a new basement beneath a new rear extension to the main house. This basement will be linked to the main house above via a staircase at existing ground floor level. It is expected that these works will be completed in a "bottom up" construction sequence.

The undertaking of such projects to existing buildings is specialist work and SDS Ltd. will be involved in the selection of an appropriate Contractor with the relevant expertise and experience for this type of project.

The Contractor is entirely responsible for maintaining the stability of all existing buildings and structures, within and adjacent to the works, and of all the works from the date of possession of the site until practical completion of the works.

A full set of temporary works drawings and calculations will be provided by the Contractor and will be reviewed by SDS Ltd. prior to works starting on site.

Please refer to section 13.0 for noise, vibration and dust assessment with proposed associated mitigation methodologies.

Stage 1 – Site Setup and Enabling Works

- All incoming services to the property are to be located and marked. Their location and depths should be communicated to the design team.
- Schedules of conditions for the adjoining properties to be completed.
- If movement monitoring has been agreed as part of the Party Wall awards this should be installed and base readings taken.
- Soft Strip of the existing building.
- Install temporary hoarding and protection to the neighbouring properties.

Stage 2 – Demolition

- Remove the existing ground floor slab
- Demolish the existing rear bay window and roof
- Install Temporary lateral propping and protection to the flank wall and party wall. Floors outside of the footprint of the new basement to be temporarily propped. Demolish the rear elevation at ground and first floor level.

Stage 3 – Install Perimeter of New basement in an Underpinning Sequence

- Dig trial underpins for inspection by SDS Ltd. to check how well the existing soil is cemented, ground water levels and flows, and in particular the ability of the ground to "stand up" whilst the individual underpin is completed.
- The underpins to the perimeter of the basement are to be formed in reinforced concrete. All underpins are to be taken down to proposed basement formation level.
- Dig the underpins in maximum 1 metre sections in the agreed sequence, installing localised trench sheeting and props around the perimeter of the shaft.
- The reinforcement in the toe of the underpin can be tied and the toe cast.

- The reinforcement in the stem of the underpin can be tied, lapping with the reinforcement from the toe and the stem cast.
- Leave the underpin to cure for 3 days. If the underpin is under an existing wall then drypack to the underside of the wall above with 3:1 sharp sand to cement dry-pack well rammed in.
- Install temporary lateral props between the face of the underpinning and the central bund of soil. These will be removed as part of the bulk excavation. This method of construction will be used to limit any horizontal ground movement associated with the construction of the underpins and limits the risk of the underpinning works on the neighbouring buildings.
- The Contractor should wait a minimum of 24 hours after drypacking before digging an adjacent underpin. Adjacent underpins should be dowelled together. An assumed sequence of underpinning is shown on the attached drawing however, the exact sequence of underpinning will be advised by the Contractor as it will relate to their sequence of construction.

Stage 4 – Install Horizontal Temporary Props and Reduced Level Dig

- Once all the underpins are complete, reduce level dig to allow the high level horizontal temporary props to be installed to the tops of the underpins cast in Stage 3.
- Temporary propping to be provided to the underpinning across the basement to prevent sliding and overturning.
- Reduce level dig down to the new basement level installing low level horizontal props across the basement to prop the underpins cast in Stage 3.

Stage 5 – Cast the New Basement Slab and Remove Temporary Low Horizontal Props

- Install the new drainage including the surface water runs and pump sumps. The drainage should be tested prior to casting the slab.
- The basement slab can be cast with reinforcement continuous with the underpin bases.
- Once the slab has cured, the bases of the RC underpins are propped by the slab, avoiding sliding and overturning in the permanent case. Hence, the low level horizontal temporary propping to the underpins can be removed.

Stage 6 – Install Ground Floor Steelwork and RC Slab

- Install the new steel beams at ground floor level to support the new ground floor slab. Install new concrete slab at ground floor level.
- Remove high level temporary horizontal props.

Stage 7 – Superstructure Works

- Construct new rear extension from above first floor level and complete superstructure works
- Install the new cavity drain system
- Complete the fit out

15.0 Noise, Vibration and Dust Mitigation

The London Borough of Richmond Upon Thames' Planning Advice Note "Good Practice Guide on Basement Developments" (dated May 2015) states that during the undertaking of any basement works it is necessary to "mitigate or maintain the amenity of neighbouring residents during construction, as well as guide the use of the highway and minimise noise and air pollution."

The proposed works at No.22 Park Drive involve the construction of a new basement extension beneath the footprint of a new single storey rear extension and the rear of the existing main house.

The construction works involve the demolition of existing concrete floor slabs, underpinning beneath existing walls, as well as excavation and construction of the basement shell. A more detailed sequence of the works has been given in section 12.0. Those most likely to be affected by noise, dust and vibration will be the immediate neighbours at No.20 and No.24 Park Drive. The properties opposite and behind No.22 Park Drive are remote from the proposed development and are therefore less likely to be affected, however need to be considered. There may be some impact on other residents on Park Drive due to the related construction traffic, but this should be minimal.

Below we have described the mitigation measures that are proposed to keep noise, dust and vibration to acceptable levels.

Mitigation Measures for Demolition of Existing Ground Floor Slab

The breaking out of existing structures shall be carried out by diamond saw cutting and hydraulic bursting where possible to minimise noise and vibration to the adjacent properties. All demolition and excavation work will be undertaken in a carefully controlled sequence, taking into account the requirement to minimise vibration and noise. The contractor will need to utilise non-percussive breaking techniques where practicable.

As the property is part of a terrace, careful consideration needs to be given to minimise noise and vibration transfer to the adjoining properties. The contractor should ensure that where any slab is adjacent to the boundary the concrete slab should be diamond saw cut first along the boundary to isolate the slab from any adjoining structures.

Dust suppression equipment should be used during the demolition process to ensure that any airborne dust is kept to a minimum. Where practical, concrete should also be wetted down prior to and during breakout to further inhibit airborne dust.

Mitigation Measures for Underpinning works to the Perimeter

The underpin shafts will be excavated using hand tools where possible. At the base of the underpin shaft it may be found that compressed air tools are required due to the compaction of the ground. Care should be taken in selecting a suitable air compressor that keeps noise to a minimum. The air compressor should be located within the site and behind a hoarding to minimise noise transfer to the adjoining properties.

The spoil will be removed from the excavation using an electrically powered conveyor. The contractor will need to ensure that this is regularly serviced and inspected to ensure any noise from this is kept to a minimum. In order to minimise dust, skips and conveyors should be covered or completely enclosed to ensure that dust cannot escape.

Mitigation Measures for Bulk Excavation

It is likely that the bulk excavation will be completed by hand. The contractor should ensure that any mechanical plant is switched off when not in use and is subject to regular maintenance checks and servicing. An electrically powered conveyor will be used as detailed above for large volumes of spoil removed.

Mitigation Measures for the Construction of the Concrete Basement Shell

The contractor should ensure that any concrete pours are completed within the permitted hours for noise generating works. The contractor should allow for a contingency period to ensure that concrete pours can be completed within these hours regardless of unforeseen circumstances such as batching plant delays and traffic congestion.

The fabrication and cutting of steelwork for the reinforced concrete underpins and slabs shall take place off site. If any rebar needs to be trimmed on site this should be completed using hydraulic or pneumatic tools instead of angle grinders.

Dust Control

In order to reduce the amount of dust generated from the site, the contractor should ensure that any cutting, grinding and sawing should be completed off site where practicable. If cutting, grinding and sawing is being carried out on site, surfaces are to be wetted down prior to and during these types of work whenever possible. Any equipment used on site should be fitted with dust suppression or a dust collection facility.

The contractor will be responsible for ensuring good practice with regards to dust and should adopt regular sweeping, cleaning and washing down of the hoardings and scaffolding to ensure that the site is kept within good order. The Contractor selected will be a member of the Considerate Contractors Scheme. Contact details of the contractor who will be responsible for containing dust and emissions within the site will be displayed on the site boundary so that the local residents can contact the contractor to raise any concerns regarding noise and dust.

The building will be enclosed within suitable scaffold sheeting and any stockpiles of sand or dust-generating materials will be covered. Cement, fine aggregates, sand and other fine powders should be sealed after use.

16.0 Structural Monitoring Proposals

Monitoring and limits on ground movements during excavation and construction

The Contractor shall provide monitoring in line with the agreements made in the Party Wall agreements.

Monitoring shall be completed as follows:

1) One month prior to any works being started to provide a base reading.

2) Weekly readings during the excavation and until the basement slab and lining wall has been cast.

3) On a monthly basis thereafter for a three-month period following completion of the notifiable works.

Cumulative movement of survey points must not exceed:

a). Settlement

Code amber trigger values: +/-6mm

Code red trigger values: +/-10mm

b). Lateral displacement

Code amber trigger values: +/-4mm

Code red trigger values: +/-8mm

Movement approaching critical values:

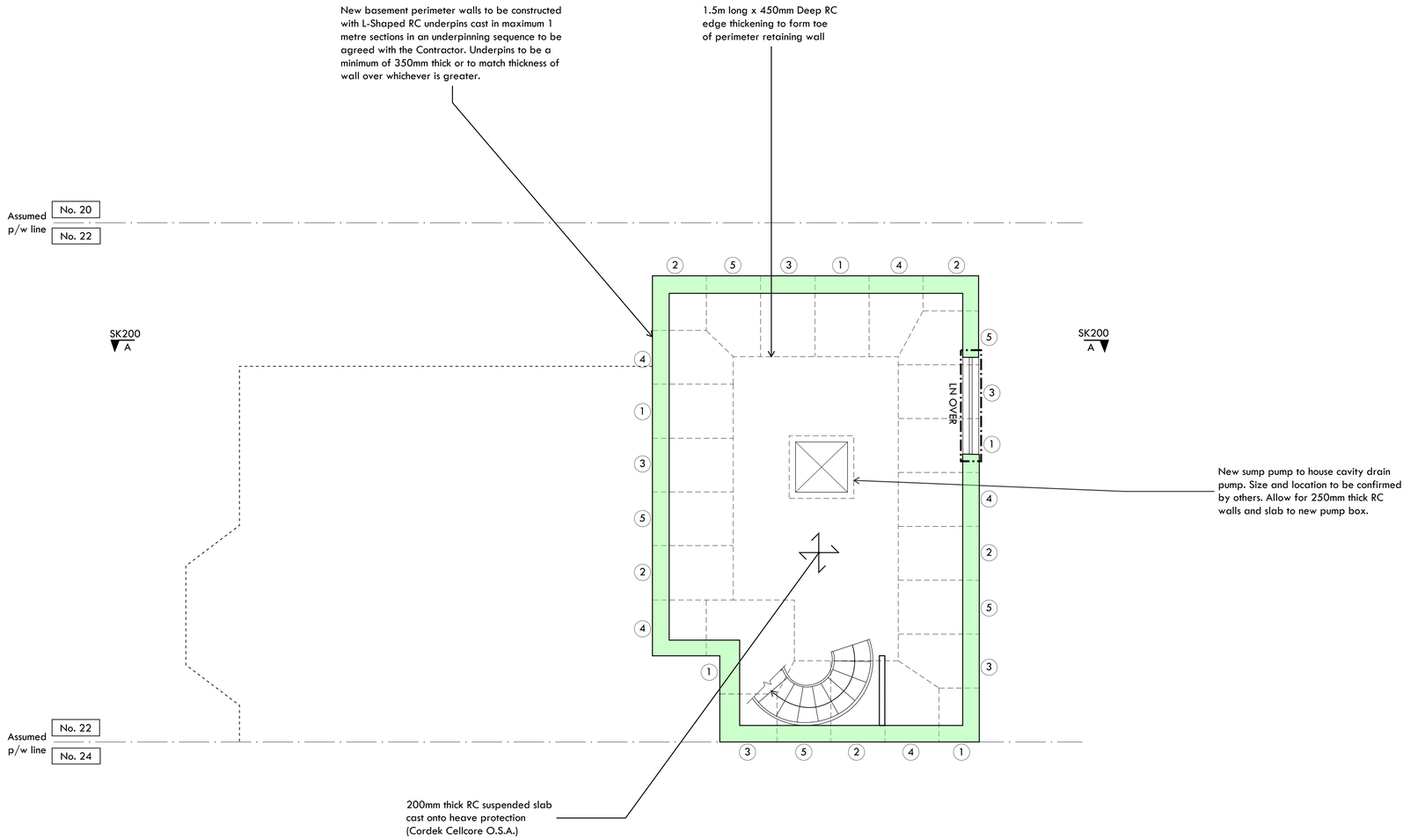
Code amber trigger value:

All interested parties, including the Adjoining Owner's Surveyor and his Engineer should be informed and further actions immediately agreed between two of the three Surveyors and implemented by the Building Owner. The Contractor is to ensure that he has 24 hour/7 days a week access to emergency support provision including but not limited to additional temporary props, needles, waling beams and concrete supply at the start of the excavation and prior to any likelihood of this trigger value being reached. If this value is reached the Contractor must without delay provide all interested parties with his plan to implement any emergency remedial and supporting works deemed necessary. The Contractor must be ready to carry out these works without delay if the movement continues and approaches the trigger value above.

Code red trigger value:

All interested parties including Adjoining Owner's Surveyor and Engineer will be informed immediately. Works will stop and be made safe using methods and equipment agreed at the above stage. The Contractor is to ensure that the movement has stopped as a result of the implemented remedial works designed and installed at this stage. The requirements of the Party Wall Act will also ensure that two of the three Surveyors and their advising Engineers shall then enter into an addendum Award, setting out whether or not the Building Owner's works can re-commence and when, and if so agree additional precautions or modifications to the proposals prior to re-commencement.

APPENDIX A – Proposed Structural Scheme Drawings



General notes:

1. Do not scale from this drawing
2. To be read in conjunction with all other structural drawings and the structural specification
3. To be read in conjunction with all other relevant disciplines drawings and specifications
4. All levels, setting out, waterproofing and fireproofing to be confirmed with the Architect
5. The Contractor is responsible for the temporary stability of the existing and proposed structure throughout the works. The sequencing and method of installation should be carefully considered and the temporary works should be designed and detailed by a suitably qualified person (appointed by the Contractor) prior to commencing the works
6. Contractor to request splices if required for handling purposes

STRUCTURAL Design STUDIO

Studio 3, Three Eastfields Avenue, SW18 1GN

020 8191 8688 | www.structuraldesignstudio.co.uk

Project

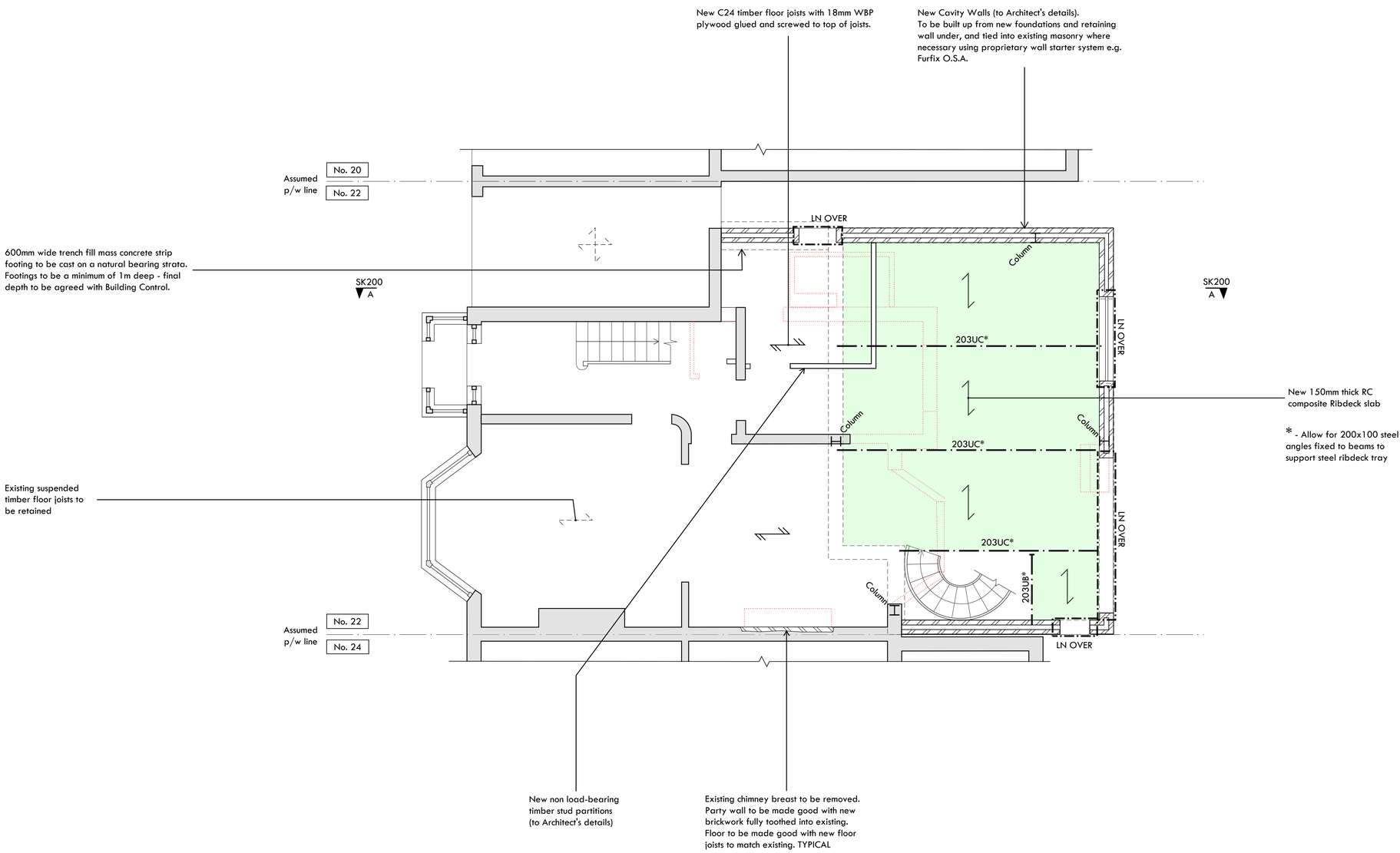
22 Park Drive, SW14 8RD

Drawing Title:

Proposed Basement Plan

Job. No.	Drawing no.	Revision
223298	SK090	Preliminary

Scale	Date	Drawn by	Rev. no:
1:50@A1	Sep 23	HB	P1



General notes:

1. Do not scale from this drawing
2. To be read in conjunction with all other structural drawings and the structural specification
3. To be read in conjunction with all other relevant disciplines drawings and specifications
4. All levels, setting out, waterproofing and fireproofing to be confirmed with the Architect
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6. Contractor to request splices if required for handling purposes

STRUCTURAL Design STUDIO

Studio 3, Three Eastfields Avenue, SW18 1GN

020 8191 8688 | www.structuraldesignstudio.co.uk

Project

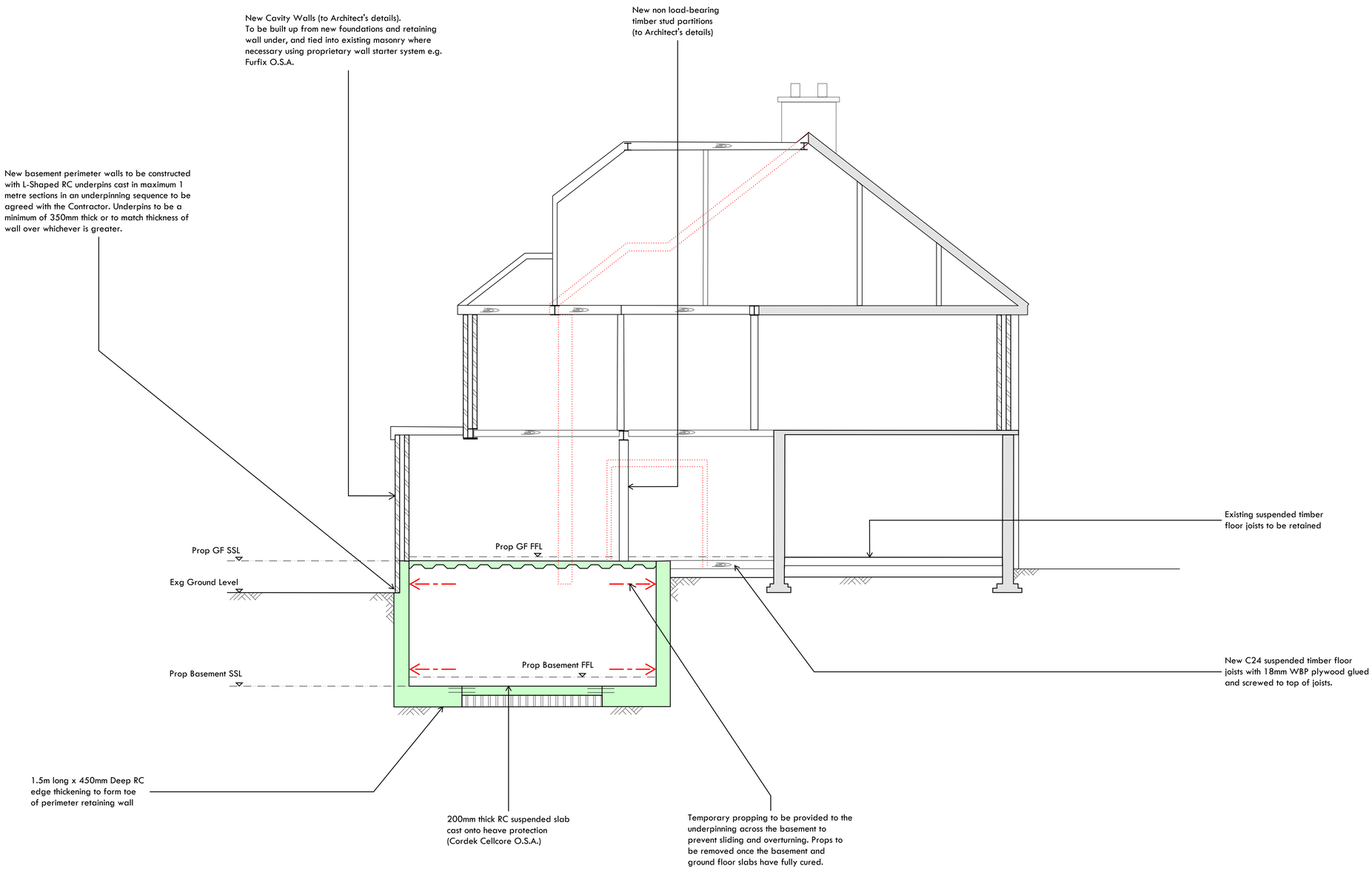
22 Park Drive, SW14 8RD

Drawing Title:

Proposed Ground Floor Plan

Job. No.	Drawing no.	Revision
223298	SK100	Preliminary

Scale	Date	Drawn by	Rev. no:
1:50@A1	Sep 23	HB	P1



General notes:

1. Do not scale from this drawing
2. To be read in conjunction with all other structural drawings and the structural specification
3. To be read in conjunction with all other relevant disciplines drawings and specifications
4. All levels, setting out, waterproofing and fireproofing to be confirmed with the Architect
5. The Contractor is responsible for the temporary stability of the existing and proposed structure throughout the works. The sequencing and method of installation should be carefully considered and the temporary works should be designed and detailed by a suitably qualified person (appointed by the Contractor) prior to commencing the works
6. Contractor to request splices if required for handling purposes

STRUCTURAL Design STUDIO

Studio 3, Three Eastfields Avenue, SW18 1GN

020 8191 8688 | www.structuraldesignstudio.co.uk

Project

22 Park Drive, SW14 8RD

Drawing Title:

Proposed Section A-A

Job. No.	Drawing no.	Revision
223257	SK200	Preliminary

Scale	Date	Drawn by	Rev. no:
1:50@A1	Oct 23	HB	P1

APPENDIX B – Retaining wall calculations

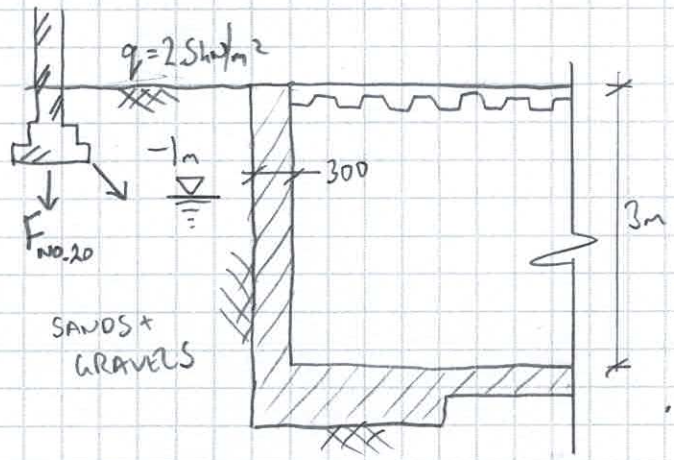
Project name: 22 PARK DRIVE

Project number: 223298 | Sheet: | Revision:

Date: 12/10/23. | Engineer: EM. | Checked:

STRUCTURAL Design STUDIO

RETAINING WALL DESIGN



SOIL PROPERTIES:

ASSUME → $\gamma = 20 kN/m^3$

$\phi' = 35°$ $\left[K_a = \frac{1-\sin 35}{1+\sin 35} = 0.271\right]$

WATER 1m bgl.

- WALL IS TO BE DESIGNED AS A PROPPED CANTILEVER (GF SLAB IS RESTRAINING THE TOP OF THE RETAINING WALL.

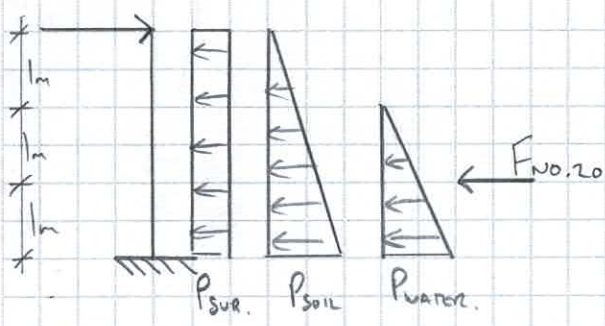
SURCHARGE LOAD FROM NO.20:

$F_{NO.20}$ = 8m(h) 1" WALL + 3no. 2m FLOOR WIDTHS + 2m OF PITCHED ROOF

$= 8(5.0, 0) + 3[2(0.8, 1.5)] + 2(1.0, 0.6) = (46.8, 10.2) kN/m$ (SLS)

APPLYING BOUSSINESQ THEORY, $F_{NO.20}$ APPLIES (5.2, 1.1) kN AT 2m DEPTH

ANALYSIS.



$P_{SUR} = K_a q h = 0.271 \times 2.5 \times 3 = 2.0 kN$ (SLS)
$3.0 kN$ (ULS).

$@ \frac{h}{2} = 1.5m$

$P_{SOIL} = \frac{1}{2} K_a \gamma h^2 = 0.5 \times 0.271 \times 20 \times 3^2$

$= 24.4 kN$ (SLS), $32.9 kN$ (ULS)

$@ \frac{h}{3} = 1m$

$P_{WATER} = \frac{1}{2} \gamma_w h^2 = 0.5 \times 10 \times 2^2 = 20 kN$ (SLS + ULS)

$@ \frac{h}{3} = 0.67m$

(SEE TEDDS ANALYSIS).

WORST CASE IS TEMPORARY CASE $M_{Ed} = 38.1 kNm$ ON INNER FACE

IN PERMANENT CASE $M_{Ed} = 34.0 kNm$ TO OUTER FACE

Project name: 22 PARK DRIVE

Project number: 223298 | Sheet: | Revision:

Date: 12/10/23 | Engineer: | Checked:

STRUCTURAL Design STUDIO

RC DESIGN

ASSUME: $t = 300mm$, 75mm COVER, H16 MAIN BARS, 10mm LINKS

C28/35, $f_{yk} = 500 N/mm^2$

$d = 300 - 75 - 10 - \frac{16}{2} = 207mm \quad (0.95d = 196.7mm)$

$M_{Ed} = 38.1 kNm$

$\rightarrow K = \frac{M_{Ed}}{bd^2 f_{ck}} = \frac{38.1 \times 10^6}{1000 \times 207^2 \times 28} = 0.032 < K' = 0.168$ ✓

∴ NO COMP. REINF. REQ'D.

$z = \frac{d}{2} \times \left(1 + \sqrt{1 - (3.53K)}\right) = \frac{207}{2} \times \left(1 + \sqrt{1 - (3.53 \times 0.032)}\right) = 201mm$

$z > 0.95d$ ∴ TAKE $0.95d = 196.7mm$

$A_{s,REQ} = \frac{M_{Ed}}{0.87 f_{yk} z} = \frac{38.1 \times 10^6}{0.87 \times 500 \times 196.7} = 445 mm^2/m$.

∴ USE H16s @ 200 c/c FRONT + BACK MAIN BARS

$A_{s,PROV} = 1005 mm^2/m > A_{s,REQ}$ ✓

APPENDIX C – Borehole Log

Unit 10 Coopers Place, Combe Lane,
Godalming, Surrey GU8 5SZ
Tel: 01883 343572
email: enquiries@riskmanagementltd.co.uk
Web: www.riskmanagementltd.co.uk

19th June 2023 RP/RML 8515

Rachael McKinlay
22 Park Drive
Sheen
London
SW14 8RD

For the attention of Rachael McKinlay

Dear Rachael,

22 PARK DRIVE, SHEEN, LONDON, SW14 8RD

Further to your recent instructions, we confirm that we attended the above noted site on Tuesday 6th June 2023 in order to carry out investigative fieldwork and Wednesday 14th June 2023 in order to undertake groundwater monitoring.

We now have pleasure in enclosing the following factual information.

1. *Light Percussion Borehole Record (BH1).*
2. *Groundwater Monitoring Results Sheet.*
3. *Drawing No. RML 8515/1 - Sketch Fieldwork Location Plan.*

Borehole BH1 was undertaken at 250mm below floor level.

We trust that you will find the enclosed self-explanatory, however, should you have any queries please do not hesitate to contact the writer at the above noted address.

yours faithfully,
for RISK MANAGEMENT LIMITED

Richard Price B.Sc. (Hons), F.G.S., M.I.Env.Sc.
Director

Risk Management

Risk Management Limited
Unit 10 Coopers Place
Combe Lane
Godalming
Surrey GU8 5SZ

Borehole Log

Borehole No.
BH1
Sheet 1 of 1

Project No.	RML 8515	**Coordinates:**		**Drilling Technique:** Light Percussion Rig	**Level (m):**
Site Address:	22 Park Drive, Sheen, London, SW14 8RD	**Date:**	06/06/2023	**Diameter (mm):** 131	**Scale:** 1:50

Stratum Description	Legend	Depth (m)	Level (m)	Samples and In Situ Testing: Depth (m)	Sample Type	Test Type	Results	Water Strikes	Well
Topsoil		0.10		0.15	D1				
MADE GROUND (brown silty clay with brick fragments and roots).		0.40		0.50	D2				
Orange-brown silty CLAY with roots.		1.00		1.00	D3				
Very dense fine to coarse sub-angular to sub-rounded GRAVEL with orange-brown silty sand.				1.50	D4				
				2.00	D5	SPT	N=51 (12,12/13,11,13,14)	▼	
				2.50	D6				
				3.00	D7	SPT	N=4 (7,3/1,1,1,1)		
		3.30		3.50	D8				
Grey-brown silty CLAY.				4.00	D9				
				4.50	D10				
				5.00	D11	SPT	N=12 (2,3/3,2,3,4)		
				5.50	D12				
Borehole terminated at 6.00m depth		6.00		6.00	D13				

Remarks: Service pit excavated to 1.20m depth. Groundwater encountered at 2.40m depth, no rise noted after 20 minutes. Standpipe installed to 6.00m depth. Borehole 250mm below floor level.

KEY

D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
W = Water Sample

CPT = Cone Penetration Test
SPT = Standard Penetration Test
V = Vane Test
PP = Pocket Penetrometer
MEXE = Insitu CBR test

AGS

Risk Management Limited
Tel : 01883 343572

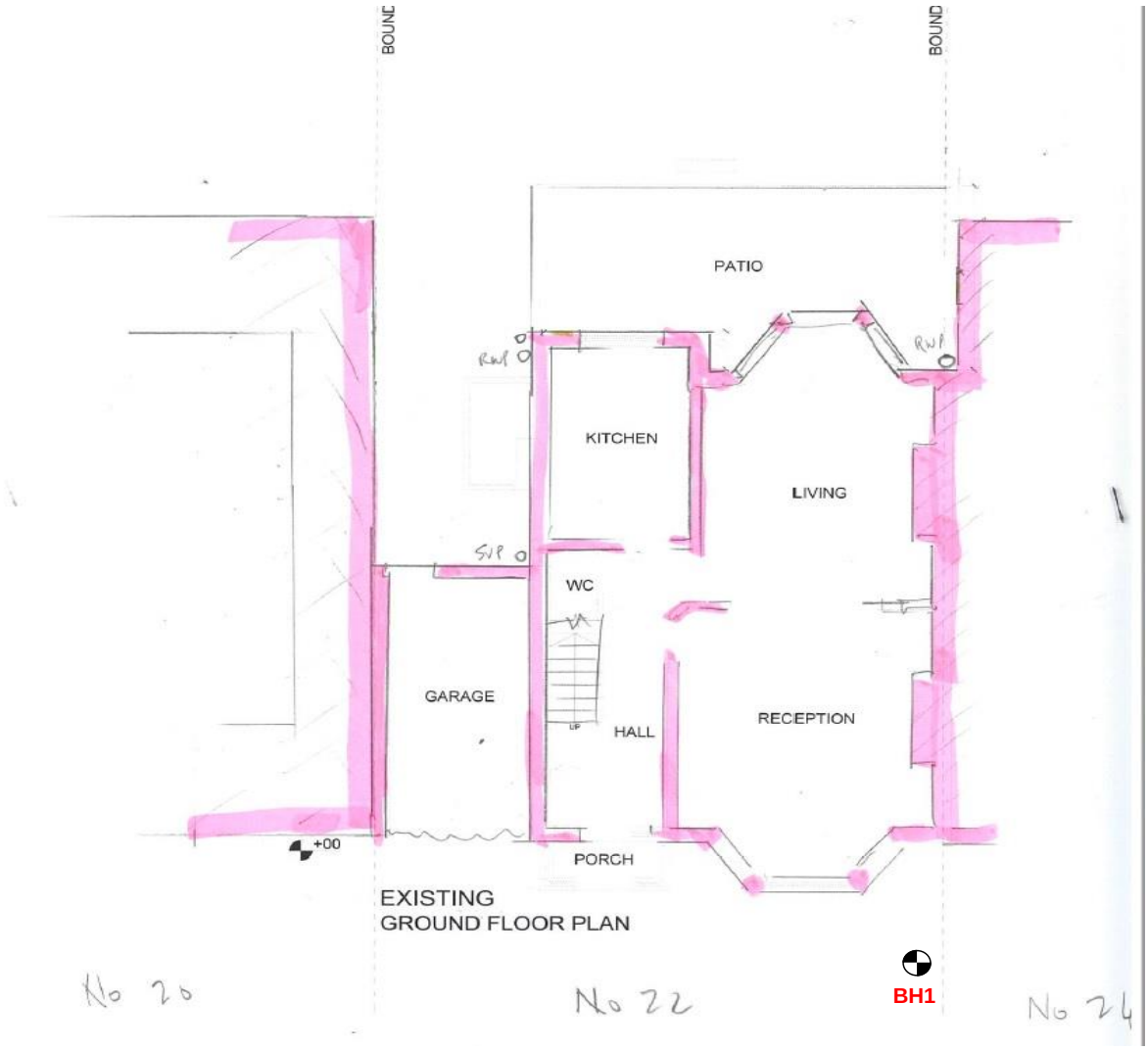
GROUNDWATER MONITORING RESULTS

Project Name:	22 Park Drive, Sheen, London, SW14 8RD	Project No. :	RML 8515
		Date :	June 2023

BH No.	Date							Groundwater Level (m)
BH1	14th June 2023							2.04

KEY

Borehole Location



Risk Management	Title : **SKETCH FIELDWORK LOCATION PLAN**
RISK MANAGEMENT LIMITED **Unit 10 Coopers Place, Combe Lane,** **Godalming, Surrey GU8 5SZ** **Tel : 01883 343572**	Project Location : 22 Park Drive, Sheen, London, SW14 8RD
	Report Date : June 2023 — Scale : NTS
	Drawn By : RP — Drg. No. RML 8515 /1

Unit 10 Coopers Place, Combe Lane,
Godalming, Surrey GU8 5SZ
Tel: 01883 343572
email: enquiries@riskmanagementltd.co.uk
Web: www.riskmanagementltd.co.uk

19th May 2023 RP/RML 8267

Suite 103 Boundary House
Boston Road
Hanwell
London
W7 2QE

For the attention of Orla Kelly

Dear Orla,

22 PARK DRIVE, SHEEN, LONDON, SW14 8RD

Further to your recent instructions, we confirm that we attended the above noted site on Monday 3rd October 2022 in order to carry out investigative fieldwork.

We now have pleasure in enclosing the following factual information.

1. *Drive-in-Sampler Borehole Record (DIS1).*
2. *Hand Excavated Trial Pit Records (TP1-TP3).*
3. *Drawing No. RML 8267/1 - Sketch Fieldwork Location Plan.*

We trust that you will find the enclosed self-explanatory, however, should you have any queries please do not hesitate to contact the writer at the above noted address.

yours faithfully,
for RISK MANAGEMENT LIMITED

Richard Price B.Sc. (Hons), F.G.S., M.I.Env.Sc.
Director

Risk Management Limited
Unit 10 Coopers Place
Combe Lane
Godalming
Surrey GU8 5SZ

Borehole Log

Borehole No. **DIS1**

Sheet 1 of 1

Project No.	RML 8267	**Coordinates:**		**Drilling Technique:** Drive-in-Sampler	**Level (m):**
Site Address:	22 Park Drive, Sheen, London, SW14 8RD	**Date:**	03/10/2022	**Diameter (mm):** 80	**Scale:** 1:25

Stratum Description	Legend	Depth (m)	Level (m)	Samples and In Situ Testing				Water Strikes	Well
				Depth (m)	Sample Type	Test Type	Results		
Grass over Topsoil		0.15		0.15	D1				
MADE GROUND (brown silty clayey sand with gravel and brick fragments).		0.50		0.50	D2				
Brown clayey SAND. *becoming orange-brown with occasional fine to medium sub-angular gravel from 0.70m depth*		1.00		1.00	D3				
Soft* orange-brown very sandy CLAY with occasional fine to coarse angular to sub-rounded gravel.		1.60		1.50	D4				
Light grey-brown silty SAND with occasional fine to coarse sub-angular to sub-rounded gravel.		2.00		2.00	D5				
Borehole terminated at 2.00m depth									

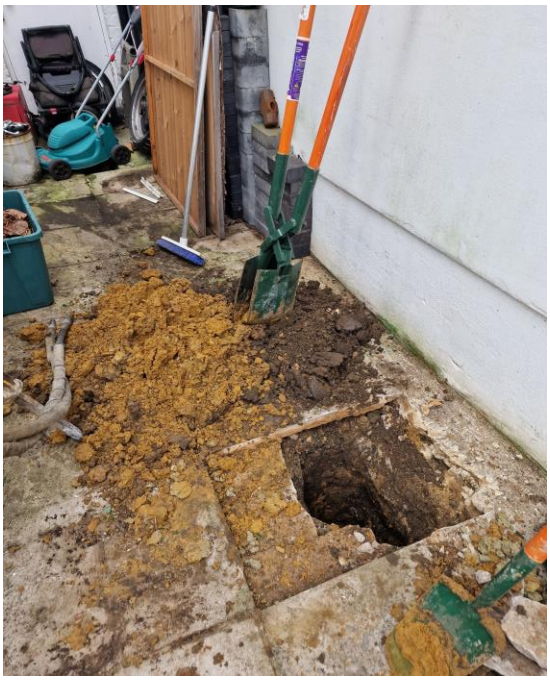
Remarks: Service pit excavated to 1.00m depth. Groundwater not noted during boring. Borehole terminated at 2.00m depth owing to 'caving-in'. *Strengths denoted are from drillers observation and not laboratory testing.

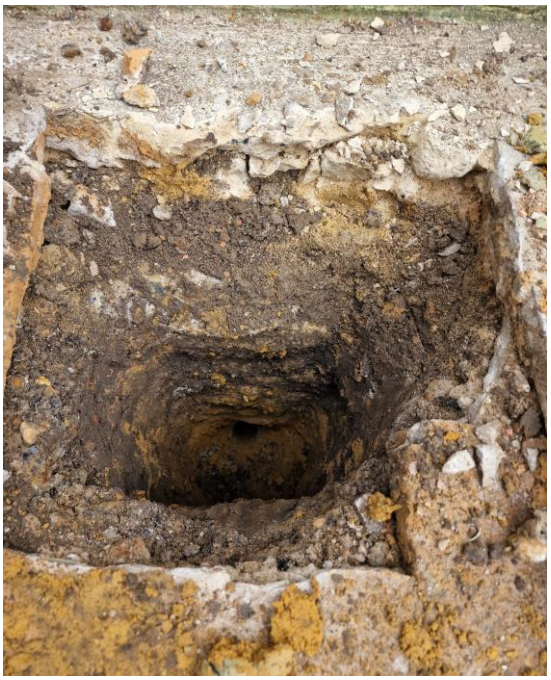
KEY

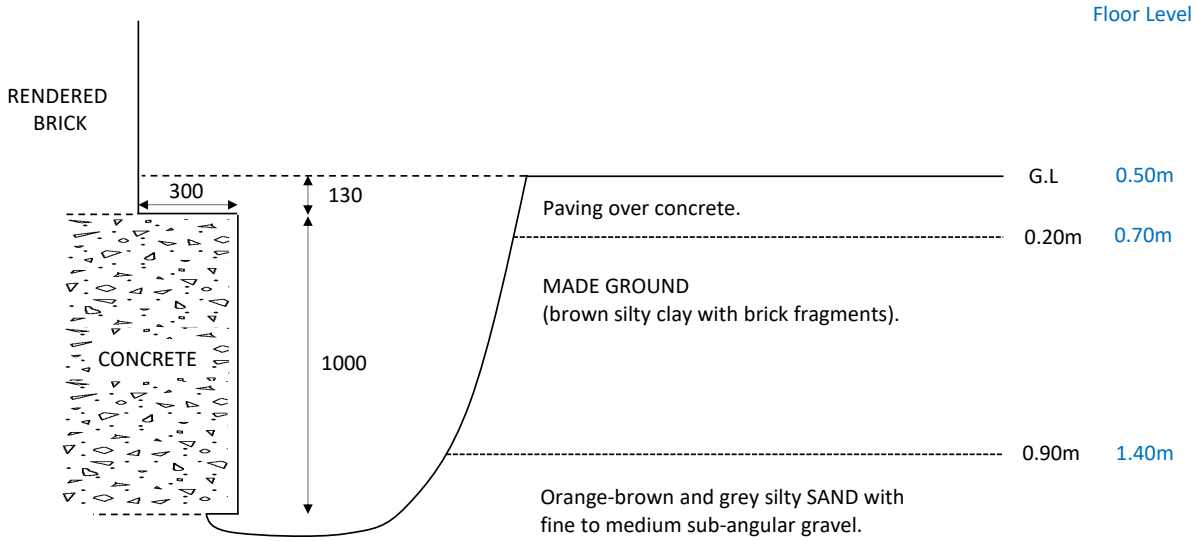
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
W = Water Sample

CPT = Cone Penetration Test
SPT = Standard Penetration Test
V = Vane Test
PP = Pocket Penetrometer
MEXE = Insitu CBR test

AGS







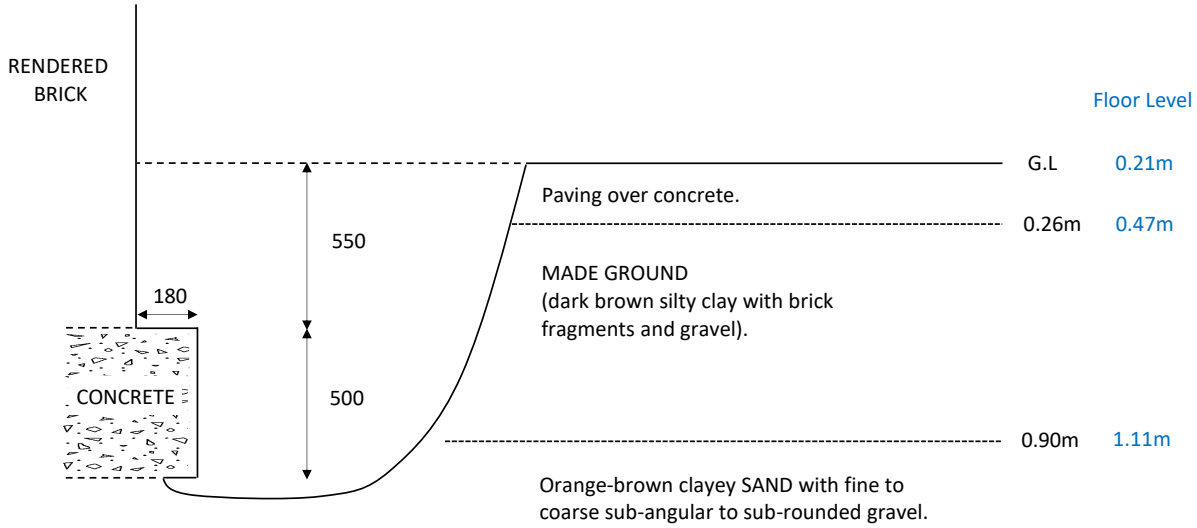
All dimensions in mm unless otherwise stated.

Underside of foundation approximately 1.13m below existing ground level and 1.63m below floor level.

Risk Management

RECORD OF HAND EXCAVATED TRIAL PIT

Title :	**TRIAL PIT TP1**
Project Location :	22 Park Drive, Sheen, London, SW14 8RD
Job No : RML 8267	Scale : Not To Scale
Date : 3rd October 2022	

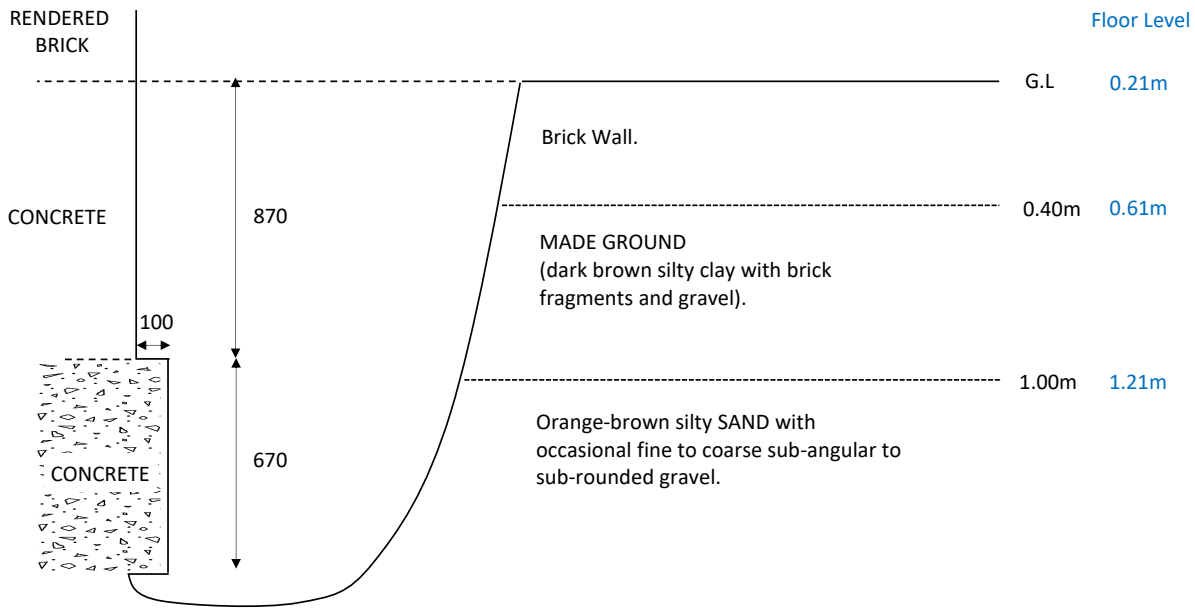


All dimensions in mm unless otherwise stated.

Underside of foundation approximately 1.05m below existing ground level and 1.26m below floor level.

Risk Management

RECORD OF HAND EXCAVATED TRIAL PIT	Title : **TRIAL PIT TP2**
	Project Location : 22 Park Drive, Sheen, London, SW14 8RD
	Job No : RML 8267 — Scale : Not To Scale
	Date : 3rd October 2022



All dimensions in mm unless otherwise stated.

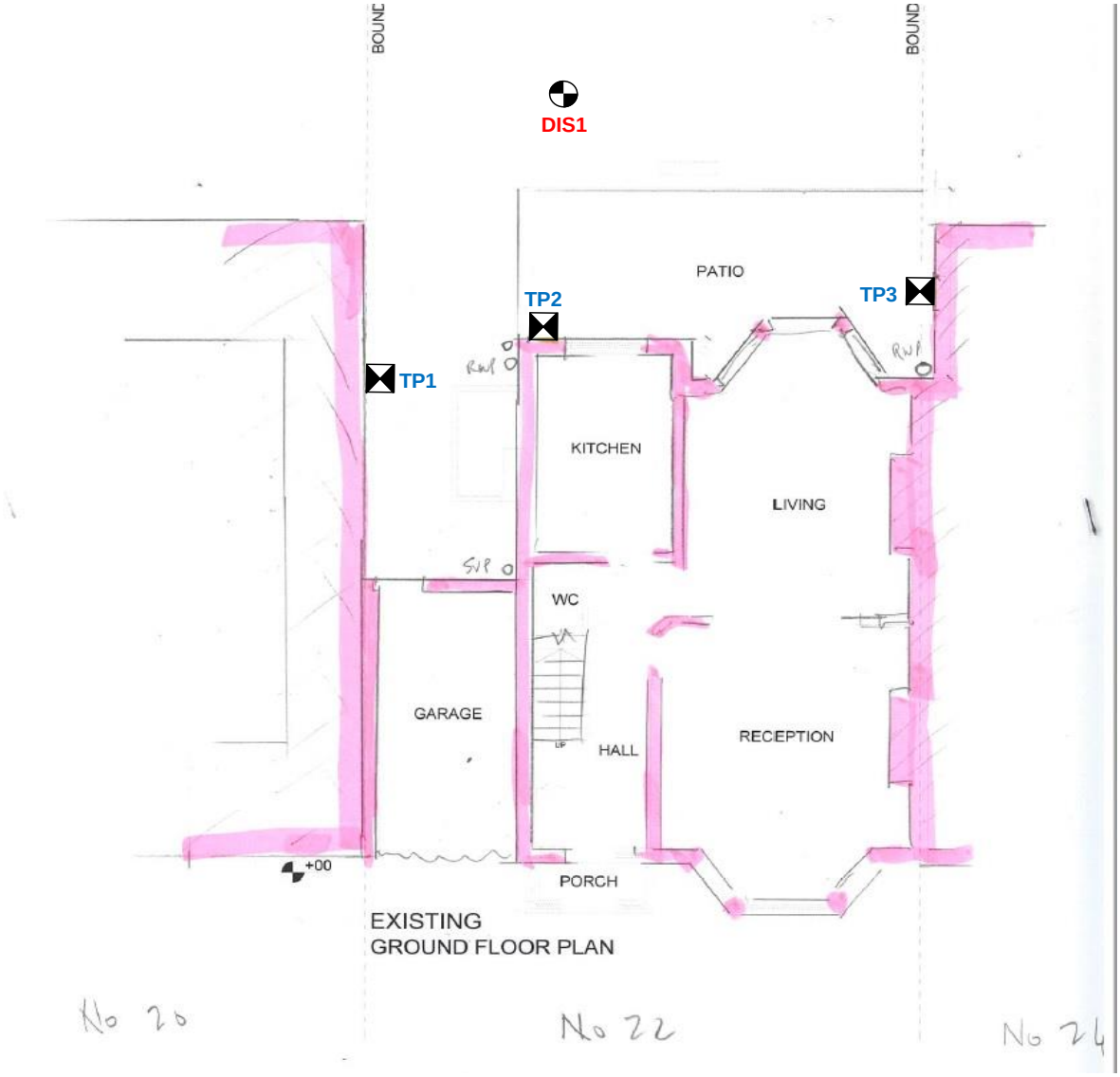
Underside of foundation approximately 1.54m below existing ground level and 1.75m below floor level.

Risk Management	Title : **TRIAL PIT TP3**	
	Project Location : 22 Park Drive, Sheen, London, SW14 8RD	
RECORD OF HAND EXCAVATED TRIAL PIT	Job No : RML 8267	Scale : Not To Scale
	Date : 16th May 2023	

KEY

Borehole Location

Trial Pit Location



Risk Management	Title : **SKETCH FIELDWORK LOCATION PLAN**
RISK MANAGEMENT LIMITED **Unit 10 Coopers Place, Combe Lane,** **Godalming, Surrey GU8 5SZ** **Tel : 01883 343572**	Project Location : 22 Park Drive, Sheen, London, SW14 8RD
	Report Date : October 2022 — Scale : NTS
	Drawn By : RP — Drg. No. RML 8267 /1

6. Site and Assessment Verification Form

This Site and Assessment Verification form should be completed and submitted as part of the planning application. The 'Chartered Professional Verification' table should be completed by the specialist that undertook the required assessment(s) (Screening Assessment and / or Basement Impact Assessment). If chartered professionals from different expertise areas carried out parts of the assessment(s), please ensure that separate Site and Assessment Verification forms are completed and submitted.

Site Details

Site Details	Applicant Information
Site name	22 Park Drive, SW14 8RD
Planning application reference (if applicable)	
Address & postcode	22 Park Drive, SW14 8RD
Brief description of the proposed works	Construction of a new basement beneath the proposed rear extension.
Geology type	Sands and gravels overlying London Clay
Presence of aquifer?	Yes
Total site area (Ha)	
Is the site currently known to be at risk of flooding from any sources?	No

Chartered Professional Verification

Professional Details	Applicant Information
Name	Sarah Wadley MEng CEng MIStructE
Profession / area of expertise	Structural and Civil Engineer
Chartered institution and membership level	Chartered Structural Engineer IStructE
Brief description of assessment involvement	Undertook screening and scoping assessment
Brief summary of the assessment results	Proposed works are not going to have a negative impact on the slope stability, flood risk or subterranean hydrology on the site or neighbouring sites.
Declaration of assessment results	Proposed works are not going to have a negative impact on the slope stability, flood risk or subterranean hydrology on the site or neighbouring sites.
Signature