



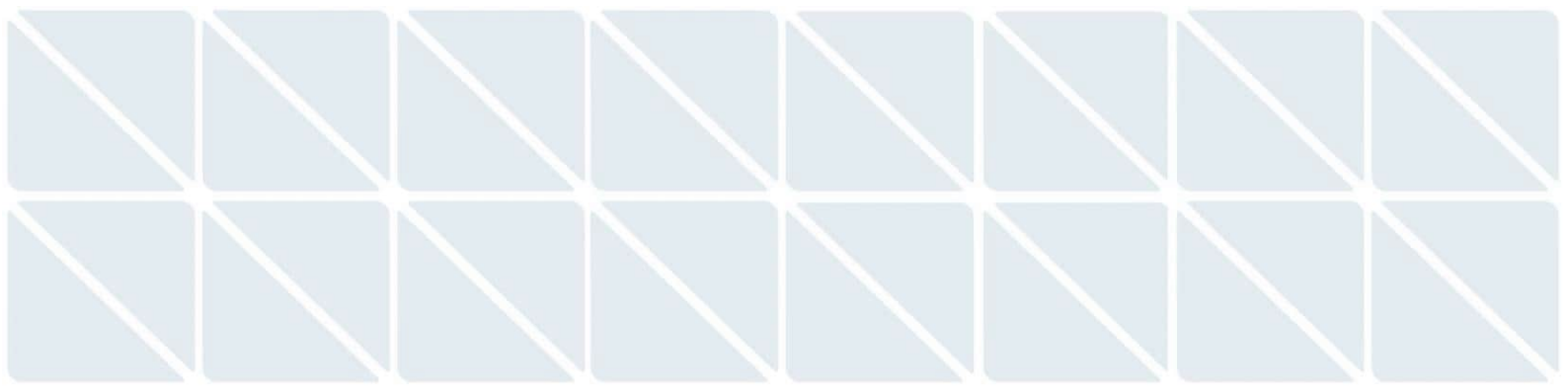
A-squared Studio

Channing School, Brunner House Redevelopment

Basement Impact Assessment

November 2023

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Project Name	Channing School, Brunner House Redevelopment
Project Number	2992
Client	Heyne Tillett Steel Ltd
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Appendix A: Various Existing and Proposed Development Drawings

Appendix B: Site Investigation and Basement Impact Assessment Report

Appendix C: Phase I Desk Study Report

Appendix D: Ground Investigation Scope Note

Appendix E: Building Ground Movement Assessment Report



1. Non-Technical Summary

- 1.1.1. The site location is Channing School, Brunner House, The Bank, Highgate, London, N6 5HF.
- 1.1.2. The site currently comprises a two-storey building ("Brunner House") with no basement level and soft-landscaping to the northeast and east of the building. There is an area of soft-landscaping to the northern portion of the site, as well as some planters and complimentary soft landscaping to the eastern portion of the site.
- 1.1.3. The scheme for the proposed redevelopment of the site consists of the partial demolition of the building to the north, and the erection of a new two-storey building, extending out laterally northwards with an additional partial basement level. The existing building footprint will also be extended out slightly to the southwestern corner of the site, with a set of stairs added to this area, connecting the ground floor to the first floor. The proposed building will continue to be used as it is currently, i.e. classroom space, with some offices and water closets with the new basement level being used for new Design & Technology (DT) facilities. These facilities include a DT Workshop & DT Office. It is proposed that the existing soft landscaping to the eastern portion of the site is to be retained.
- 1.1.4. The following assessments are presented in the current document:
- Screening.
 - Scoping.
 - Additional evidence/assessments (as required), including:
 - o Architectural and structural drawings.
 - o Ground movement assessment.
 - Basement impact assessment.
- 1.1.5. The ground conditions beneath the site within the zone of influence given the proposed development comprise (based on a review of BGS data and site-specific ground investigation):
- **Made Ground** to a depth of ~1.0m below ground level (bgl).
 - **Bagshot Formation** which overlies the Claygate Member, is expected to be at least 5.5m thick to a depth ~6.5m bgl.
 - **Claygate Member** which overlies the London Clay Formation, is expected to be at least 6.0m thick to a depth ~12.5m bgl.
 - **London Clay Formation** which overlies the Thanet Sand Formation, is expected to be at least 113.5m thick to a depth of ~126.00m bgl.
- 1.1.6. The hydrogeological conditions at the site, relevant to the proposed development, are predicted to comprise:
- Finite bodies of local perched groundwater within pockets of granular Made Ground.
 - The Bagshot Formation and Claygate Member are classified as Secondary A Aquifers, defined as containing permeable layers capable of supporting water supplies at a local rather than strategic scale, in some cases forming an important source of base flow to rivers. These strata are aquifers formerly classified as Minor Aquifers.



- Data available from both the historical BGS boreholes and data included as part of the Site Investigation (SI) and Basement Impact Assessment (BIA) Report issued January 2012 (ref. J11240) for the wider Channing School site, prepared for Heyne Tillett Steel Ltd (HTS) by Geotechnical & Environmental Associated Limited (GEA), dated January 2012 (ref. J11240), included as Appendix B, indicates that the shallow groundwater table is present between 4.02 to 7.19m bgl within the Bagshot Formation and Claygate Member. The groundwater is anticipated to flow downhill, towards the southeast within these materials.

1.1.7. The BIA has assessed land stability, and the impacts of the proposed development on neighbouring off-site structures will be limited to Category 1 – Very Slight, in accordance with the Burland Scale. The impact to the adjacent public highway to the front of the north and northwest of the site is also considered to be low, based on movements predicted in the ground movement assessment.

1.1.8. The BIA has identified a hydrogeological impact. The excavation will be within the Made Ground and partially within the Bagshot Formation. The latter of which is classed as a Secondary A Aquifer. The Bagshot Formation Member in which the basement sits are largely cohesive with low permeabilities, and the proposed basement is set back from the edges of the site. The overall risk of groundwater flooding associated with the creation of a new basement box is considered to be low.



2. Introduction

2.1. Overview

2.1.1. A-squared Studio Engineers Ltd (A-squared) was engaged by Heyne Tillett Steel Ltd (HTS) to prepare a Basement Impact Assessment (BIA) for the proposed redevelopment of Channing School, Brunner House, The Bank, Highgate, London, N6 5HF. The purpose of this assessment is to consider the potential effects of the proposed works at the site on the local hydrology, geology and hydrogeology, and the potential impacts to neighbours and the wider environment.

2.1.2. The development site is located within the jurisdiction of the London Borough of Haringey.

2.1.3. The location of the proposed development is shown in Figure 2.1.



Figure 2.1 Location of the proposed development (red line reflects the site boundary used for this assessment)

2.1.4. The BIA has followed the approach developed by Camden Council, which is a robust approach and is considered to represent industry best practice.

2.1.5. The BIA comprises the following elements:

- Screening.
- Scoping.
- Additional evidence / assessments (as required), including:
 - o Architectural and structural drawings.
 - o Ground investigation.
- Basement impact assessment.



2.2. Credentials

- 2.2.1. This technical note has been reviewed by Hamed Shariff. Hamed is a Chartered Member of the Institution of Civil Engineers (MICE) with several years of experience in geotechnical design, hydrogeological assessment, and construction of basements. Hamed is an Associate at A-squared Studio Engineers Ltd (A-squared) and has a Master of Engineering from University College London. He also heads the hydrogeological division of A-squared and has experience in groundwater flow modelling and impact reviews.
- 2.2.2. The BIA has been approved by Alex Nikolic. Alex is a Chartered Member of the Institution of Civil Engineers (MICE) with more than 20 years of industry experience in geotechnical design and construction of ground engineering works. Alex has attained post-graduate qualifications, including a Master of Science in Soil Mechanics (MSc DIC) from the Imperial College London and a Master of Studies (MSt Cantab) in Sustainable Development from the University of Cambridge. Alex was formerly the Director of Ground Engineering at Buro Happold Ltd.

2.3. Sources of Information

- 2.3.1. The following baseline data has been referenced to complete the BIA in relation to the proposed development:
- Current design information/data and drawings (available at the time of undertaking the assessment), provided by the project design team, included as Appendix A.
 - *Site Investigation & Basement Impact Assessment Report* for Channing School prepared for (and provided by) HTS, prepared by Geotechnical & Environmental Associated Limited (GEA), issued January 2012 (ref. J11240), included as Appendix B.
 - *Phase I Desk Study Report* for Channing School, Brunner House Redevelopment prepared by A-squared, issued October 2023 (ref. 2992-A2S-XX-XX-RP-Y-0001-00), included as Appendix C.
 - *Ground Investigation Scope Note* for Channing School, Brunner House Redevelopment prepared by A-squared, issued October 2023 (ref. 2992-A2S-XX-XX-TN-Y-0001-01), included as Appendix D.
 - *Building Ground Movement Assessment* prepared by A-squared, dated November 2023 (ref. 2992-A2SI-XX-XX-RP-Y-0003-00).
 - *Envirocheck Report* for Channing School prepared by Landmark Information Group, dated October 2023 (ref. 319191896_1_1).
 - *Preliminary Unexploded Ordnance (UXO) Risk Assessment* for Channing School, London, prepared by Brimstone Limited, dated October 2023 (ref. PRA-23-2269-00).
 - Site walkover undertaken by a representative of A-squared on 6th October 2023.
 - Information from HTS related to the surface water and flooding of the site (dated 20/10/2023).
- 2.3.2. Information available in the public domain:
- Google Earth (ref. earth.google.com/web/), accessed 4th October 2023.
 - Flood Maps for Planning from the Environment Agency. (ref. <https://flood-map-for-planning.service.gov.uk/>), accessed 4th October 2023).
 - The Lost Rivers of London by Nicholas Barton, 1962.
 - British Geological Survey, GeoIndex Onshore GIS database (accessed 4th October 2023); <https://mapapps2.bgs.ac.uk/geoindex/>.
 - Department for Environment, Food & Rural Affairs (DEFRA), Magic Map Application (accessed 4th October 2023); <https://magic.defra.gov.uk/MagicMap.aspx>.



- Historic England, online Aerial Photo Explorer (accessed 4th October 2023); <https://historicengland.org.uk/images-books/archive/collections/aerial-photos/>.
- UK Health Security Agency (UKHSA) and BGS radon mapping (accessed 4th October 2023); <https://www.ukradon.org/information/ukmaps>.
- Local authority planning portal (ref. https://publicregister.haringey.gov.uk/pr/s/register-view?c__r=Arcus_BE_Public_Register), accessed 4th October 2023.

2.4. Existing Development

- 2.4.1. The site is located within the Highgate Ward of the London Borough of Haringey (the Council).
- 2.4.2. The development site is located at Channing School, Brunner House, The Bank, Highgate, London, N6 5HF.
- 2.4.3. The site has approximate dimensions of 70m-long by 25m-wide, covering an area of approximately 0.15ha.
- 2.4.4. The approximate ground surface elevation at the site varies between 111m above Ordnance Datum (OD) within the northeastern portion of the site and 114mOD in the southwestern portion.
- 2.4.5. The change in elevation across the site causes a slope, which falls towards the north and east. With a steep slope in the area of soft-landscaping immediately north of Brunner House, where there is a considerable reduction in gradient.
- 2.4.6. As shown in Figure 2.2, the current development consists of Brunner House, a two-storey masonry building with no existing basement space. It is used as classroom space, with some offices and water closets. There is an area of soft-landscaping to the northern portion of the site, as well as some planters and complimentary soft landscaping to the eastern portion of the site.

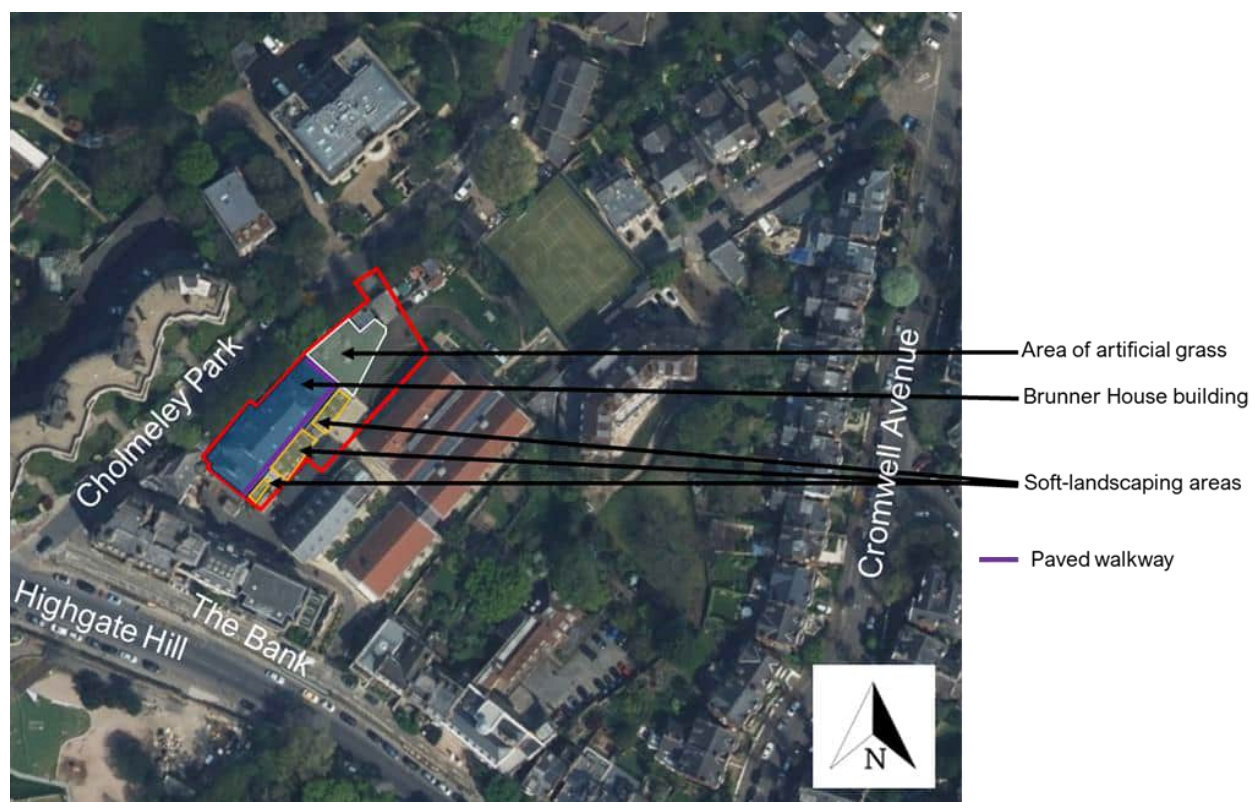


Figure 2.2 Existing site layout (red line indicative of site boundary)



- 2.4.7. The current development (“Brunner House”) is not a listed building. The original part of the building was constructed in the early 1990’s and was later extended vertically in 2003.

2.5. Neighbouring Properties and Infrastructure

- 2.5.1. To the immediate north of the site there is an area of open space. To the immediate northeast of the site, there is a building currently used as a “Sixth Form Centre” for recreational use and study space with an adjoining sports hall. To the southeast of the site, there is the “Founder’s Hall”, a performing arts theatre. “Channing Cottage”, is located to the immediate southwest of the site beyond the boundary wall (between “Cholmeley Park” and the wider Channing School site). Cholmeley Park, is a single carriageway road which trends southwest-northeast. “Channing House” is located to the immediate southwest to south of the site (to the immediate east of “Channing Cottage”). “Slingly House and Westview House” is located to the immediate south of the site (to the immediate east of Channing House). “Haigh House”, is located to the immediate southwest of the site (to the immediate east of Slingly House and Westview House).
- 2.5.2. There is a boundary wall along the northwestern boundary of the Brunner House building associated with the Cholmeley Park road. This masonry wall is immediately adjacent to the northwestern part of Brunner House along selected alignments and is a maximum of approximately 4m in height from ground level. The structure is considered to be in good condition. There is a smaller masonry wall in front of this wall, which is approximately 1m in height. The vegetated bank is retained between this smaller wall and the larger boundary wall. It is located immediately adjacent to Cholmeley Park. The southwestern walls of the existing Brunner House structure are immediately adjacent to the northeastern walls of “Channing House”. This is a stepped building that is a maximum of five storeys in height, with an additional basement level present across the entire building footprint. Channing House consists of classrooms and office space.
- 2.5.3. All of the buildings to the south are classroom, offices and reception space associated with the wider Channing School site and have associated limited (complementary strip) areas of associated soft-landscaping. Other than the road to the immediate northwest and western boundary of the site (Cholmeley Park), the immediate surrounding land uses of the site are associated with the wider Channing School site.
- 2.5.4. There is one listed building (Grade II) within the zone of influence of the proposed development, which is Slingly and Westview House (Historic England, ref. 1294537).
- 2.5.5. Asset owners with existing underground services that may be impacted by the proposed development include the following:
- London Borough of Haringey.
 - Thames Water Ltd – Clean water and wastewater.
 - BT (BT Group Plc) and Virgin Media Ltd – Telecoms.
 - UK Power Networks Ltd – Electricity distribution.
 - Cadent Gas Ltd and Southern Gas Networks Plc – Gas.
- 2.5.6. Asset protection teams for the assets listed in 2.5.5 may require engagement as the design of the proposed development continues.

2.6. Proposed Development

- 2.6.1. Relevant drawings for the proposed development are included in Appendix A.



- 2.6.2. The development is planned to continue to be used for educational use (commercial) as part of the wider Channing School site.
- 2.6.3. The scheme for the proposed redevelopment of the site consists of the partial demolition of the building to the north, and the erection of a new two-storey building, extending out laterally northwards with an additional partial basement level. The existing building footprint will also be extended out slightly to the southwestern corner of the site, with a set of stairs added to this area, connecting the ground floor to the first floor. The proposed building will continue to be used as it is currently, i.e. classroom space, with some offices and water closets with the new basement level being used for new Design & Technology (DT) facilities. These facilities include a DT Workshop & DT Office.
- 2.6.4. The redeveloped structure is anticipated to be supported by shallow foundations.
- 2.6.5. A contiguous piled wall is proposed to be installed to the northern, southern and western boundary in the area of the proposed basement.
- 2.6.6. It is proposed that the existing soft landscaping to the eastern portion of the site is to be retained.



3. Desk Study

- 3.1.1. A *Phase I Desk Study*, included in this report as Appendix C, has been produced by A-squared. This desk-based review has been used to inform this BIA.
- 3.1.2. The *Phase I Desk Study* includes a Preliminary Risk Assessment (PRA) which highlights the potentially complete contaminant linkages. Unacceptable risks have been identified to human health of proposed site end users, on-site buildings / structures (proposed) and controlled waters.
- 3.1.3. A Ground Investigation (GI) is anticipated to be undertaken to further assess the unacceptable risks identified as part of the PRA (included as part of the *Phase I Desk Study Report*) and a further understanding of the Geo-Environmental and Geotechnical conditions of the site. As part of the planned works, a *Ground Investigation Scope Note*, has been produced by A-squared, included in this report as Appendix D.



4. Screening

4.1. Subterranean (Groundwater) Flow, Screening Flowchart

Question	Response	Details
1. Is the site located directly above an aquifer?	Yes	The site is underlain by the Bagshot Formation which is classified as a Secondary A Aquifer.
2. Will the proposed basement extend beneath the water table surface?	No	It is not anticipated that the new basement will extend below the water table surface. While during the intrusive on-site GEA ground investigation groundwater was encountered within the Bagshot Formation and Claygate Member strata between 2.00 to 8.00m bgl, records from subsequent groundwater monitoring visits indicates that the shallow groundwater table is present between 4.02 to 7.19m bgl within the Bagshot Formation and Claygate Member. The proposed partial basement level is not expected to extend beyond 3.5m bgl.
3. Is the site within 100m of a watercourse, well (used / disused) or potential spring line?	No	The site is not within 100m of a watercourse, well or potential spring line. There are records which suggest that a tributary of a lost river of London, the "Fleet" river is present approximately 425m south of the site.
4. Will the proposed development result in a change in the effective proportion of hard surfaced / paved areas (including impermeable basement rooftops beneath garden areas)?	Yes	As the proposed building footprint is to be extended northwards, there will be a reduction of the majority of the existing open space to the north of the existing Brunner House building. The soft-landscaping to the eastern portion of the building is to be retained.
5. As part of the site drainage, will more surface water (e.g. rainfall and runoff) than at present be discharged to the ground?	No	The proposed development will maintain the existing surface water discharge conditions within a proposed site wide drainage system. In the case of extreme events, it is envisaged that the overland flow directions will not change.
6. Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean level of any local pond?	Yes	There is the potential for the lowest point of the proposed excavation to be close to, or lower than, the mean level of the closest pond to the site which is the "Upper Pond Nature Area", which is associated with Waterlow Park (public recreational open space), and located approximately 217m southwest of the site, down the anticipated hydraulic gradient.

4.2. Stability Screening Flow Chart

Question	Response	Details
1. Does the existing site include slopes, natural or man-made, greater than 7 degrees (approximately 1 in 8)?	Yes	The gradient across the site is greater than 7 degrees. There is a significant slope to the north of the site. As part of the Phase I Desk, included as Appendix B, through the use of several resources to assess the history of the site, it is evident that the northern portion of the site has been anthropogenically raised (first evident in 1937). It is evident that although the northern portion has been raised, it is still lower than the southern portion. This area is currently used as open space consisting of a mixture of artificial grass and small trees.
2. Will the proposed re-profiling or landscaping at the site change slopes at the property boundary to more than 7 degrees (approximately 1 in 8)?	No	There are no re-profiling / landscaping works proposed that will increase the slopes existing on site to gradients greater than 7 degrees.



Question	Response	Details
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees (approximately 1 in 8)?	No	The neighbouring areas do not have a slope greater than 7 degrees.
4. Is the site within a wider hillside setting in which the general slope is greater than 7 degrees (approximately 1 in 8)?	Yes	The site is founded on a wider hillside setting in which the general slope is greater than 7 degrees.
5. Is the London Clay the shallowest strata at the site?	No	The GEA investigation and historical BGS borehole records show the site is underlain by the Bagshot Formation which is underlain by the Claygate Member.
6. Will any trees be felled as part of the development and/or are any works proposed within any tree protection zones where trees are to be retained?	Yes	As part of the proposed development works, some young trees in the northern portion of the site will be removed.
7. Is there a history of seasonal shrink-swell subsidence in the local area and/or evidence of such effects at the site?	No	The London Clay strata is usually classified as having a high volume-change potential and hence can lead to seasonal shrink-swell subsidence where buildings are founded in desiccated soils. However, there is no specific evidence of subsidence having been experienced on site or in the immediate surrounding area. In addition, the London Clay strata is not the shallowest natural strata on-site, so seasonal shrink-swell subsidence is not considered to be of concern for the site.
8. Is the site within 100m of a watercourse or a potential spring line?	No	The site is not within 100m of a watercourse, well or potential spring line. There are records which suggest that a tributary of a lost river of London, the "Fleet" river is present approximately 425m south of the site.
9. Is the site within an area of previously worked ground?	Yes	Historical records reviewed as part of the Phase I Desk Study indicated that from approximately 1935, infilled ground in the form of an artificial slope (as existing) was incorporated to the northern portion of the site.
10. Is the site within an aquifer? If so, will the proposed basement extend beneath the water table such that dewatering may be required during construction?	No	While the site is underlain by the Bagshot Formation which is classified as a Secondary A Aquifer, it is not anticipated that the new basement will extend below the water table surface. Groundwater monitoring visits undertaken during a historical investigation indicate that the shallow groundwater table is present between 4.02 to 7.19m bgl within the Bagshot Formation and Claygate Member. The proposed partial basement level is not expected to extend beyond 3.5m bgl, i.e. above the anticipated groundwater table.
11. Is the site within 5m of a highway or pedestrian right of way?	Yes	The north and northwestern portion of the site at the closest point is approximately 3m set back from "Cholmeley Park", which is a single carriageway road located to the immediate northwest of the site. This road trends southwest to northeast. At the closest point between the site boundary and Cholmeley Park, there is a boundary wall and a smaller wall in front retaining the vegetated bank between the two walls. The smaller wall is immediately adjacent to Cholmeley Park. Only the side of the road furthest away from the site has a pedestrian pavement, i.e. towards the west of the site.
12. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	No	The surrounding buildings are expected to be supported by shallow foundations. The buildings immediately adjacent to the southern site boundary (i.e. "Channing House", "Slingly House and Westview House" and "Haigh House") have a single level basement. The proposed redevelopment involves the excavation of ground for a new



Question	Response	Details
		basement with reinforced concrete footings. It is anticipated that the depth of these proposed footings is at the relative depth of those of neighbouring buildings within the zone of influence. Therefore; the differential depth of the proposed redevelopment will not be significantly increased. A <i>Building Ground Movement Assessment</i> has been undertaken to confirm this.
13. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	No	The site is not located within or above the exclusion zone of any tunnels.

4.3. Surface Water and Flooding Screening Flowchart

Question	Response	Details
1. Is the site within the catchment of the ponds chains on Hampstead Heath?	No	The site is not within the catchment of the ponds chains on Hampstead Heath and nor is the Upper Pond, which is located approximately 217m southwest of the site.
2. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	No	For the proposed scheme of development, surface water flows will alter slightly from the existing setting as the building extents and external hard landscaping will increase. The proposed green/blue roof and rain gardens will act to reduce runoff for the development.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	Yes	The proposed development consists of extending the building footprint northwards. In turn, this will increase both the building area and the hard surfaced area, which will increase negative impact on adjacent properties or watercourses.
4. Will the proposed basement result in changes to the profile of the inflows (instantaneous and long-term) of surface water being received by adjacent properties or downstream watercourses?	No	Surface water flows will be altered by the proposals. Site to discharge as per the existing setting to the neighbouring Thames Water sewer pending capacity confirmation and CCTV survey works. Sustainable drainage systems (SuDS) are to be implemented to restrict runoff where possible. No impact should be applied to adjacent properties or watercourses.
5. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No	Water quality from the proposals should not alter from the existing setting or impact adjacent properties or watercourses. Inclusion of green roof and rain gardens to aid in water quality. Further coordination is required with the landscape architect at the next design stage to develop the landscape strategy.
6. Is the site in an area identified to have surface water flood risk according to either the Local Flood Risk Management Strategy or the Strategic Flood Risk Assessment or is it at risk from flooding, for example because the proposed basement is below the static water level of nearby surface water feature?	No	The long-term surface water flood risk map from the Environment Agency (EA) shows that the building and surrounding external area is at very low risk of surface water flooding. The SWMP also identifies the building is at very low risk/hazard and not located within a critical drainage area (CDA).

4.4. Non-Technical Summary of Screening Process

4.4.1. The screening process identifies the following issues to be carried forward to scoping for further assessment:

- The site is located directly above an aquifer.



- The proposed building footprint is to be extended northwards, with a reduction of the majority of the existing open space (soft landscaping) to the north of the site, as a result the proposed development will increase the effective proportion of on-site hard landscaping.
- There is the potential for the lowest point of the proposed excavation to be close to, or lower than the mean level of the closest pond to the site (i.e. “Upper Pond Nature Area”, which is associated with Waterlow Park), such that dewatering/groundwater control measures may be required during construction.
- The gradient across the site is greater than 7 degrees. There is a significant slope to the north of the site.
- As part of the proposed development works, some young trees in the northern portion of the site will be removed.
- The site is founded on a wider hillside setting in which the general slope is greater than 7 degrees.
- The north and northwestern portion of the site, at the closest point, is set back 3m from Cholmeley Park, which is a single carriageway road.

4.4.2. 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.



5. Scoping

- 5.1. Subterranean Flow: The site is located directly above an aquifer and there is the potential for the lowest point of the proposed excavation to be close to, or lower than the mean level of the closest pond to the site.

Hazards

- 5.1.1. The site is underlain by the Bagshot Formation which overlies the Claygate Member. Both of these bedrock strata are classified as Secondary A Aquifers, defined as containing permeable layers capable of supporting water supplies at a local level.
- 5.1.2. The basement excavation will extend below the anticipated mean level of the closest pond to the site.
- 5.1.3. The groundwater flow regime at the site may be affected by construction of the proposed basement.
- 5.1.4. Groundwater may flow into the basement excavation during construction.

Potential Impacts

- 5.1.5. Encountering water inflow during excavation of the basement may lead to collapse events or excavation flooding.
- 5.1.6. Basement construction may result in damming of the aquifer and groundwater flow regime.
- 5.1.7. Changes in groundwater head may cause stress changes or instability within the ground. The alteration of existing flow paths may result in a permanent increase in the local water table upstream of the proposed development due to the damming effect of the basement, and a corresponding drop in groundwater levels downstream.
- 5.1.8. Ground movements associated with these stress changes in the ground may impact existing properties.
- 5.1.9. The proposed basement will also be at an increased risk of flooding and damp in the long term due to permanent submergence beneath the groundwater table.

Mitigating Factors

- 5.1.10. A review of the hydrogeological regime of the site and the surrounding areas has been undertaken. The influence of the proposed development on the hydrogeological regime has been assessed and it has been determined that the proposed development is not anticipated to comprise significant groundwater flow, and any damming effects will likely result in minor increases in groundwater head. Any groundwater will likely flow around the basement box obstruction. Any effects of this obstruction on the groundwater table are mostly likely to be minor with other hydrogeological factors such as seasonality considered to be a greater influence on the existing variation of the groundwater table.
- 5.1.11. Several basements of similar depth and scale have been successfully constructed throughout London within similar geological conditions and urban settings.



Assessments and Further Actions

- 5.1.12. Site-specific ground investigation works are proposed to be undertaken in order to better understand/confirm the anticipated groundwater regime. From the findings of the groundwater monitoring works, significant groundwater flow across the site at the depth of the proposed basement is not anticipated.
- 5.1.13. Appropriate detailing of the basement retaining wall waterproofing should be provided by a waterproofing specialist to mitigate the risk of flooding and damp conditions within the basement.
- 5.1.14. Where a dewatering array is proposed, the design of the system will consider the volume of water that is necessary to be pumped to sufficiently reduce the groundwater level and the site-specific soil permeability of the material surrounding the excavation (Made Ground and Bagshot Formation). However; the requirement for dewatering is unlikely given the anticipated depth of the groundwater table below the depth of the proposed basement footings.
- 5.2. Subterranean Flow and Surface Water and Flooding: The proposed development will result in a change in the proportion of the hard surfaced/paved areas, which will slightly alter the existing surface water flows. This includes the surface water being received by adjacent properties downstream being altered.

Hazards

- 5.2.1. The proposed building footprint is to be extended northwards, with a reduction of the majority of the existing open space (soft-landscaping) to the north of the site. As a result the proposed development will increase the effective proportion of hard surfaced areas.

Potential Impacts

- 5.2.2. The existing drainage across the site will be altered and with an increase in hard surfaced/paved areas, leading to a reduction in the ability for water to drain through the site. From this the surface water flows will be altered slightly from the existing setting, and although unlikely; there is the potential for standing water to arise during heavy rainfall over a short period of time, which may lead to flooding.
- 5.2.3. An increase in groundwater flow in a downwards gradient from the site.

Mitigating Factors

- 5.2.4. While the soft landscaping to the north of the site is to be removed for the basement works and the lateral extension of the building footprint, there will be some soft-landscaping retained towards the eastern site boundary.
- 5.2.5. A robust site wide drainage system is proposed to be incorporated into the proposed development scheme. It is anticipated that this drainage system will sufficiently accommodate any surface runoff. Furthermore, in the case of extreme events it is envisaged that the overland flow directions will not change. Therefore, with this in consideration, it is very unlikely for a flooding event to occur, despite the change in the effective proportion of hard surfaced/paved areas.

Assessments and Further Actions

- 5.2.6. Specialist drainage advice may be necessary to understand how the alteration of proportion of hardstanding zones may impact the surrounding surface water flow regime.



- 5.3. **Stability:** The gradient across the site is greater than 7 degrees. The site is founded on a wider hillside setting in which the general slope is greater than 7 degrees. The site is within an area of previously worked ground.

Hazards

- 5.3.1. The gradient across the site is greater than 7 degrees.
- 5.3.2. The site is founded on a wider hillside setting in which the general slope is greater than 7 degrees.
- 5.3.3. The site is within an area of previously worked ground.

Potential Impacts

- 5.3.4. Collapse of the excavation and associated impact on surrounding assets.
- 5.3.5. Damage to the existing Brunner House due to mobilisation of a slope stability failure mechanism.
- 5.3.6. Damage to the road surface of Cholmeley Park or buried services within the public highway easement due to excessive ground movements.

Mitigating Factors

- 5.3.7. Numerous basements of similar depth and scale with similar geological conditions and urban settings have been successfully constructed in the vicinity of the site.
- 5.3.8. The majority of the buildings to the south surrounding the proposed Brunner House (i.e. Channing House, Slingly House, Westview House and Haigh House) have below-ground space, meaning the impact of the basement construction will be reduced.
- 5.3.9. The site is underlain by competent natural deposits with an angle of repose much greater than seven degrees.
- 5.3.10. The proposed basement excavation will remove the majority of the Made Ground on-site.
- 5.3.11. The proposed basement walls will be designed considering the sloped nature of the site.

Assessments and Further Actions

- 5.3.12. A site-specific ground investigation will be undertaken, with exploratory locations in the area of the infilled ground, to the north of the site, to assess the thickness of the Made Ground.
- 5.3.13. The design of the contiguous pile wall and temporary propping shall be carried out by an appropriately experienced and qualified specialist / engineer / ground engineering contractor in accordance with relevant Eurocodes / British Standards, Codes of Practice, and industry standards.

- 5.4. **Stability:** Trees maybe felled during the development works.

Hazards

- 5.4.1. Shrink/swell behaviour of underlying cohesive soil masses due to the removal of trees.



- 5.4.2. Potential reduction in the proportion of on-site soft-landscaping, leading to increased surface water run-off into the local drainage system due to a reduction in uptake from vegetation.

Potential Impacts

- 5.4.3. Additional ground movements from shrink/swell may cause impact to the neighbouring structures.
- 5.4.4. Properties downstream of the development may be subject to increased surface overland flow.

Mitigating Factors

- 5.4.5. Any potential changes to the surface water run-off volume are anticipated to be captured by the proposed drainage scheme.
- 5.4.6. The trees maybe felled as part of the proposed development are minimal in number and relatively young. Therefore; the trees have little value in terms of drainage.
- 5.5. **Stability: The site is adjacent to a road and control measures may be necessary during construction.**

Hazards

- 5.5.1. The north and northwestern portion of the site, at the closest point, is set back approximately 3m from Cholmeley Park, which is a single carriageway road.

Potential Impacts

- 5.5.2. Collapse of the excavation and associated impact on surrounding assets.
- 5.5.3. Damage to the road surface of Cholmeley Park or buried services within the public highway easement due to excessive ground movements.

Mitigating Factors

- 5.5.4. Numerous basements of similar depth and scale with similar geological conditions and urban settings have been successfully constructed in the vicinity of the site.

Assessments and Further Actions

- 5.5.5. The design of the contiguous pile wall and temporary propping shall be carried out by an appropriately experienced and qualified specialist / engineer / ground engineering contractor in accordance with relevant Eurocodes / British Standards, Codes of Practice, and industry standards.
- 5.5.6. Appropriate wall and ground movement monitoring will be implemented during construction to assess the performance of the earth retention system (baseline monitoring pre-commencement of the works should be carried out to determine any potential existing movement trends). Allowance will also be made for making good of any cracking / damage to adjacent pavement surfaces (if required).
- 5.5.7. It is recommended that an assessment of the ground movements of the neighbouring roads associated within the proposed works are to be undertaken as part of the detailed design to confirm that there is no significant impact during construction.



5.5.8. The contractor should allow for making good of any superficial damage to the existing pavements and roads.



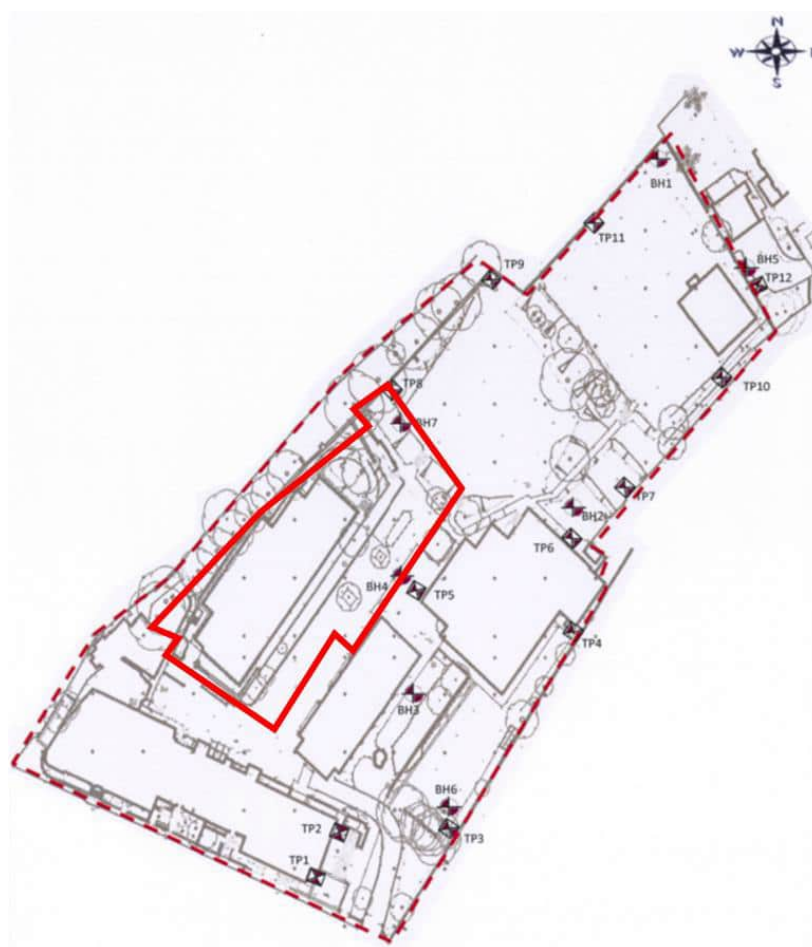
6. Site Investigation

6.1.1. A *SI & BIA Report* for the wider Channing School site has been prepared for HTS by GEA, issued January 2012 (ref. J11240). This report was issued to A-squared by HTS as an archived information source for the site.

6.1.2. The works undertaken between 10th November to 16th November 2011 comprised the following:

- 3 no. opendrive sampler (Terrier rig) boreholes (BH1 to BH3) to a maximum depth of 9.00m bgl.
- 1 no. cable percussion borehole (BH4) to a depth of 20.0m bgl.
- 3 no. window sampler boreholes (BH5 to BH7) to a maximum depth of 5.00mbgl.
- 12 no. hand excavated trial pits to unknown depths (logs were not provided as part of the SI & BIA Report).
- Standard penetration testing (SPTs) within the boreholes (carried out at regular intervals).
- Geotechnical laboratory testing in the form of index/classification testing.
- Geo-environmental laboratory testing.

6.1.3. While there are no locations within the assessed boundary for this assessment, there are two locations on the boundary of this assessed area, i.e. BH4 along the eastern boundary and BH7 in the northwest. The locations of the ground investigation positions are shown in Figure 6.1.



Source: *SI & BIA Report for Channing School prepared for (and provided by) HTS, prepared by GEA, issued January 2012 (ref. J11240).*

Figure 6.1 GEA exploratory hole location plan



- 6.1.4. The parameters used to complete this Basement Impact Assessment have been obtained from the information include as part of the *GEA SI & BIA Report*, issued January 2012, (ref. J11240), and data available from the BGS and previous project experience within the surrounding area of the site.
- 6.1.5. The purpose of the site-specific investigation undertaken by GEA was designed to provide information on the ground model and geotechnical parameters and to accurately determine the hydrogeological conditions beneath the wider Channing School site.
- 6.1.6. The ground conditions encountered onsite are summarised in Table 6.1.

Table 6.1 Encountered stratigraphic profile

Stratum	Elevation (mOD)	Thickness (m)	Description
Made Ground	114.0	1.0	Dark brown sandy CLAY becoming sandy gravelly CLAY with depth with occasional fragments of flint, ash, brick, glass, pottery, concrete and old roots and clinker (variable anthropogenic deposits).
Bagshot Formation	113.0	5.5	Variable sequence of light brown occasionally clayey and silty fine to medium SAND and firm light brown silty sandy CLAY.
Claygate Member	107.5	6.0	Variable sequence of orange to brown and mottled grey silty very sandy and a very clayey silty SAND.
London Clay Formation	101.5	113.5	Firm becoming stiff brownish grey silty fissured CLAY with depth, with occasional selenite crystals.

- 6.1.7. Data available from both the historical BGS boreholes and data included as part of the *GEA SI & BIA Report* indicates that the shallow groundwater table is present between 4.02 to 7.19m bgl within the Bagshot Formation and Claygate Member. In terms of elevation, as summarised in Table 6.2, the level of this groundwater table, is 109.98 to 107.81m above OD, where the ground surface elevation has been taken as 114m above OD (as none were specified in the *GEA Report*). There was a water strike encountered during the intrusive GI works at 2.00m bgl (BH5). However, this is anticipated to be perched water within the uppermost part of the Bagshot Formation, rather than representative of the water body.

Table 6.2 Groundwater monitoring from *GEA SIR & BIA Report*

Borehole No.	Standpipe depth (m bgl)	Depth at groundwater (m bgl)		
		29/11/2011	07/12/2011	14/12/2011
BH1	7.00	4.05	4.02	4.03
BH2	7.00	5.11	5.07	5.07



BH3	8.50	7.12	7.15	7.19
BH4	13.0	6.65	6.65	6.67

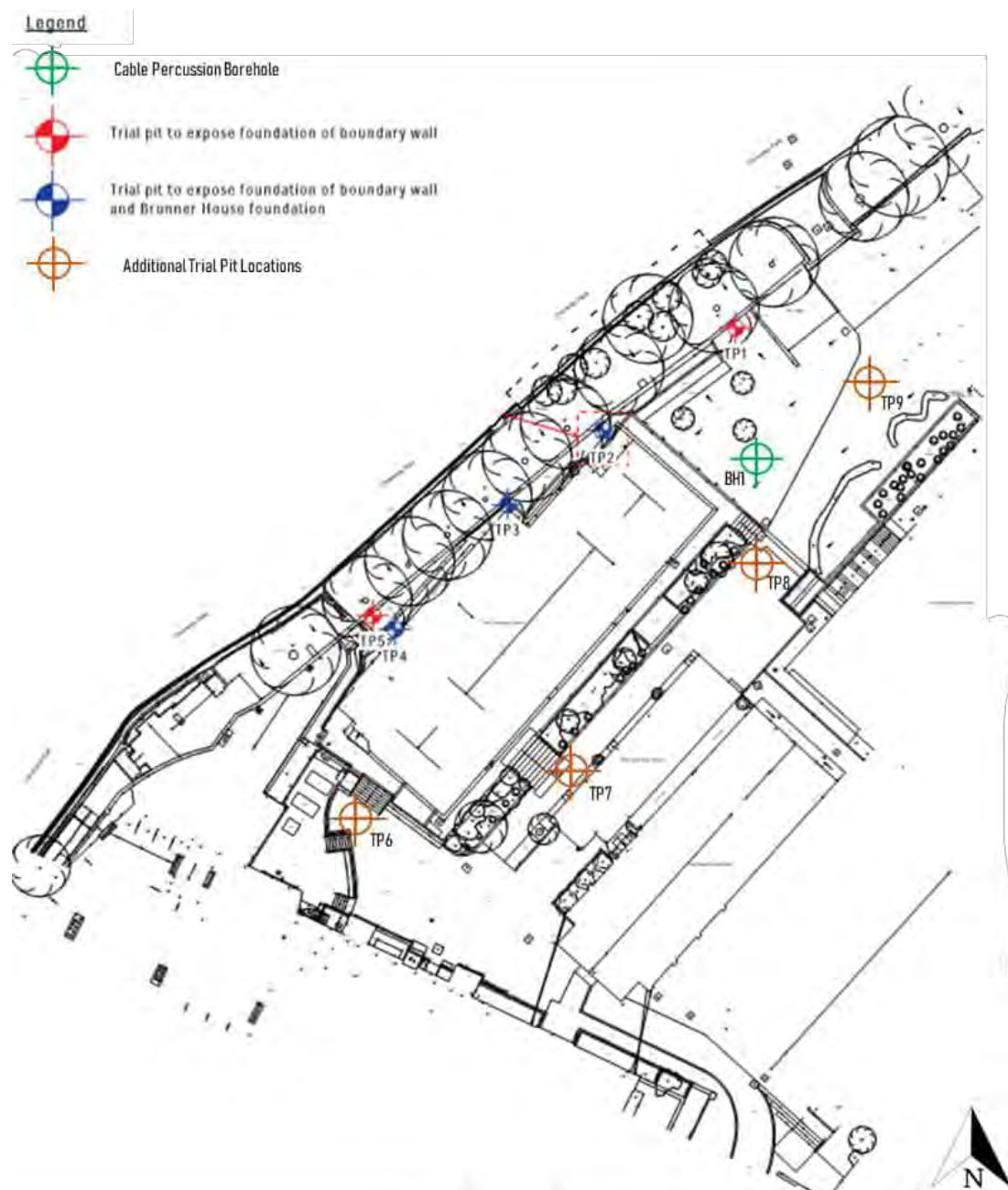
6.1.8. A *Ground Investigation Scope Note*, has been prepared by A-squared, included as Appendix D, to determine the geotechnical and geo-environmental conditions of the site for detailed design and assessment. The scope aims to validate the ground conditions, geotechnical parameters and hydrogeological assessment presented in this BIA.

6.1.9. The proposed GI works comprise of

- 1 no. cable percussion borehole (BH1) to a depth of 25.0m bgl.
- 5 no. hand-excavated trial pits (TP1 to TP5) to a maximum depth of 1.0m bgl.
- 4 no. mechanically excavated trial pits (TP6 to TP9) to a maximum depth of 1.2m bgl.
- In-situ testing consisting of UT100 sampling, Standard Penetration Testing (SPTs) at regular intervals and soil sample volatile organic compounds (VOC) head-space testing using a photoionisation (PID) detector is to be undertaken at the borehole (BH1).
- Geotechnical laboratory testing in the form of index/classification testing.
- Geo-environmental laboratory testing.



6.1.10. An exploratory hole location plan for the proposed GI works is provided below as



Exploratory hole locations are indicative subject to a change following a review of site logistics.

Figure 6.2 Exploratory hole location plan



7. Construction Methodology / Engineer Statements

7.1. Outline Temporary and Permanent Works Proposals

- 7.1.1. The outline basement construction proposal comprises of the construction of a new 3.5m-deep single-level basement to the northern portion of the site.
- 7.1.2. Standard means and methods of excavation are expected to be suitable to excavate the basement, based upon the ground conditions proven by means of ground investigation works.
- 7.1.3. *Bottom-up* basement construction methods will be adopted.
- 7.1.4. A contiguous piled wall consisting of 450mm diameter piles at 750 crs is to be installed to the northern, southern and western portion of the site within the area of the proposed basement, in order to support the basement excavation. The contiguous pile wall will have a length of approximately 7.0m. It is to be installed from ground level, with the base anticipated within the Claygate Member.
- 7.1.5. It is anticipated that any potential ground water inflow during excavation arising from finite bodies of perched ground water can be suitably managed/mitigated with localised pumping if/where required. However; given the anticipated groundwater table, i.e. below the depth of basement construction, this is unlikely.
- 7.1.6. All basement construction works will be undertaken by a reputable and experienced groundworks contractor, with appropriate safety measures implemented.
- 7.1.7. Design of the contiguous piled wall and temporary propping shall be carried out in accordance with the relevant Eurocodes/British Standards, non-conflicting codes of practice, and associated design best practice.
- 7.1.8. Backfilling and installation of earth and landscaping works across the site will be undertaken. The above ground storeys are then to be constructed above.
- 7.1.9. The reinforced concrete (RC) boundary wall to the rear of the Brunner House adjacent to Cholmeley Park will remain as existing.

7.2. Ground Movement and Damage Impact Assessment

- 7.2.1. A GMA has been carried out in accordance with CIRIA C760 and takes into account the construction methodology and site-specific ground and groundwater conditions. The GMA is included as Appendix E.
- 7.2.2. All structures / properties within the zone of influence of the proposed development have been assessed.
- 7.2.3. The following assumptions have been made within the GMA:
- The contiguous piled wall is assumed to be installed in the Bagshot Formation and Claygate Member.
 - The buildings included in the GMA are assumed to be founded on ground surface.
 - The walls of the above-mentioned buildings are assumed to behave as equivalent beams.
- 7.2.4. The ground movements resulting from the works comprise deformations arising from the following mechanisms:
- Wall installation.



- Bulk excavation works.
- Heave and settlements due to the unloading / load redistribution of the Bagshot Formation.

7.2.5. The following structures were assessed, having been identified as falling within the zone of influence of the proposed development:

- CC.1 to CC.5, “Channing Cottage” – a single storey building to the southwestern site boundary.
- CH.1 to CH.19, “Channing House” – a five storey building to the southern and southwestern site boundary.
- SWH.1 to SWH.4, “Singly House and Wesview House” – a five storey, Grade II listed, building to the southern site boundary.
- SWH-HH.1 to SWH-HH.4, a single storey link between “Singly and Wesview House” and “Haigh House” to the southeastern site boundary.
- HH.1 to HH.6, “Haigh House” – a five storey building to the southeastern site boundary.
- FH.1 to FH.4, “Founder’s Hall” – a single storey building to the southeastern site boundary.
- SSH.1 to SSH.6, an integrated two storey “Sixth Form Centre”/“Sports Hall” building to the eastern site boundary.
- SS-AC.1 to SS-AC.4, a single storey link between the integrated “Sixth Form Centre”/“Sports Hall” building and the “Arundel Centre” to the central eastern site boundary.
- AC.1 to AC.4, “Arundel Centre” – a two storey building to the southeastern site boundary.
- BH.1 to BH.8, “Brunner House” – a two storey on-site building (existing section, which is to be retained).

7.2.6. While the evaluated potential impact is contained within Category 2 – Slight, in accordance with the Burland Scale for both the base assessment and sensitivity check. The two façades where a Category 2 was assigned, i.e. facade ref. BH1 (to the southern boundary of the site) and facade ref. BH2 (to the eastern boundary of the site) were both determined to be associated with the existing on-site Brunner House, which is proposed to be refurbished as part of the proposed works. In any case, active monitoring will be undertaken to review the impact of the basement construction works. The remainder façades, all of which are off-site, were assigned a maximum of Category 1 – Very Slight.

7.2.7. An outline impact review of the works on Cholmeley Park has also been undertaken. The road is anticipated to experience horizontal and vertical movements of less than 2mm.

7.2.8. The expected ground movements resulting from the works are proposed to be limited by means of temporary propping of the capping beam, which is planned to be installed before the excavation phase.

7.2.9. The following mitigation measures are proposed to reduce ground movements and impact:

- Design of the propping measures shall be carried out in accordance with the relevant Eurocodes, non-conflicting codes of practice, and associated design best practice.
- Wall construction works to be performed by an experienced piling contractor.
- Frequent monitoring of neighbouring properties to be carried out during excavation, to validate ground movement predictions against reality.
- Development of a monitoring-trigger-action plan that identifies trigger levels, responsible personnel and actions to be followed in the event of a trigger level exceedance.
- Incorporating stiff, high-level props into the temporary works design of the excavation, so as to provide a high stiffness wall. Design details regarding minimum wall flexural stiffness, prop stiffness and arrangement, shall be defined as part of detailed design development.



- The GMA did not consider the impact of the proposed development on existing buried utilities (e.g. Thames Water sewer assets). It is expected that these assets will be assessed (if applicable to the proposed works) following engagement of the asset owner and direction from the asset protection team, with regards to establishing limiting performance criteria.

7.3. Control of Construction Works

- 7.3.1. Following the selection of a Principal Contractor, a Construction Method Statement should be developed, which will cover the items outlined in this section in detail.
- 7.3.2. Work method statements developed for main stages of the construction works, outlining the means and methods of safely carrying out the works.
- 7.3.3. Details of temporary propping and temporary works, required to ensure structural stability is maintained throughout demolition and excavation operations.
- 7.3.4. Construction traffic management plans.
- 7.3.5. Detailed development of structural and environmental monitoring strategy, developed to control construction works and maintain movements/impacts within the predicted limits and monitor environmental impacts, including:
 - A structural monitoring layout plan of instrumentation/survey points/critical sections.
 - Programme/frequency of monitoring.
 - Trigger values derived for each of the structures within the zone of influence of the proposed works.
 - Contingency actions and project team lines of responsibility.



8. Basement Impact Assessment

8.1.1. The Conceptual Site Model (CSM) is described below:

- The ground conditions of the site comprise Made Ground overlying the Bagshot Formation over Claygate Member over London Clay Formation.
- The approximate ground surface elevation at the site varies between 111m above OD within the northeastern portion of the site and 114mOD in the southwestern portion.
- There is a significant slope across the site with ground surface elevations falling towards the east.
- The shallow groundwater table is present between 4.02 to 7.19m bgl within the Bagshot Formation and Claygate Member. The groundwater is anticipated to flow downhill, towards the southeast within these materials.
- The current development site currently comprises of a two-storey masonry building. It is used as classroom space, with some offices and water closets. There is an area of soft-landscaping to the northern portion of the site, as well as some planters and complimentary soft landscaping to the eastern portion of the site.
- There is no existing basement space located on-site.
- Neighbouring buildings are assumed to be founded near surface.
- The proposed development may result in impact to the neighbouring buildings. Any potential impact will be mitigated by appropriate construction means and methods (such as temporary propping/shoring and controlled excavation operations).

8.2. Land Stability / Slope Stability

- 8.2.1. It is assumed that all new substructure elements will be founded on a shallow foundation in the form of a 300mm thick reinforced concrete ground bearing slab in the Bagshot Formation, which is considered to be a suitable founding stratum.
- 8.2.2. The risk of movement and impact to this development due to volumetric changes of the Claygate Member of the London Clay Formation will be considered as part of the scheme design of the development. Heave mitigation measures (if appropriate) will be adopted, and the relevant soil structure interaction mechanisms will be reviewed.
- 8.2.3. A GMA has concluded that ground movements caused by excavation and construction of the proposed development will be limited. The upper bound impact category for surrounding structures within the zone of influence of the proposed development for neighbouring off-site buildings has been assessed as Category 1 – Very Slight in accordance with the Burland Scale.
- 8.2.4. The BIA has concluded that risks to the adjacent properties, public highway and infrastructure (including ultimate and serviceability limit state considerations) are limited and will be mitigated in a reasonable fashion as part of design development.

8.3. Hydrology and Groundwater Flooding

- 8.3.1. The BIA has concluded that there is no risk of groundwater flooding.



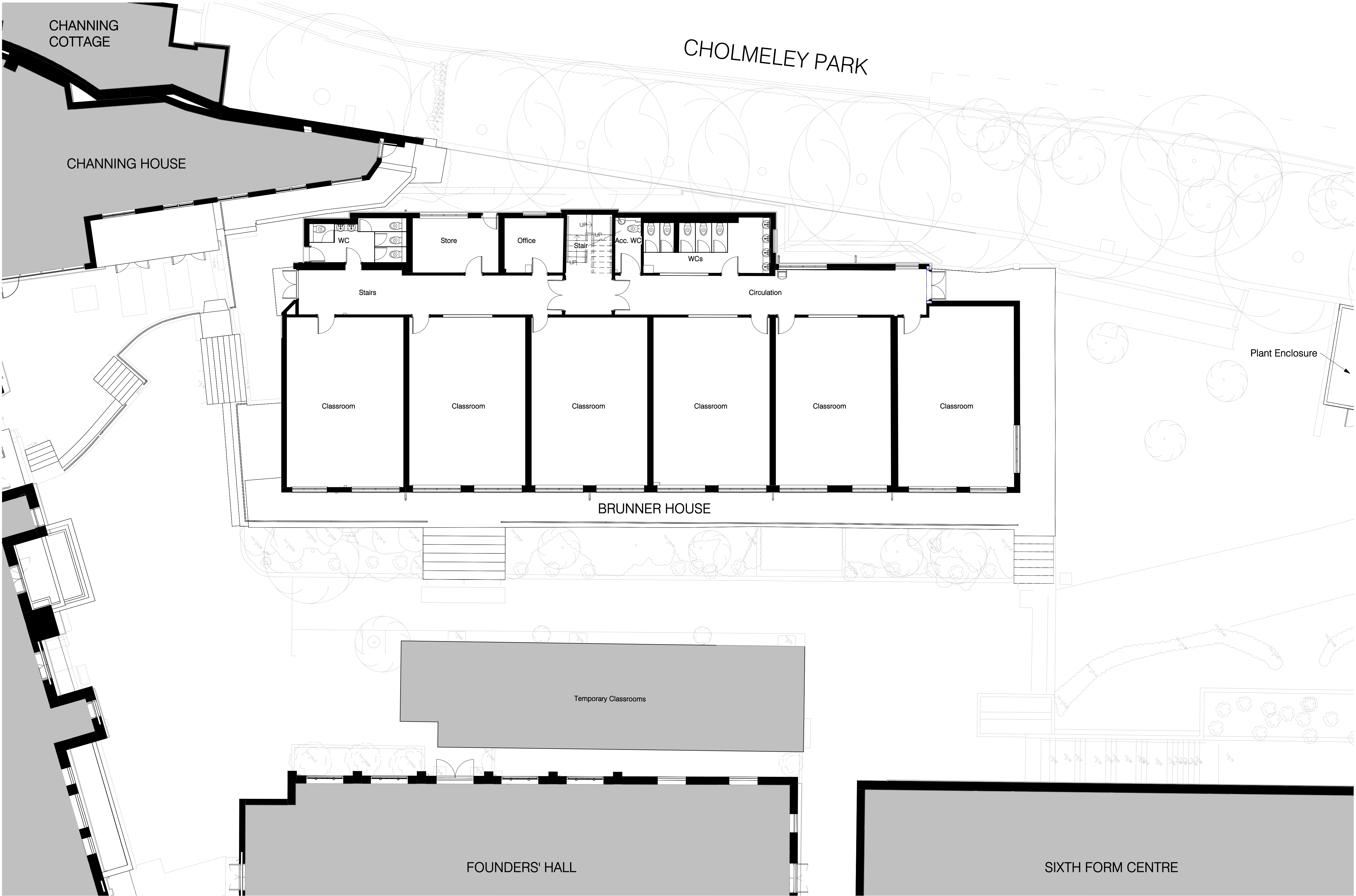
- 8.3.2. The BIA has identified a hydrogeological impact. The excavation will be within the Made Ground and partially within the Bagshot Formation. The latter of which is classed as a Secondary A Aquifer. The Bagshot Formation Member in which the basement sits are largely cohesive with low permeabilities, and the proposed basement is set back from the edges of the site. The overall risk of groundwater flooding associated with the creation of a new basement box is considered to be low.

8.4. Hydrology, Surface Water Flooding and Sewer Flooding

- 8.5. The BIA has concluded that there is a very low risk of surface water flooding.
- 8.6. The BIA has concluded that there are no impacts to the wider hydrological environment.



Appendix A: Various Existing and Proposed Development Drawings



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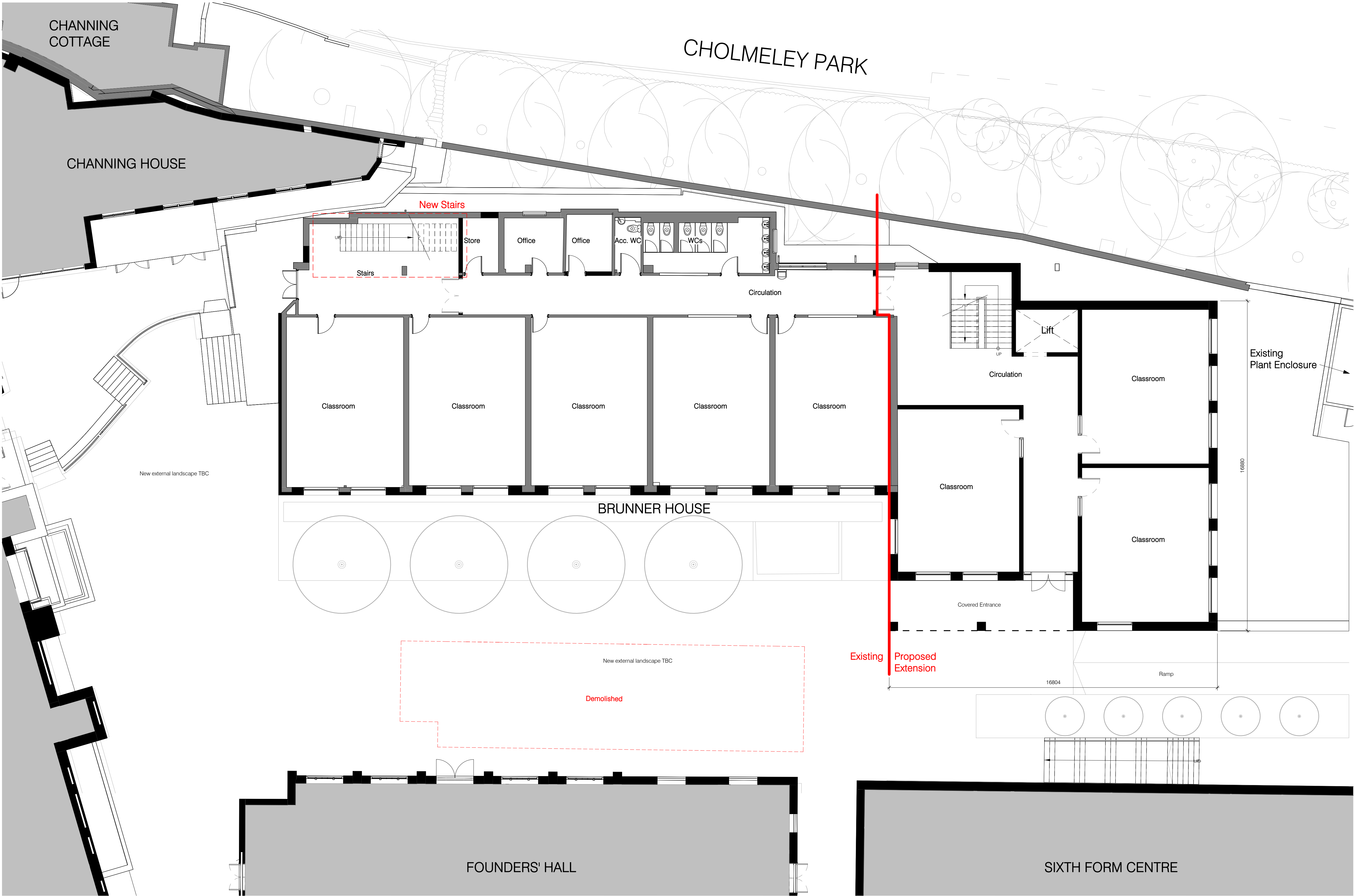
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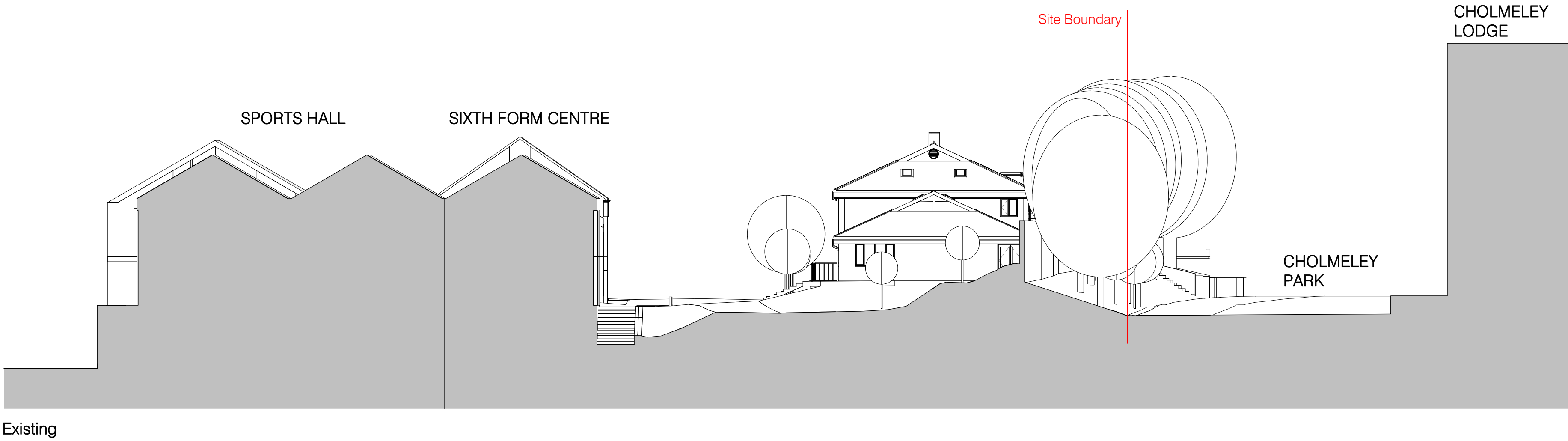
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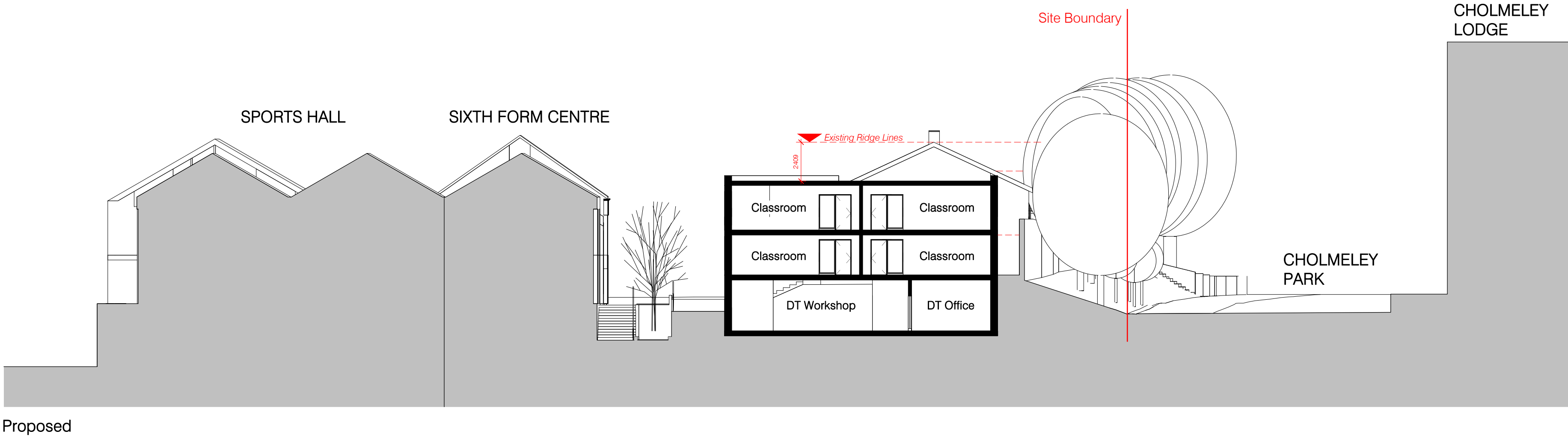
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Project Stage	Purpose	Scale
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CHS-NVB-BRU-00-D-A-2040		P01 S2



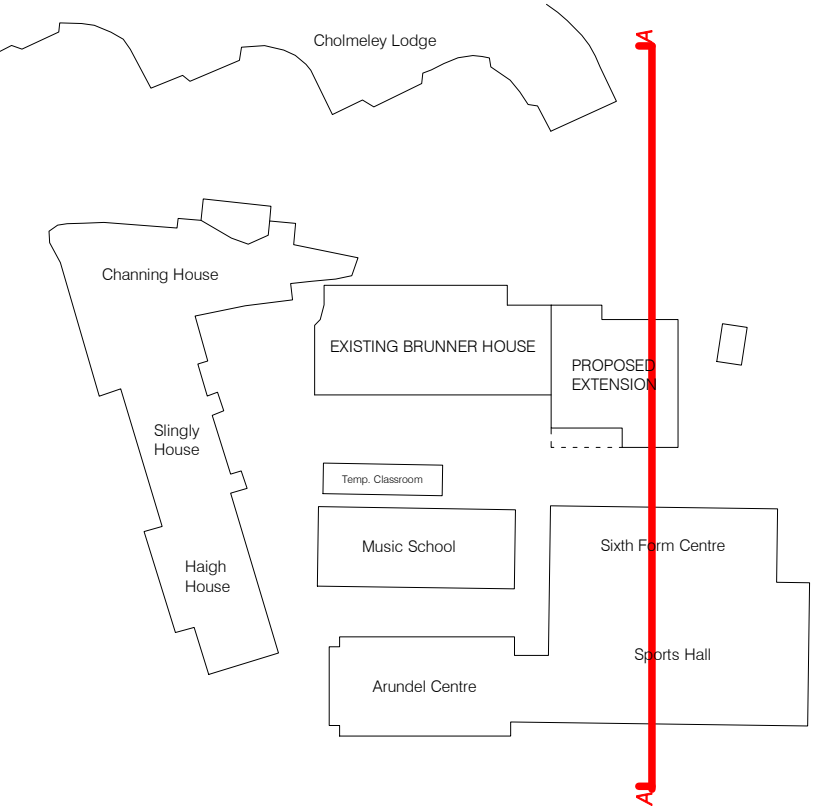
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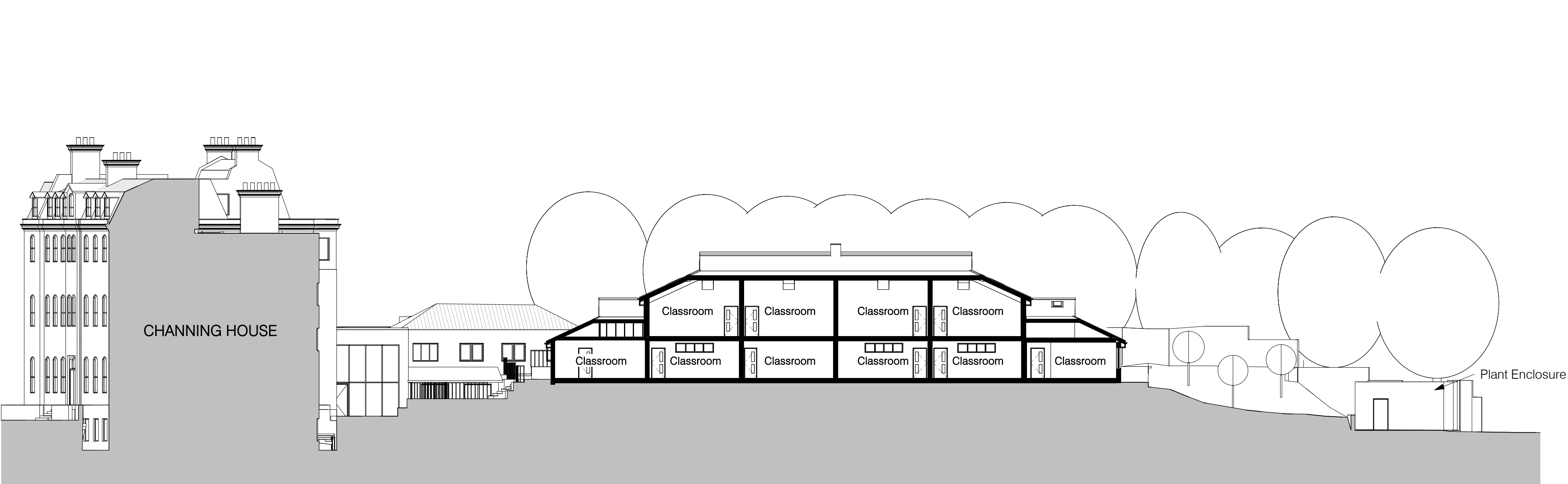
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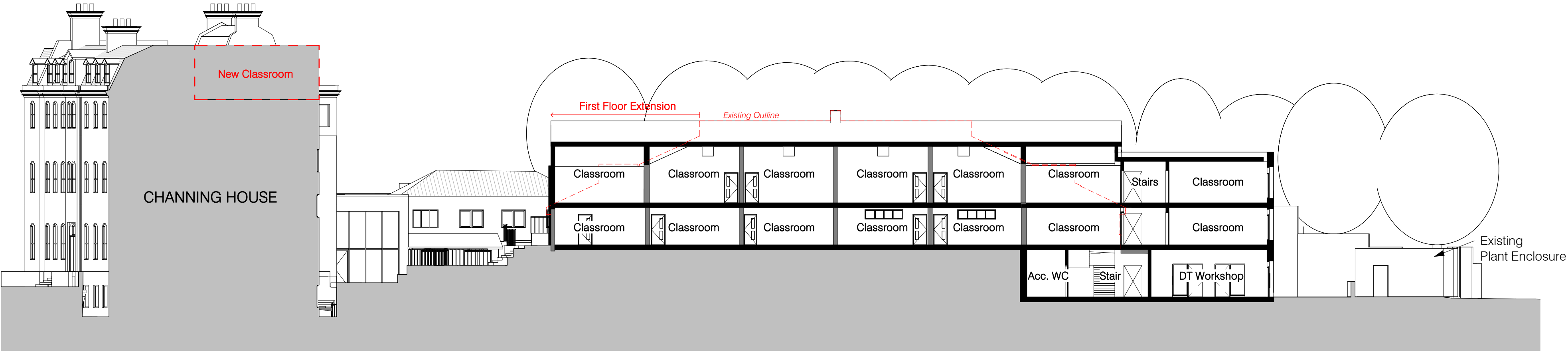
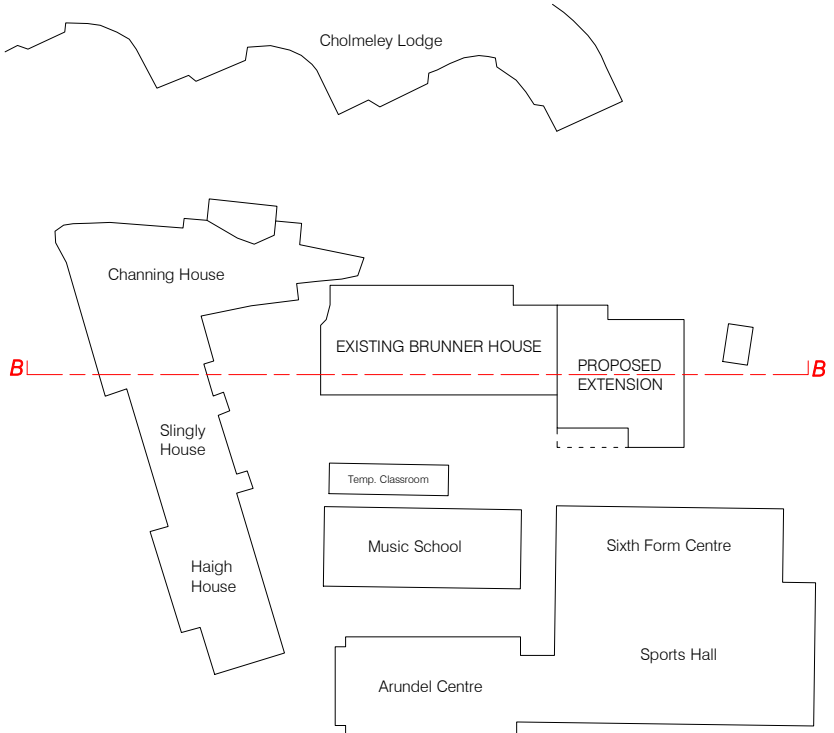
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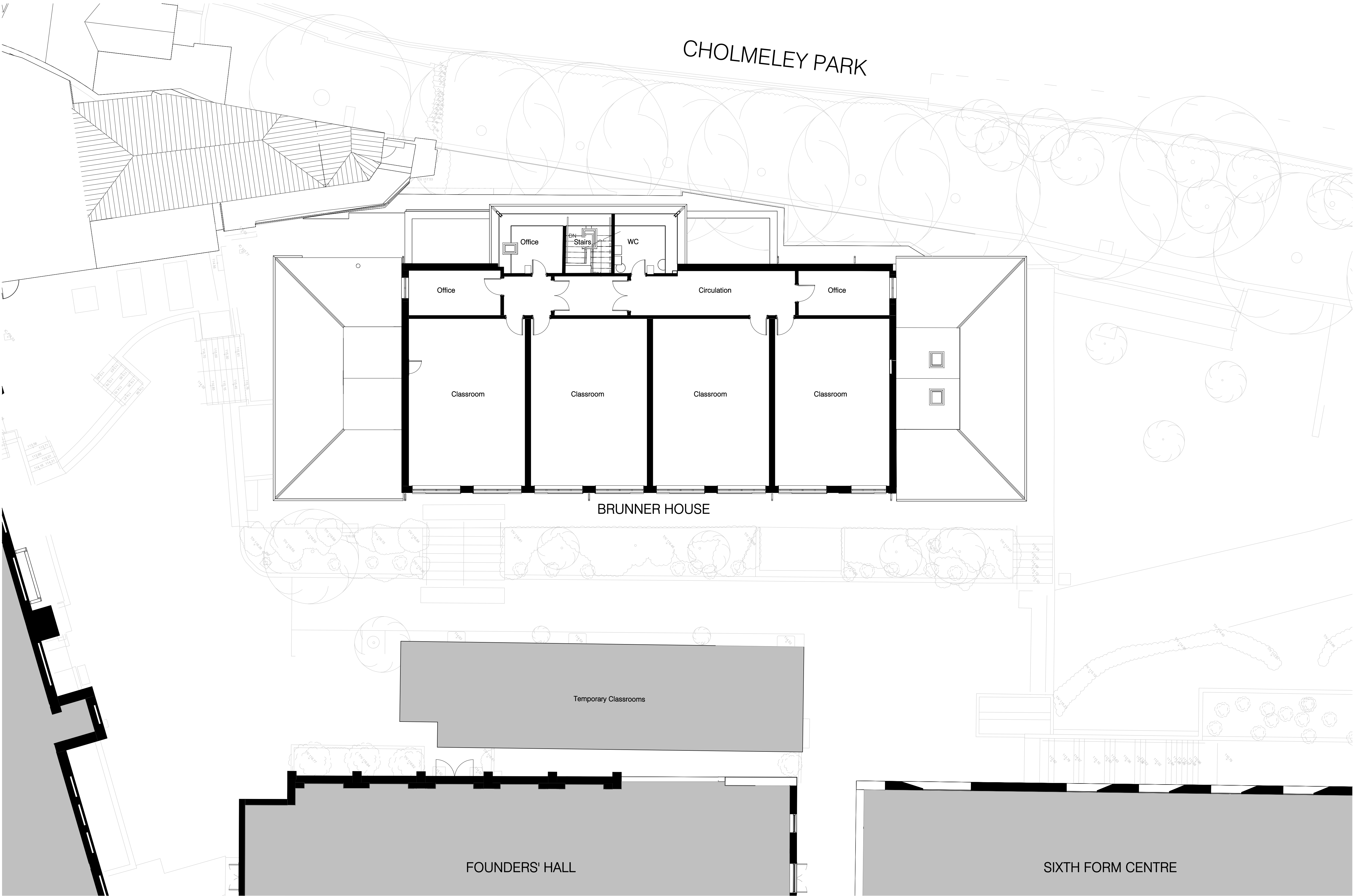


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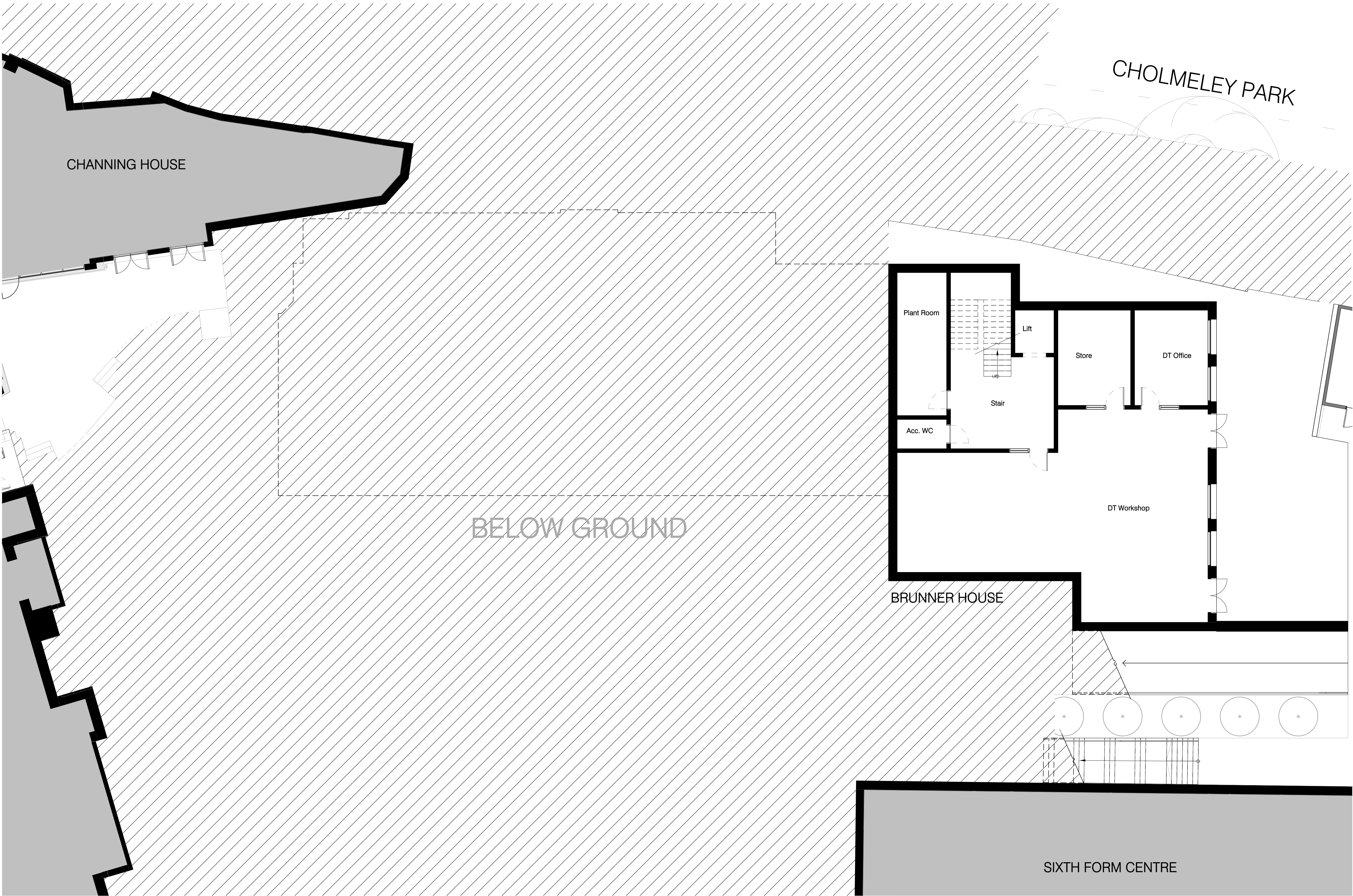


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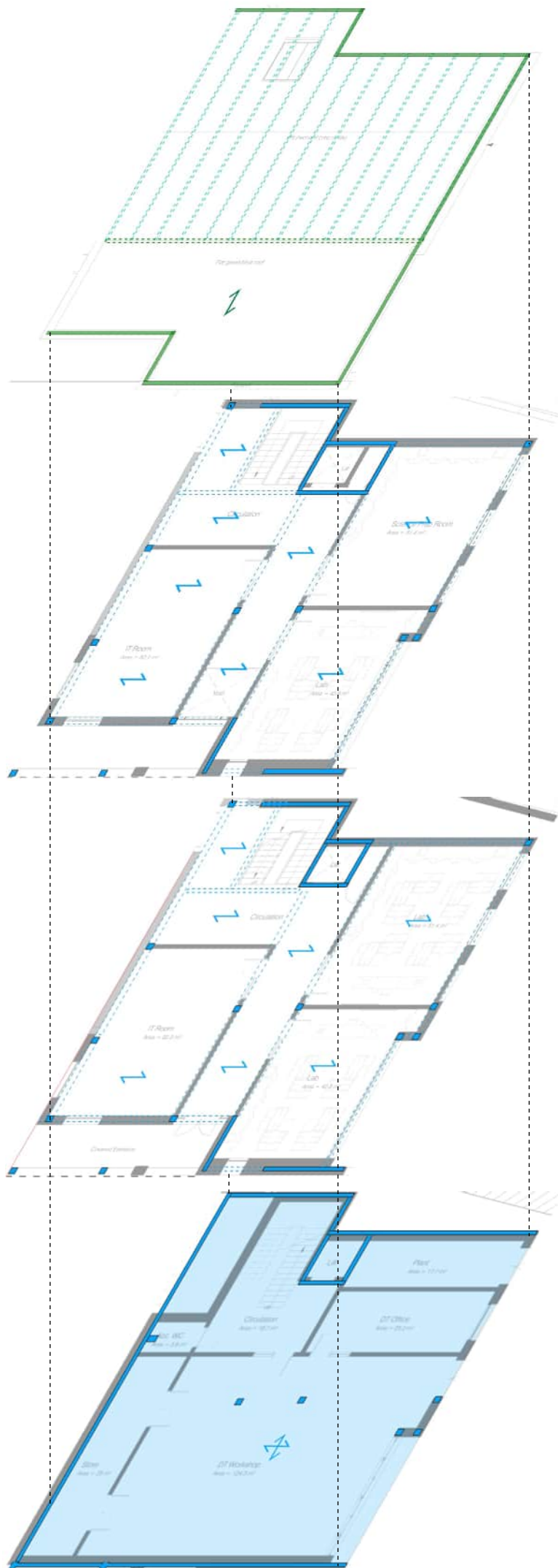
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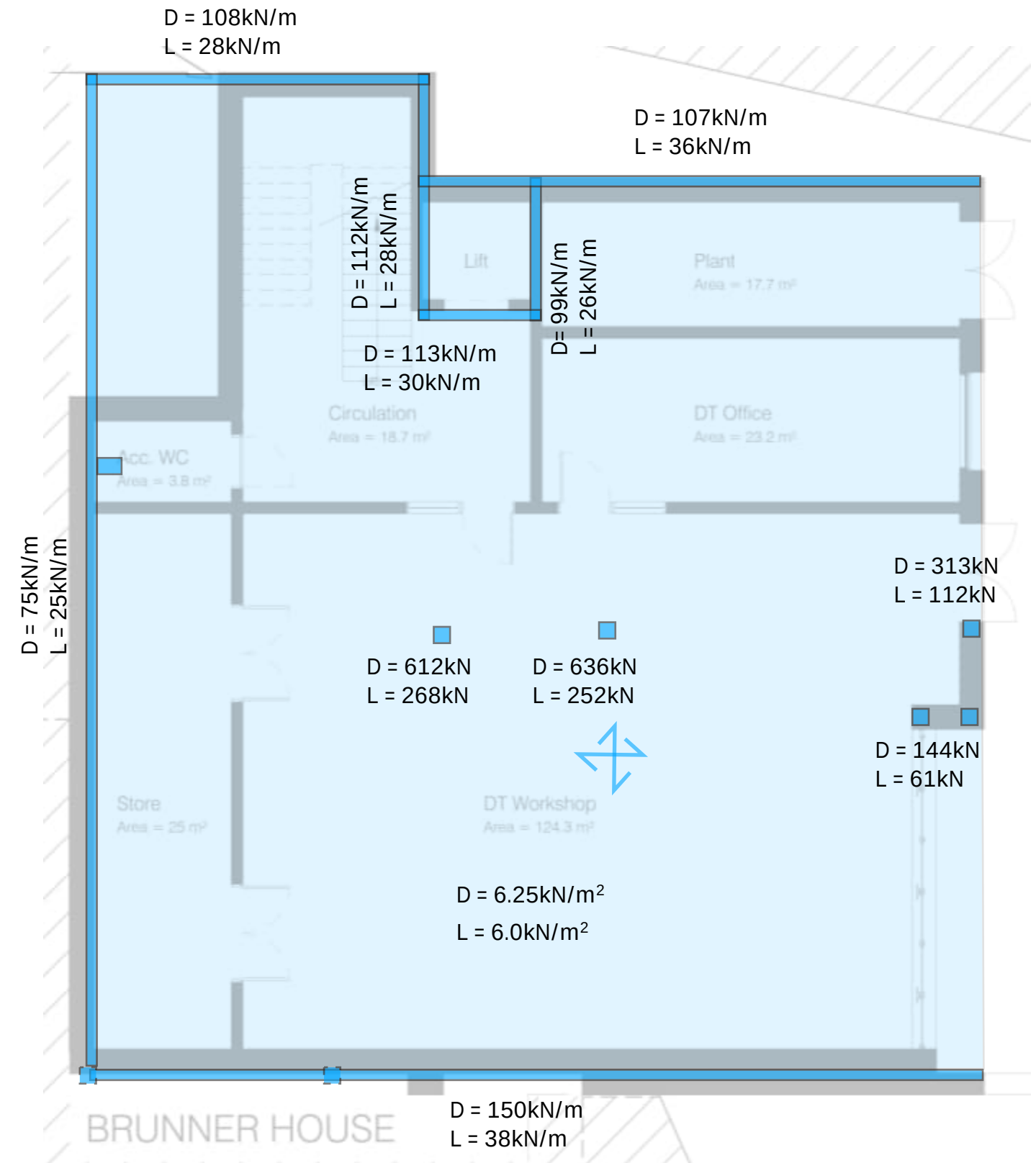
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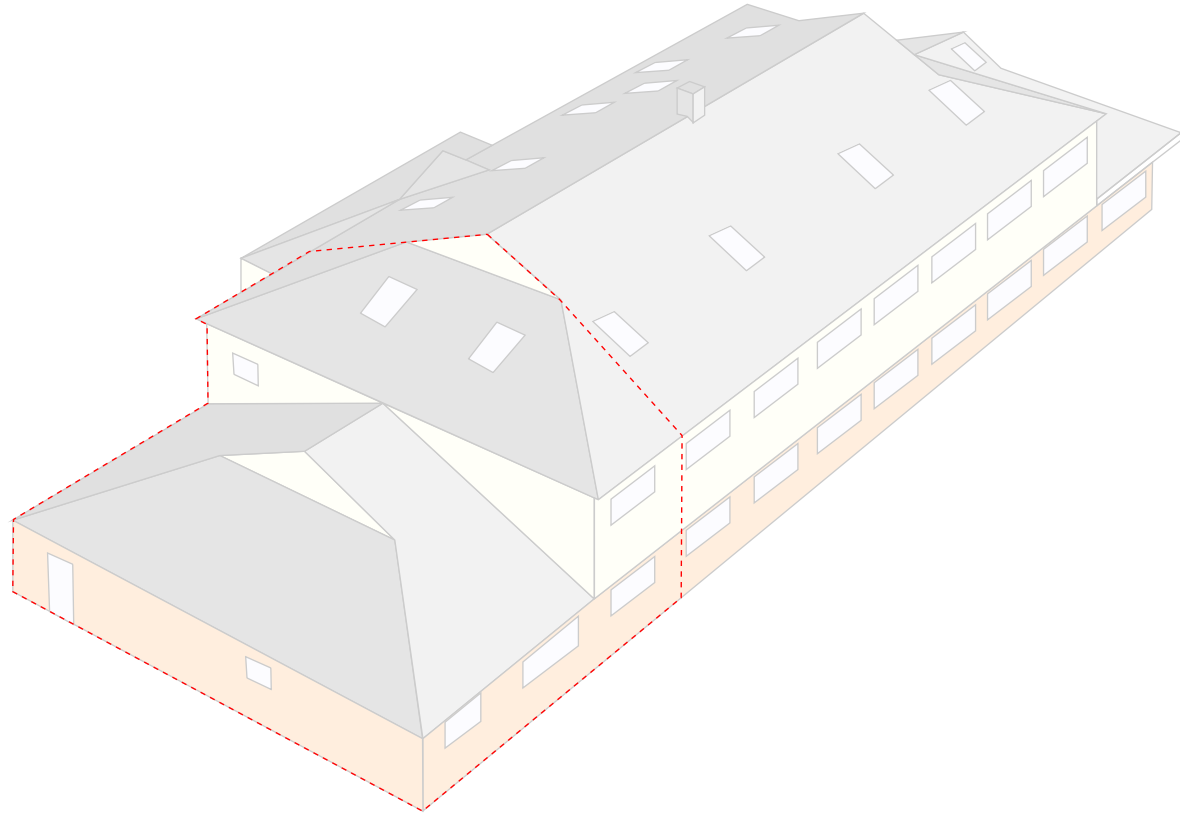


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Document Title		
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Project Stage Purpose Scale		
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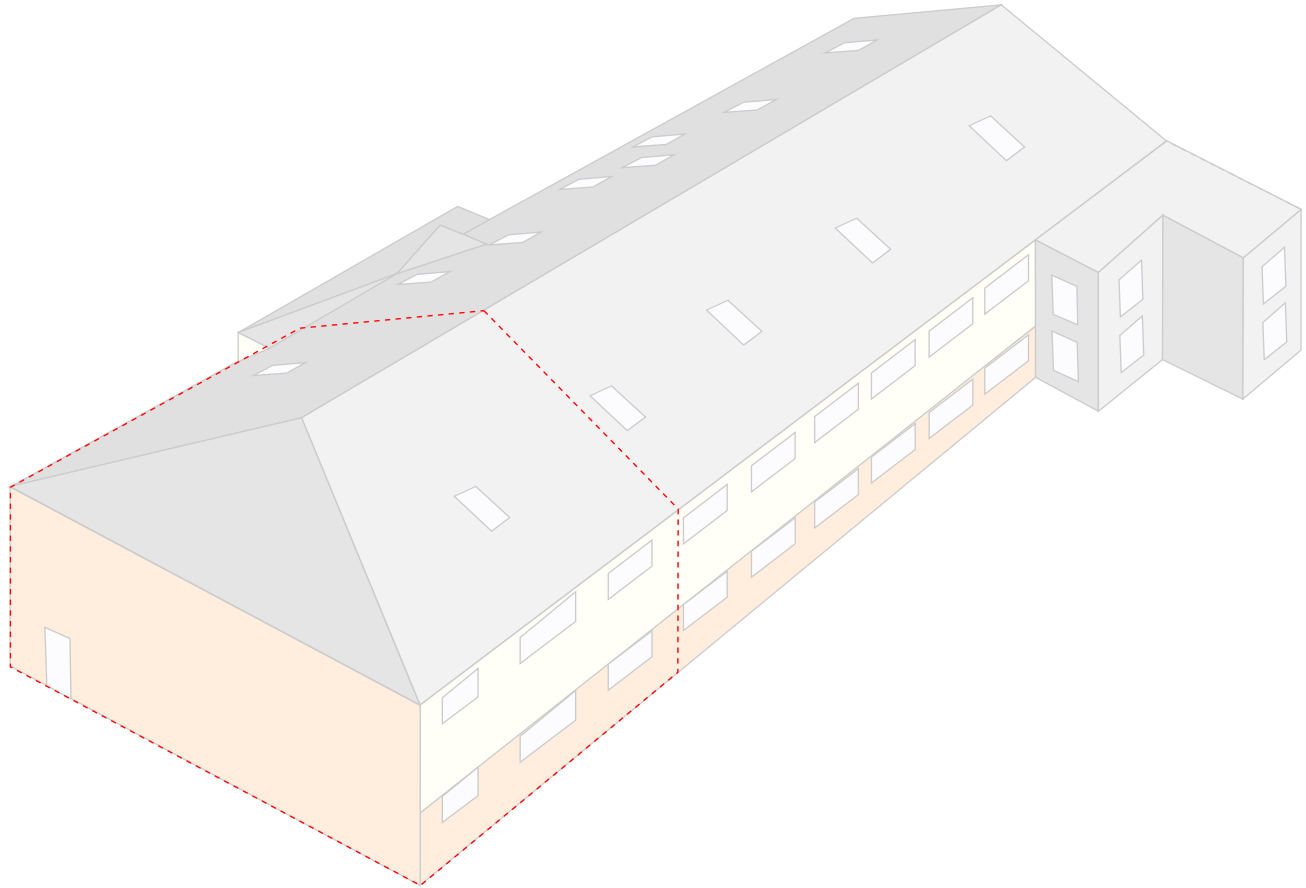


Roof	Dead = 1.0kN/m ² Live = 0.6kN/m ²	(timber truss) (snow)
1st Ceiling	Dead = 6.25kN/m ² Live = 0.75kN/m ²	(250mm RC slab) (maintenance)
1st Floor	Dead = 6.25kN/m ² Live = 3(+1)kN/m ²	(250mm RC slab) (classroom)
Ground Floor	Dead = 6.25kN/m ² Live = 3(+1)kN/m ²	(250mm RC slab) (classroom)
Basement	Dead = 6.25kN/m ² Live = 5(+1)kN/m ²	(250mm raft foundation) (workshop)
Structure	Beams = 2.81kN/m Walls = 17.5kN/m Columns = 5.47kN	(450dp RC) (200mm thk) (250x250 RC)

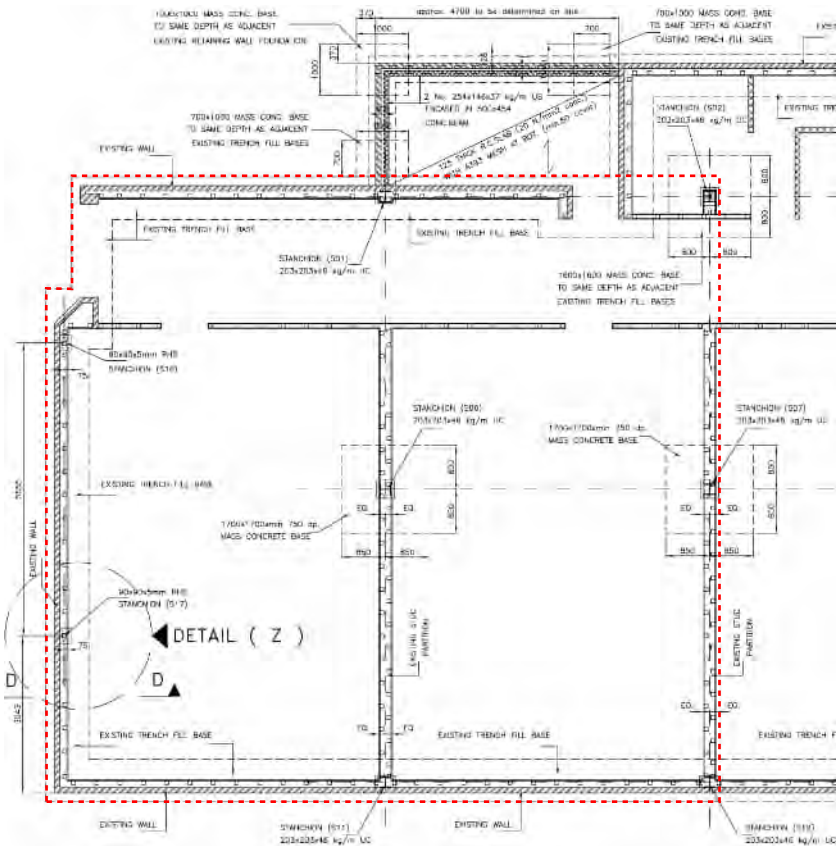




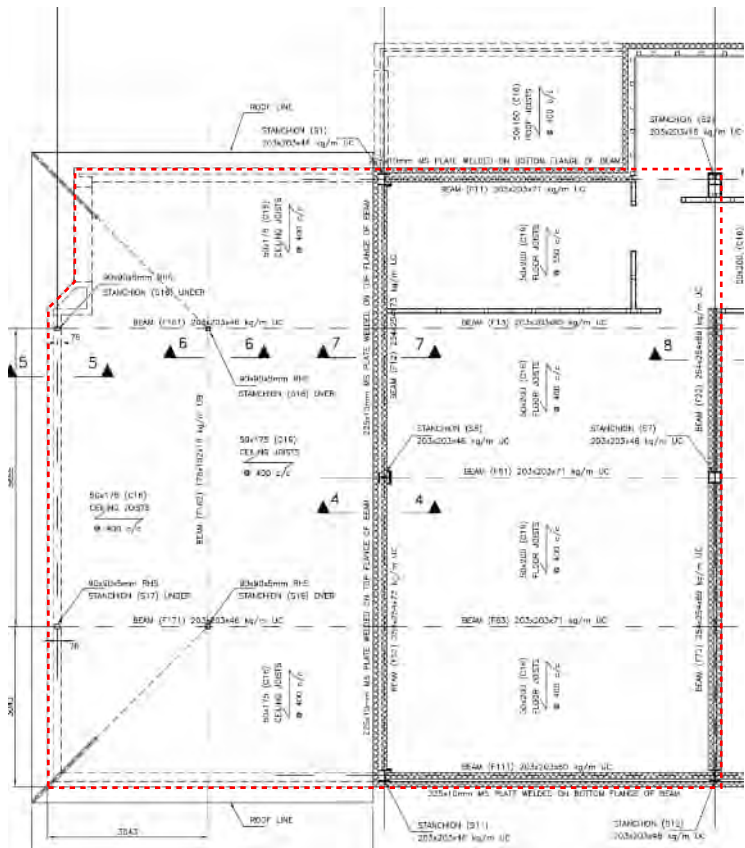
Perspective view of existing building



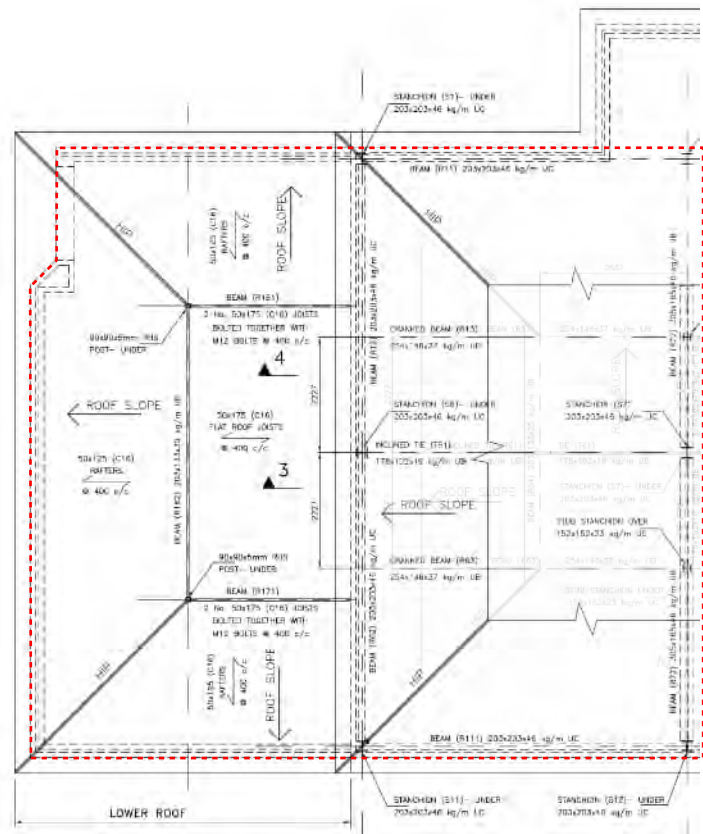
Perspective view of proposed building



Archive ground floor plan



Archive first floor plan



Archive roof and upper roof plan

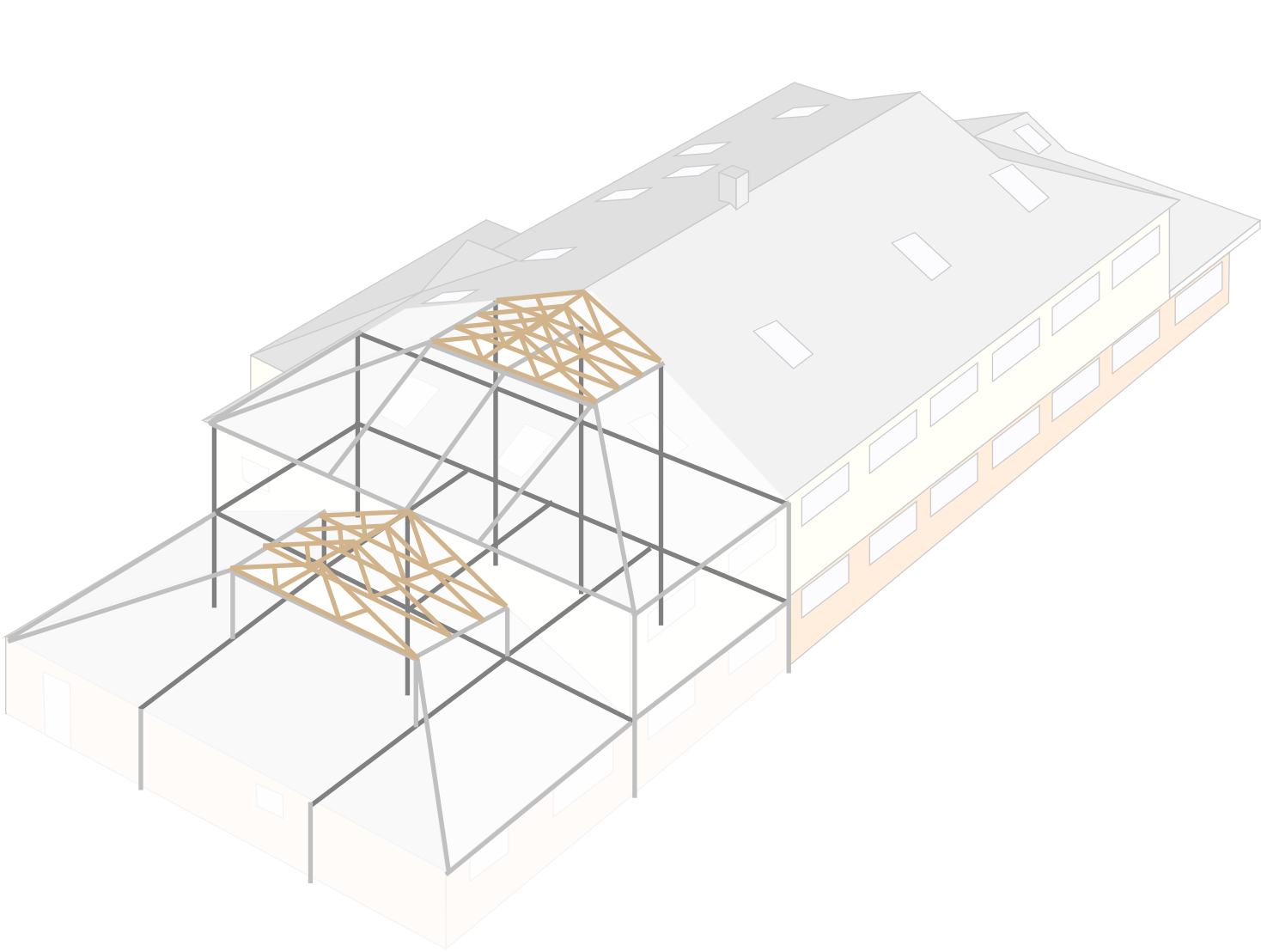
KEY:

Steel Struture

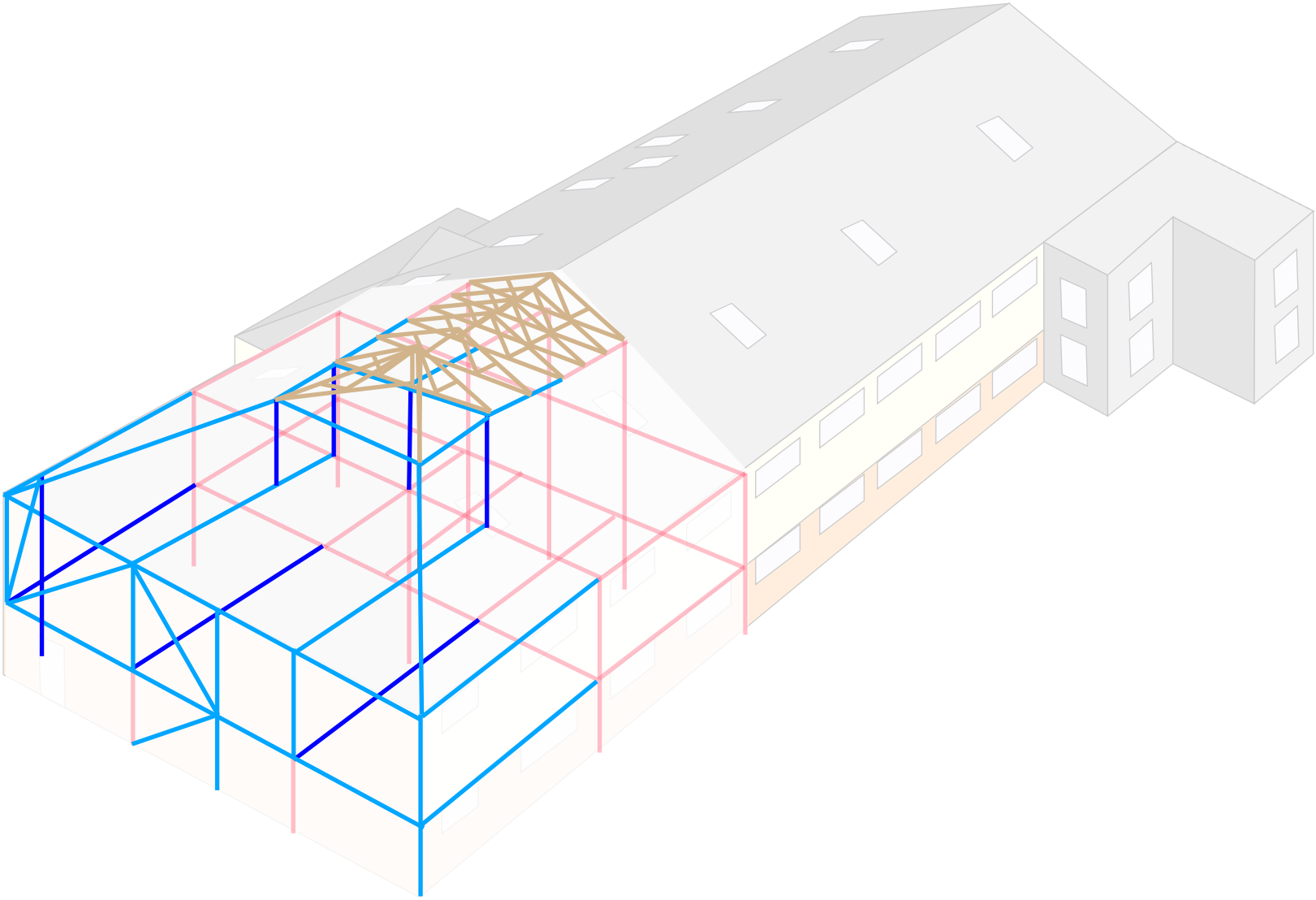
Timber Structure

Reused Steel

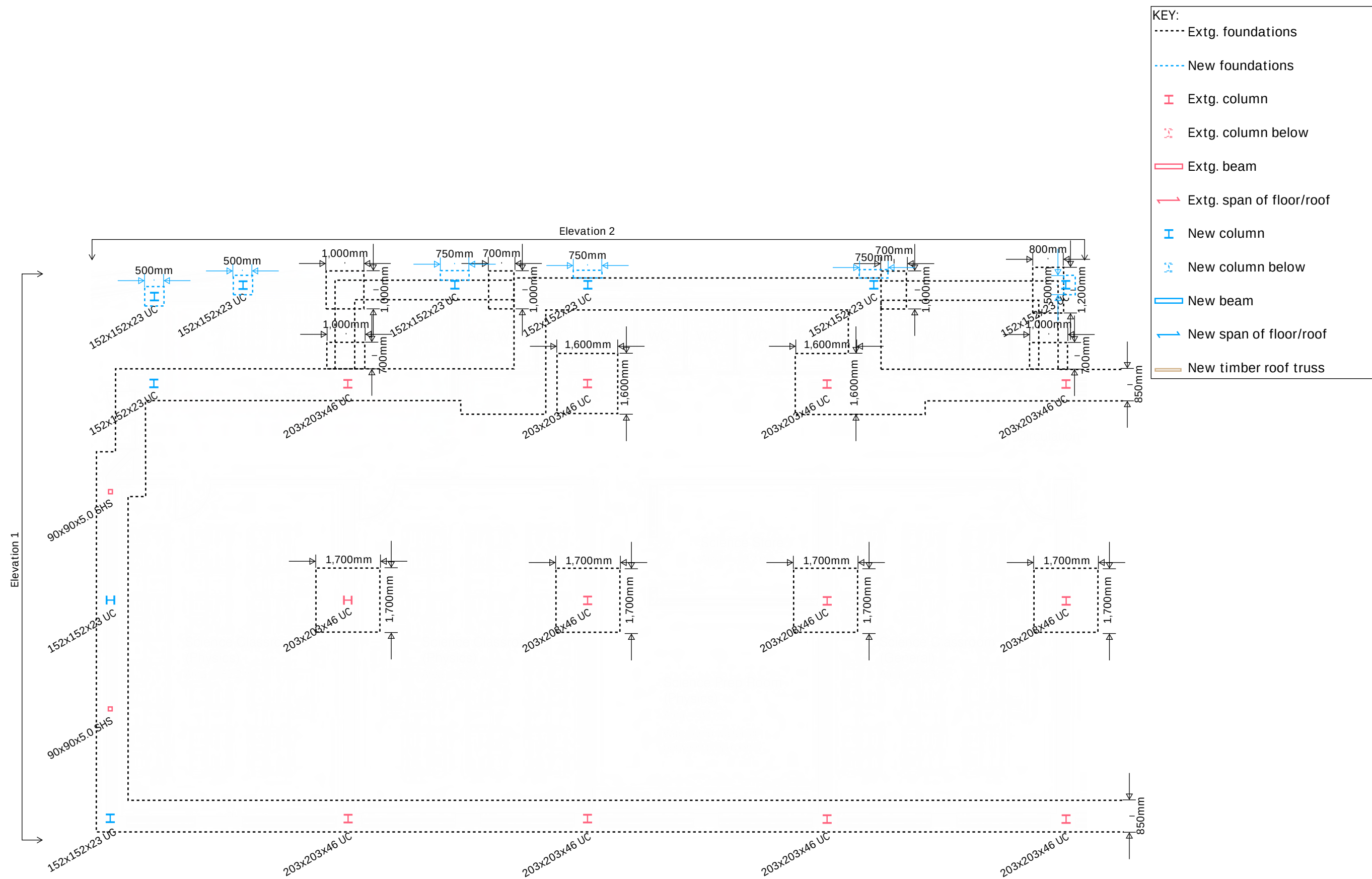
New Steel

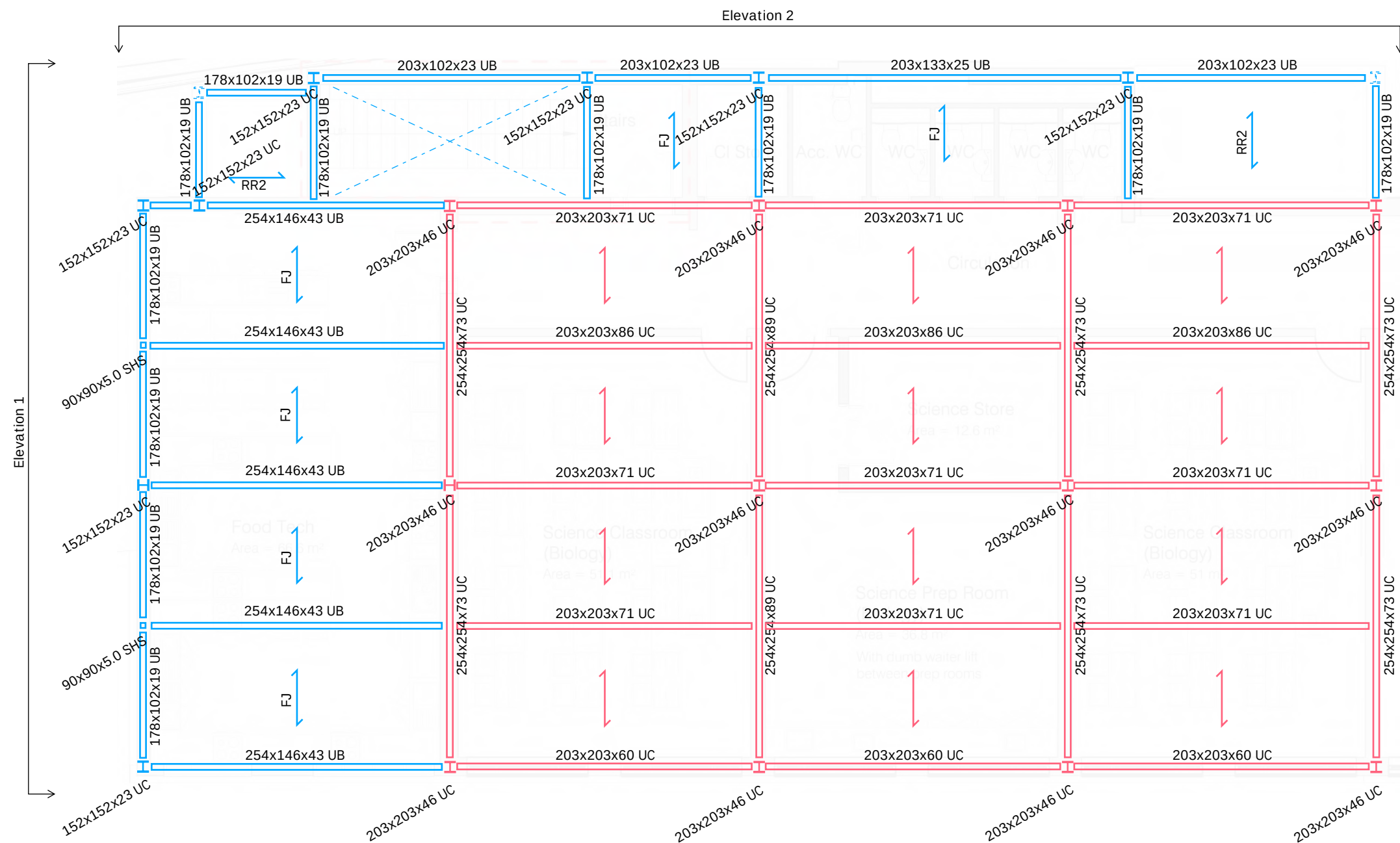


Existing structure



Proposed structure and reuse of existing

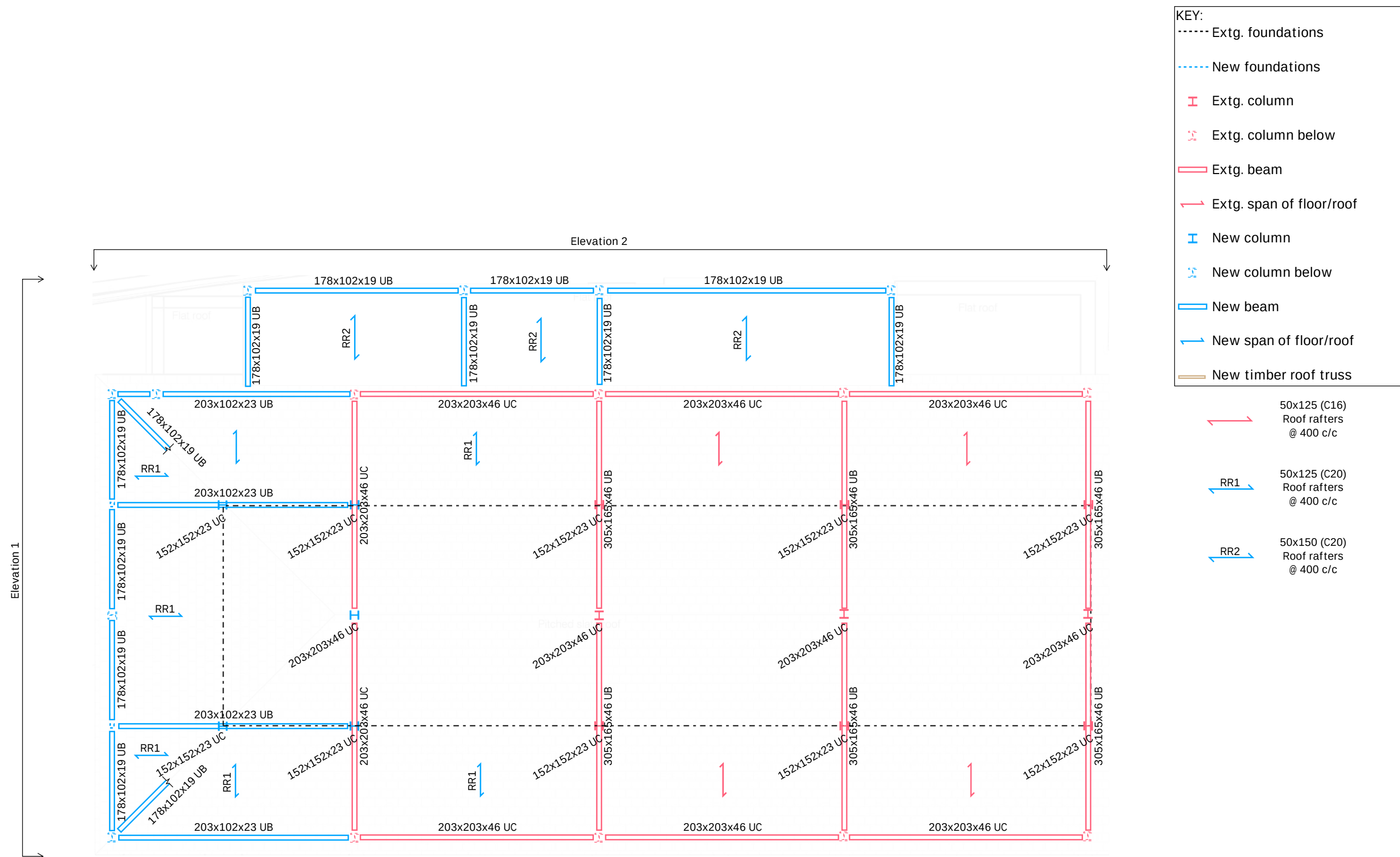


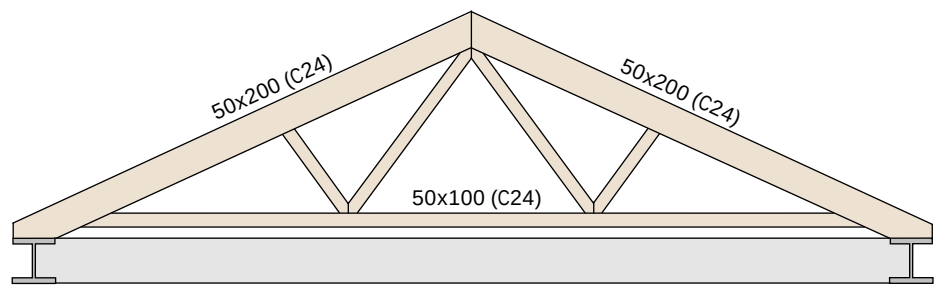
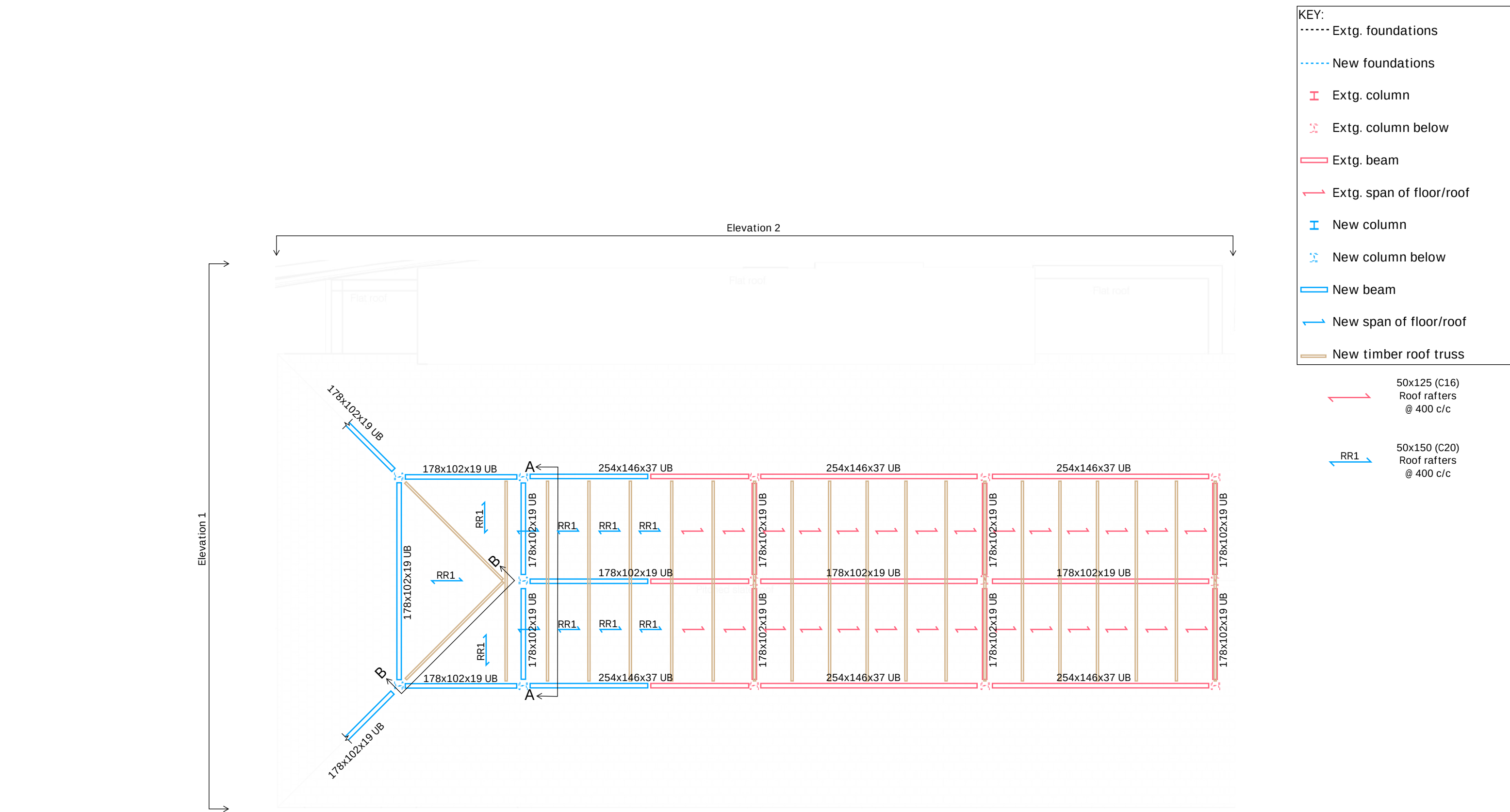


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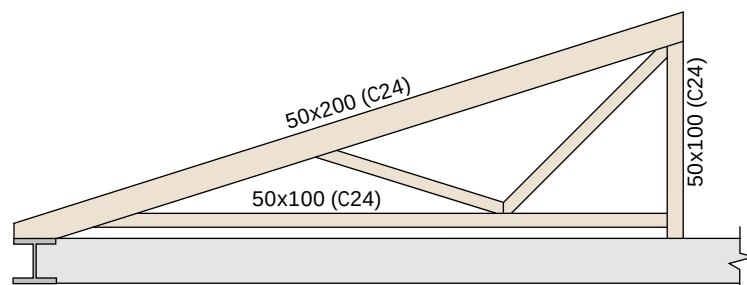
- Extg. foundations
- New foundations
- Extg. column
- Extg. column below
- Extg. beam
- Extg. span of floor/roof
- New column
- New column below
- New beam
- New span of floor/roof
- New timber roof truss

- 50x200 (C16)
Floor joists
@ 400 c/c
- FJ
50x200 (C20)
Floor joists
@ 400 c/c
- RR2
50x150 (C20)
Roof rafters
@ 400 c/c

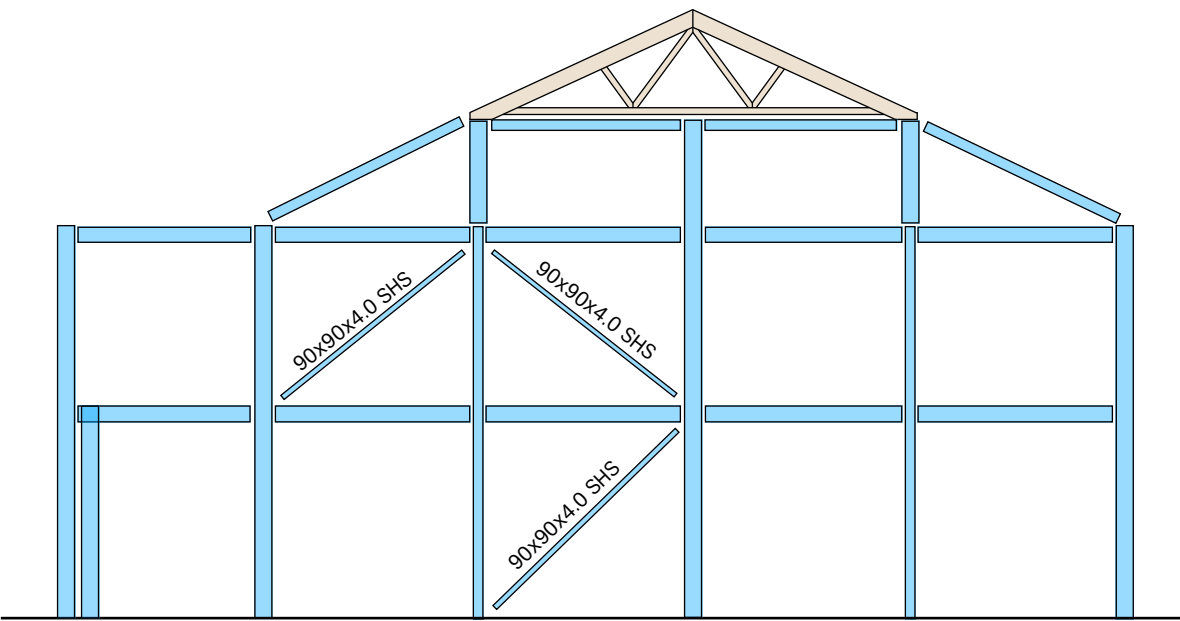




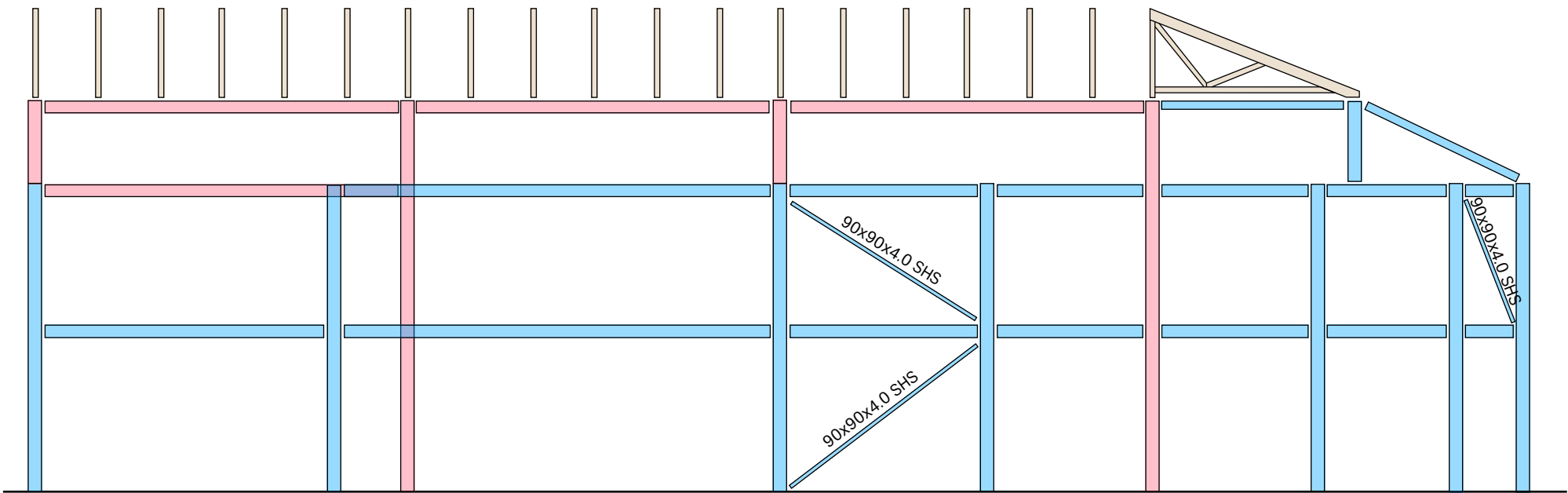
Section A-A



Section B-B



Elevation 1



Elevation 2



Appendix B: Site Investigation and Basement Impact Assessment Report

Site Investigation & Basement Impact Assessment Report

**Channing School
The Bank
Highgate
London N6**

Client Channing School

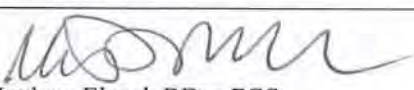
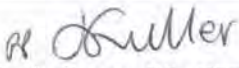
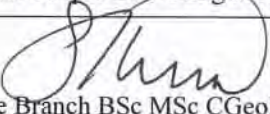
Engineer Heyne Tillett Steel

J11240

January 2012



Document Control

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Issue No	Status	Date	Approved for Issue
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EXECUTIVE SUMMARY

This executive summary contains an overview of the key findings and conclusions. No reliance should be placed on any part of the executive summary until the whole of the report has been read. Other sections of the report may contain information that puts into context the findings that are summarised in the executive summary.

BRIEF

This report describes the findings of a site investigation carried out by Geotechnical and Environmental Associates Limited (GEA), on the instructions of Heyne Tillett Steel, on behalf of Channing School, with respect to the demolition of the sports hall and construction of a new building with a partial basement that will accommodate a gymnasium, sixth form dance studio and performing arts centre. The main school building will be extended and the playing fields are to undergo some regrading. The purpose of the investigation has been to research the history of the site with respect to possible contaminative uses, to determine the ground and hydrogeological conditions, to assess the extent of any contamination and to provide information to assist with the design of the basement and suitable foundations for the proposed development. The report also includes a Basement Impact Assessment carried out in accordance with guidelines from London Borough of Camden in support of a planning application.

DESK STUDY FINDINGS

The earliest map studied, dated 1870, shows houses on the southwestern boundary with Highgate High St which are shown to have gardens to the rear containing an orchard and small out-buildings, and a pond was present approximately 30 m north of the site. Between 1884 and 1885 the pond was infilled as houses were built to the north of the site. Evidence of regrading of the site is apparent on maps between 1869 and 1935. The southernmost building on the site and the residential building in the north were demolished between the 1938 and 1951 maps. Five buildings were constructed on the site between 1958 and 1967, including the existing sports hall. Four square buildings in the west of the site were replaced with the existing school building in this area between 1991 and 1992. The site has remained unchanged to the present day since 1992. World War II bomb damage maps gained from the London Metropolitan Archives indicate that the site was not damaged during WWII; however an internet search has indicated that Channing School was badly damaged by a parachute mine.

GROUND CONDITIONS

Below a variable thickness of made ground, the Bagshot Formation was encountered over the Claygate Member of the London Clay Formation, which was in turn underlain by the London Clay proper. The made ground was absent from one location, but elsewhere was found to extend to depths of between 0.40 m (49.60 m TBM) and 5.60 m (36.97 m TBM) and to typically comprise dark brown silty sandy gravelly clay or a clayey sand with fragments of brick and occasionally ash, glass, pottery and clinker. The Bagshot Formation generally comprised light brown, fine sand with occasional silt and fine gravel, and was recorded to have a clay layer near to the top of the stratum. The Claygate Member comprised either orange-brown mottled grey silty very sandy clay or silty very clayey sand which was proved to a depth of 12.7 m (37.30 m TBM). The underlying London Clay comprised firm becoming stiff grey silty fissured clay with occasional selenite crystals which graded into a silty sandy clay below a depth of 16.5 m (33.5 m TBM). Groundwater was struck during the drilling between depths of 2.0 m (38.20 m TBM) and 8.0 m (42.0 m TBM). Monitoring of standpipes installed in four boreholes has indicated water to be at approximate depths of 7.0 m (43.00 m TBM) and 4.0 m (38.55 m TBM) at the highest and lowest levels of the site respectively, and groundwater appears to be flowing toward the east. Contamination analyses have indicated elevated concentrations of lead and a number of polyaromatic hydrocarbons within samples of made ground.

RECOMMENDATIONS

Excavations for the proposed basement structure will require temporary support to maintain stability of the existing and surrounding structures and to prevent any excessive ground movements, including the stability of the existing slopes and retaining walls, and the completed structure will need to take account of the sloping ground and retaining walls. Based on the groundwater observations to date, groundwater is not likely to be encountered within the basement excavation. Formation level for the proposed development is likely to be within the Bagshot Formation, which should provide an eminently suitable bearing stratum for spread foundations excavated from basement level. Alternatively, piled foundations would also provide a suitable solution.

It is likely that some form of remediation will be required due to soil contamination, although further testing may allow this requirement to be minimised.

Part 1: INVESTIGATION REPORT

This section of the report details the objectives of the investigation, the work that has been carried out to meet these objectives and the results of the investigation. Interpretation of the findings is presented in Part 2.

1.0 INTRODUCTION

Geotechnical and Environmental Associates (GEA) has been commissioned by Heyne Tillett Steel, on behalf of Channing School, to carry out a site investigation at Channing School, The Bank, Highgate, London, N6 5HF.

This report also forms part of a Basement Impact Assessment (BIA), which has been carried out in accordance with guidelines from the London Borough of Camden in support of a planning application. The site is located in the London Borough of Haringey, but the boundary with Camden passes immediately adjacent to the southern boundary of the site and it was considered appropriate therefore to follow the BIA procedures to demonstrate to planners and other interested parties that a rigorous assessment has been made of the possible effects of the proposed development.

1.1 Proposed Development

It is proposed to develop the site by demolishing the existing sports hall and constructing a building consisting of three parts; a gymnasium, a sixth form dance studio and a performing arts centre, which will have a partial basement; the playing fields are to undergo some levelling. The Dining Hall in the main school building will be extended to the west by a single storey, which is understood to be subject to a separate planning application.

This report is specific to the proposed development and the advice herein should be reviewed once the development proposals have been finalised.

1.2 Purpose of Work

The principal technical objectives of the work carried out were as follows:

- ❑ to check the history of the site with respect to previous contaminative uses;
- ❑ to determine the ground conditions and their engineering properties;
- ❑ to assess the possible impact of the proposed development on the local hydrogeology;
- ❑ to provide advice with respect to the design of suitable foundations and retaining walls;
- ❑ to provide an indication of the degree of soil contamination present; and
- ❑ to assess the risk that any such contamination may pose to the proposed development, its users or the wider environment.

1.3 Scope of Work

In order to meet the above objectives, a desk study was carried out, followed by a ground investigation. The desk study comprised:

- ❑ a review of readily available geological and hydrogeological maps;
- ❑ a review of historical Ordnance Survey (OS) maps and environmental searches sourced from the Envirocheck database;
- ❑ visit the London Metropolitan Archives to obtain World War II (WWII) bomb damage maps; and
- ❑ a walkover survey of the site carried out in conjunction with the fieldwork.

In the light of this desk study an intrusive ground investigation was carried out which comprised, in summary, the following activities:

- ❑ a single borehole, advanced to a depth of 20.0 m, by means of a cable percussion drilling rig;
- ❑ three opendrive sampler boreholes advanced to a maximum depth of 9.0 m;
- ❑ standard penetration tests (SPTs), carried out at regular intervals in the boreholes, to provide additional quantitative data on the strength of the soils;
- ❑ three window sampler boreholes advanced to a maximum depth of 5.0 m;
- ❑ the installation of groundwater monitoring standpipes in four of the boreholes to depths of between 7.0 m and 13.0 m, and three subsequent monitoring visits over a three week period;
- ❑ twelve trial pits, manually excavated in order to investigate the configuration of existing foundations;
- ❑ laboratory testing of selected soil samples for geotechnical purposes and for the presence of contamination; and
- ❑ provision of a report presenting and interpreting the above data, together with our advice and recommendations with respect to the proposed development.

The report includes a contaminated land assessment which has been undertaken in accordance with the methodology presented in Contaminated Land Report (CLR) 11¹ and involves identifying, making decisions on, and taking appropriate action to deal with, land contamination in a way that is consistent with government policies and legislation within the United Kingdom. The risk assessment is thus divided into three stages comprising Preliminary Risk Assessment, Generic Quantitative Risk Assessment, and Site-Specific Risk Assessment.

1.3.1 Basement Impact Assessment

The work carried out also includes a Hydrological and Hydrogeological Assessment and Land Stability Assessment (also referred to as Slope Stability Assessment), all of which form part of the BIA procedure specified in the London Borough of Camden (LBC) Planning Guidance

1 *Model Procedures for the Management of Land Contamination* issued jointly by the Environment Agency and the Department for Environment, Food and Rural Affairs (DEFRA) Sept 2004

CPG4² and their Guidance for Subterranean Development³ prepared by Arup. The aim of this work is to provide information on the groundwater conditions specific to this site and land stability, in particular to assess whether the development will affect the stability of neighbouring properties and whether any identified impacts can be appropriately mitigated.

The BIA elements of the work have been carried out by Martin Cooper, a BEng in Civil Engineering, a chartered engineer (CEng) and member of the Institution of Civil Engineers (MICE), who has over 20 years specialist experience in ground engineering. The assessment has been made in conjunction with Steve Branch, a BSc in Engineering Geology and Geotechnics, MSc in Geotechnical Engineering, a chartered geologist (CGeol) and Fellow of the Geological Society (FGS) with 25 years experience in geotechnical engineering, engineering geology and hydrogeology. Both assessors meet the Geotechnical Specialist criteria of the Site Investigation Steering Group and satisfy the qualification requirements of the Council guidance.

1.4 Limitations

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the investigation. The results of the work should be viewed in the context of the range of data sources consulted, the number of locations where the ground was sampled and the number of soil, gas or groundwater samples tested; no liability can be accepted for information in other data sources or conditions not revealed by the sampling or testing. Any comments made on the basis of information obtained from the client or other third parties are given in good faith on the assumption that the information is accurate; no independent validation of such information has been made by GEA.

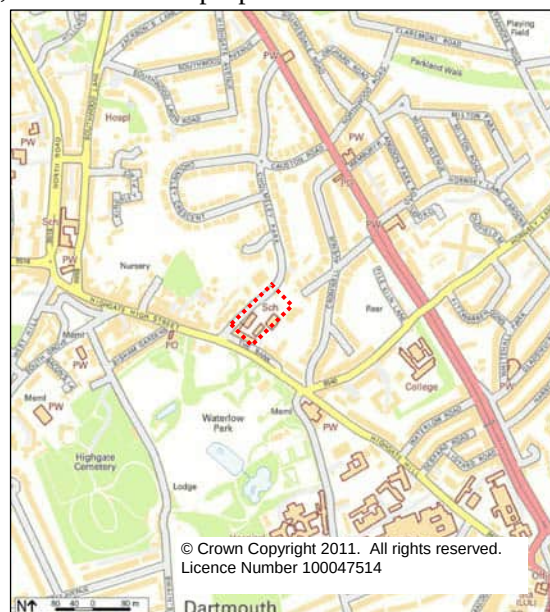
2.0 THE SITE

2.1 Site Description

The site is located in Highgate, north London, approximately 830 m to the northwest of Archway London Underground station. The site fronts onto The Bank to the southwest, and is bordered to the northwest by Cholmeley Park, and residential properties to the northeast and southeast. The site may be additionally located by National Grid Reference 528760, 187364, and is shown on the map opposite.

The site covers a roughly rectangular area measuring approximately 175 m by 75 m and is occupied by Channing School.

The site slopes from its maximum elevation in the west down toward the east and north, with a fall across the site of about 9 m to a retaining wall between the school site and the adjacent caretaker's house, which has a retained height of about 3 m. The slope has however been regraded to create level platforms which are used for buildings and playing areas. Within the site the breaks in slope are relatively gradual and well



2 London Borough of Camden Planning Guidance CPG4 Basements and lightwells

3 Ove Arup & Partners (2010) *Camden geological, hydrogeological and hydrological study. Guidance for Subterranean Development*. For London Borough of Camden November 2010

vegetated with grass and trees. There are a number of small retaining walls in the school, but the largest is on the northeastern boundary with the caretaker's house.

Channing School comprises five main buildings on different levels and locations in the site. The main school building fronts onto The Bank and is a two and five-storey building. The sloping nature of the site means that the lower floor becomes a basement to the north of the building. There are two other buildings used as classrooms in the centre of the site, and a sports hall is located in the east of the site which was constructed over a break in slope, such that it has two separate levels. A temporary building is located on the tennis courts in the lowest area of the site, in the north.

The site is mainly covered in hardstanding with the exception to the playing fields in the centre of the site and a grassed picnic area to the southwest of the sports hall. There are numerous trees of differing species and maturity around the site.

The boundaries of the school in the north are mainly formed by retaining walls, with evidence of bowing and general weathering of the bricks noted. The wall forming the northwest of the site is locally fenced off and new brick buttresses have been built to support the wall which is leaning towards the east.

2.2 Site History

The site history has been researched by reference to historical Ordnance Survey (OS) maps sourced from the Envirocheck database.

The earliest map studied, dated 1870, shows approximately six houses fronting onto The Bank on the southwestern boundary of the site. The houses are shown to have gardens to the rear which extended to the northeastern boundary of the site; an orchard and what appear to be small outbuildings were located within the gardens to the north. The surrounding area was typically developed with houses and private gardens and a pond was located approximately 30 m north of the site. Cromwell House is shown to the south of the site and is later shown as a children's hospital on subsequent maps. Between 1984 and 1985 the pond was infilled as houses are shown to have been built to the north of the site along Winchester Place.

At some time between 1869 and 1915 the northwestern boundary was altered and a slope is indicated along the majority of the boundary on the 1915 map. Further changes to site levels occurred between 1920 and 1935, with the 1935 map showing a break in slope which would create the existing playing field level; a building is also shown to have been built in the southwest of the site on this map. The southernmost building on the site and the residential building in the north were demolished between the 1938 and 1951 maps. Six buildings were constructed between 1958 and 1967, including the existing sports hall and the caretaker's house to the north of the site. The existing school building in the west of the site was built between 1991 and 1992. The site has remained unchanged to the present day since 1992.

World War II bomb damage maps obtained from the London Metropolitan Archives indicate that the site was not damaged during WWII; however an internet search has indicated that Channing School was badly damaged by a parachute mine, and as a result a new building was constructed on the site.

The internet search also revealed that the school has been operating on the site since 1885, and slowly bought adjacent residential properties extending the school until around 1931.

2.3 Other Information

A search of public registers and databases has been made via the Envirocheck database and relevant extracts from the search are appended. Full results of the search can be provided if required.

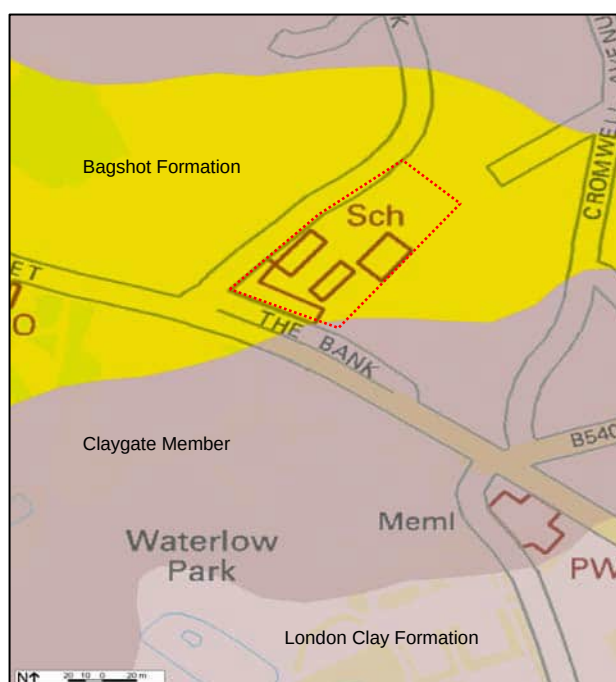
The search has revealed that there are no landfills, waste management, transfer, treatment or disposal sites within 1000 m of the site. There have also not been any recorded pollution incidents to controlled waters within 250 m of the site.

The search has indicated that the site is located in an area where less than 1% of homes are affected by radon emissions; which is the lowest classification given by the Health Protection Agency (HPA) and therefore no radon protective measures will be necessary.

2.4 Geology

The Geological Survey map of the area (sheet 256) indicates that the site should be underlain by the Bagshot Formation, overlying the Claygate Member which is in turn underlain by the London Clay Formation.

The geology in this area is generally horizontally bedded such that the boundary between the geological formations roughly follows the ground surface contour lines. The boundary between the Bagshot Formation and the underlying Claygate Member is located near to the southernmost point of the site, the boundary between the Claygate Member and the London Clay Formation is in the region of 190 m to the south of the site.



2.5 Hydrology and Hydrogeology

The Bagshot Formation and Claygate Member are classified as a Secondary 'A' Aquifers meaning they have permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers as defined by the Environment Agency (EA). The London Clay Formation is classified as unproductive strata with soils that have a low permeability and negligible significance to local water supply, as defined by the EA.

The topographical maps shows that the nearest surface water features are the Waterlow Park ponds, which are located approximately 200 m to the south of the site. The site is not within an area at risk from flooding as defined by the EA.

Existing and historical spring lines are present at the interface of the Claygate Member and the underlying essentially impermeable London Clay. These springs have been the source of a

number of London's "lost" rivers, notably the Fleet, Westbourne and Tyburn. Historically⁴, an eastern tributary of the Fleet originated near Kenwood House, Highgate, which drained into man made ponds before crossing what is now Highgate West Hill toward Swain's Lane, which is south of the site, adjacent to Waterlow Park. The Fleet flowed in a southerly direction where it ultimately joined the River Thames near Blackfriars Bridge.

Any water infiltrating the London Clay will generally tend to flow vertically downwards at a very slow rate towards the chalk aquifer. Due to the predominantly cohesive nature of the soils, the groundwater flow rate is anticipated to be very slow. Published data for the permeability of the London Clay indicates the horizontal permeability to generally range between 1×10^{-10} m/s and 1×10^{-8} m/s, with an even lower vertical permeability.

2.6 Preliminary Risk Assessment

Part IIA of the Environmental Protection Act 1990, which was inserted into that Act by Section 57 of the Environment Act 1995, provides the main regulatory regime for the identification and remediation of contaminated land. The determination of contaminated sites is based on a "suitable for use" approach which involves managing the risks posed by contaminated land by making risk-based decisions. This risk assessment is carried out on the basis of a source-pathway-receptor approach.

2.6.1 Source

The historical usage of the site that has been established by the desk study and the site walkover indicates that the site has a small potential for contamination in association with the orchard in the north of the site, however the use of the site as residential properties and later a school do not provide obvious sources of contamination at the site, nor are there any nearby in the immediate vicinity.

Although the site is known to have suffered a bomb strike, the bomb is designed to explode at the surface and should not result in a significant crater, furthermore the affected buildings have been demolished and further development has occurred at the site. Thus, there is considered to be a low risk of UXO at the site.

2.6.2 Receptor

The continued use of the site as a school will not result in extensive exposure to the soil and thus represents a moderate to low sensitivity end-use. Being underlain by a Secondary 'A' Aquifer, groundwater is likely to represent a relatively sensitive receptor. Adjacent sites are a potential receptor for contamination migrating off the site.

2.6.3 Pathway

The redevelopment will not create any new exposure pathways for end users. The presence of the building and the hardstanding will effectively form a barrier between any contaminants within the near-surface soils and end users or infiltration of surface water. Only in soft landscaped areas could there be a potential for contaminant exposure pathways, although such pathways are already in existence. Surface water run-off will create a pathway for contamination to reach groundwater and adjacent sites, although this pathway is already in existence.

Buried services will be exposed to any contaminants within the soil through direct contact and site workers will come into contact with the soils during demolition and construction works. There is thus considered to be a low potential for a contaminant pathway to be present between any potential contaminant source and a target for the particular contaminant.

4 Nicholas Barton (2000) *London's Lost Rivers*. Historical Publications Ltd

2.6.4 Preliminary Risk Appraisal

On the basis of the above it is considered that there is a low risk of there being a significant contaminant linkage at this site which would result in a requirement for major remediation work. Standard testing will identify if arsenic is elevated in the north of the site. Furthermore as there is no evidence of filled ground within the vicinity of the site there is not considered to be a significant potential for hazardous soil gas to be present on or migrating towards the site: there should thus be no need to consider soil gas exclusion systems.

3.0 SCREENING

The LBC guidance suggests that any development proposal that includes a subterranean basement should be screened to determine whether or not a full BIA is required.

3.1 Screening Assessment

A number of screening tools are included in the Arup document and for the purposes of this report reference has been made to Appendix E which includes a series of questions within a screening flowchart for three categories; groundwater flow; land stability; and surface water flow. Responses to the questions are tabulated below.

3.1.1 Subterranean (groundwater) Screening Assessment

Question	Response for Channing School
1a. Is the site located directly above an aquifer?	Yes, Secondary 'A' Aquifer
1b. Will the proposed basement extend beneath the water table surface?	Probably not, but will need to be confirmed by ground investigation. If a piled retaining wall is adopted it may extend below the basement level.
2. Is the site within 100 m of a watercourse, well (used/disused) or potential spring line?	No known spring or well within 100 m of the site, the nearest water feature is approximately 200 m south, which is thought to be fed from natural springs.
3. Is the site within the catchment of the pond chains on Hampstead Heath?	No
4. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	Yes, the proposed performance centre will reduce the percentage of grassed areas.
5. As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	It is assumed that additional surface water will be discharged to existing surface water sewers, however this is not known (outside scope of this report)
6. Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to or lower than, the mean water level in any local pond or spring line?	No

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

- Q1 The site is underlain by a Secondary 'A' Aquifer.
- Q2 The site may be within 100 m of a spring line
- Q4 A new extension will increase paved areas

3.1.2 Stability Screening Assessment

Question	Response for Channing School
1. Does the existing site include slopes, natural or manmade, greater than 7°?	Yes, there are manmade slopes greater than 7°
2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7°?	No.
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?	No
4. Is the site within a wider hillside setting in which the general slope is greater than 7°?	Yes, Parts of the natural hillside setting include slopes greater than 7°.
5. Is the London Clay the shallowest strata at the site?	No, the Claygate Member is the shallowest strata
6. Will any trees be felled as part of the proposed development and / or are any works proposed within any tree protection zones where trees are to be retained?	Yes, some trees will be felled and it is understood that there are no protected trees.
7. Is there a history of seasonal shrink-swell subsidence in the local area and / or evidence of such effects at the site?	No - although the retaining walls forming the site boundary are old and appear to be suffering from bowing and weathering.
8. Is the site within 100 m of a watercourse or potential spring line?	No.
9. Is the site within an area of previously worked ground?	No
10. Is the site within an aquifer?	Yes, a Secondary 'A' aquifer
11. Is the site within 50 m of Hampstead Heath ponds?	No
12. Is the site within 5 m of a highway or pedestrian right of way?	Yes , the site is adjacent to The Bank, Winchester Place and Cholmeley Park
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	No, the site is typically set higher than the neighbouring properties and the proposed basement will decrease differential depths of foundations.
14. Is the site over (or within the exclusion zone of) any tunnels, eg railway lines?	No

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

- Q1 Currently there are slopes greater than 7°.
- Q4 Parts of the natural hillside setting include slopes greater than 7°.
- Q6 Some trees will be felled but and it is understood that there are no protected trees.
- Q10 The site is underlain by a Secondary 'A' Aquifer.
- Q12 The site is within 5 m of a public highway.

3.1.3 Surface Flow and Flooding Screening Assessment

This element of the BIA is provided for guidance only and should be confirmed by a suitably qualified engineer experienced in carrying out surface water assessments.

Question	Response for Channing School
1. Is the site within the catchment of the pond chains on Hampstead Heath?	No
2. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	No

Question	Response for Channing School
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	Yes, some grassed areas will become developed with a new Performance Centre
4. Will the proposed basement development result in changes to the profile of the inflows (instantaneous and long term) of surface water being received by adjacent properties or downstream watercourses?	No, but the increased hardstanding will increase the peak flow to existing surface water drainage.
5. Will the proposed basement result in changes to the quantity of surface water being received by adjacent properties or downstream watercourses?	No
6. Is the site in an area known to be at risk from surface water flooding such as South Hampstead, West Hampstead, Gospel Oak and Kings Cross, or is it at risk of flooding because the proposed basement is below the static water level of a nearby surface water feature?	No

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

Q3 Some soft landscaping will be reduced by the construction of an extension

4.0 SCOPING AND SITE INVESTIGATION

The purpose of scoping is to assess in more detail the factors to be investigated in the impact assessment. Potential consequences are assessed for each of the identified potential impact factors.

4.1 Potential Impacts

The following potential impacts have been identified.

Potential Impact	Possible Consequence
The existing site includes slopes, natural or manmade, greater than 7°	Local slope instability within the site
The site within 100 m of a watercourse, well (used/ disused) or potential spring line	The flow from a spring, well or watercourse may increase or decrease if the groundwater flow regime is affected by a proposed basement. If the flow is diverted, it may result in the groundwater flow finding another location to issue from with new springs forming or old springs being reactivated. A secondary impact is on the quality of the water.
The site is within a wider hillside setting in which the general slope is greater than 7°?	Ground instability
Tree/s to be felled as part of the proposed development and/or works proposed within any tree protection zones where trees are to be retained?	The removal of trees may cause the recovery of the soil moisture deficit of clay, which may lead to swelling of the clay. Existing root systems may be adding stability to the existing slope and the removal of trees may induce instability.
The site is within an aquifer	Dewatering can cause ground settlement. The zone of settlement will extend for the dewatering zone, and thus could extend beyond a site boundary and affect neighbouring structures. Conversely, an increase in water levels can have a detrimental effect on stability.
Site within 5 m of a highway or pedestrian right of way	Excavation of a basement may result in structural damage to the road or footway; however work for the proposed basement at this site will take place at a distance of greater than 5 m from adjacent public highways.

Potential Impact	Possible Consequence
Proposed basement development may result in a change in the proportion of hard surface / paved external areas	A change in the proportion of hard surfaced or paved areas of a property will affect the way in which rainfall and surface water are transmitted away from the property. This includes changes to the surface water received by the underlying aquifers, adjacent properties and nearby watercourses. Changes could result in decreased flow, which may affect ecosystems or reduce amenity, or increased flow may additionally increase the risk of flooding.
Site located directly above an aquifer	Potentially the basement may extend into the underlying aquifer and thus affect the groundwater flow regime.

These potential impacts have been investigated through the site investigation, as detailed below.

4.2 Exploratory Work

In order to meet the objectives described in Section 1.2, a single cable percussion borehole was drilled to a depth of 20.00 m using a standard cable percussion rig and three boreholes were advanced using an opendrive sampler (Terrier rig) to depths of between 7.00 m and 9.00 m. Standard penetration tests (SPTs) were carried out at regular intervals in these boreholes. In addition three further boreholes were drilled by hand held window sampling equipment in areas only accessible with portable equipment. Disturbed and undisturbed samples were recovered from the boreholes and sent for laboratory examination, geotechnical testing and a suite of contamination analysis.

Access was available on land to the north of the site, on the adjacent residential property to allow a trial pit and borehole to be excavated to provide structural information and information on the ground conditions from that ground level.

Eleven trial pits were manually excavated adjacent to various existing elevations and boundary walls in order to expose and allow the inspection of the existing foundations. This work has not been completed as the depths of excavation required to reach foundations has been found to be in excess of that initially anticipated; some of the trial pits have been abandoned and omitted from the scope of works and further work is required to complete outstanding trial pits. The additional work will be reported as an addendum to this report.

The borehole and trial pit records and results of the laboratory analyses are appended, together with a site plan indicating the exploratory positions. The Temporary Bench Mark (TBM) levels shown on the borehole and trial pit records have been interpolated from spot heights shown on an undated site survey drawing (ref: 1509_B of unknown date), which was provided by the consulting engineers. It is apparent from knowledge of the surrounding ground levels that the spot heights on the survey drawing have not been related to an Ordnance Survey bench mark, but the drawing does not refer to the location or assumed value of an assumed site datum or TBM.

4.3 Sampling Strategy

The borehole and trial pit locations were positioned on site by GEA to provide optimum coverage of the site with due regard to the proposed development, whilst avoiding the areas of known services.

Groundwater monitoring standpipes were installed to depths of 7.00 m (35.57 m TBM), 7.00 m (40.60 m TBM), 8.50 m (41.50 m TBM) and 13.00 m (37.00 m TBM) in four of the

boreholes, in order to facilitate future monitoring. Each has been monitored on three occasions over a three week period.

Six samples of made ground were subjected to analysis for a range of common industrial contaminants and contamination indicative parameters. For this investigation the analytical suite for the soil included a range of metals, speciation of total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), total cyanide and monohydric phenols. The soil samples were selected to provide a general view of the chemical conditions of the soils that are likely to be involved in a human exposure or groundwater pathway and to provide advice in respect of re-use or for waste disposal classification.

The contamination analyses were carried out at an MCERTs accredited laboratory with the majority of the testing suite accredited to MCERTS standards. Details of the MCERTs accreditation and test methods are included in the Appendix together with the analytical results.

5.0 GROUND CONDITIONS

The investigation has confirmed the expected ground conditions in that, beneath a generally moderate but locally significant thickness of made ground, the Bagshot Formation was recorded to be underlain by the Claygate Member which was in turn underlain by the London Clay Formation which extended to the full depth of the investigation.

5.1 Made Ground

Borehole No 1 was drilled adjacent to a retaining wall in the north of the site and encountered a significant thickness of made ground which typically comprised dark brown and brown sandy gravelly occasionally cobbly clay or clayey sand with fragments of brick, concrete, ash, glass, pottery and clinker which extends to a depth of 5.6 m (39.97 m OD).

The made ground found in the other boreholes generally comprised dark brown and brown clayey gravelly sand with occasional fragments of brick and ash and extended to depths of between 0.4 m and 2.1 m. Made ground was absent from Borehole No 4.

No visual or olfactory evidence of contamination was observed within these soils, although fragments of ash, clinker, glass, pottery, were noted within the made ground, which can commonly contain elevated concentrations of polyaromatic hydrocarbons (PAH). Samples of the made ground have been analysed for a range of contaminants and the results are summarised in section 5.6.

5.2 Bagshot Formation

This stratum generally comprised light brown, locally orange-brown and reddish brown, fine to coarse sand which was occasionally silty and gravelly. In Borehole Nos 3, 4 and 7 only, which were located within the higher parts of the site, encountered a layer of firm light brown silty sandy clay to depths of between 1.50 m (46.50 m TBM) and 2.90 m (47.10 m TBM); this material may represent a downwash deposit. Below the clay light brown occasionally clayey and silty fine to medium sand extended to depths of between 6.50 m (43.50 m TBM) and 6.80 m (40.80 m TBM).

Laboratory testing has indicated that the upper clay layer encountered on the higher ground is of medium volume change potential.

No visual or obvious signs of contamination were noted in these soils.

5.3 Claygate Member

The Claygate Member was found to comprise a variable sequence of orange-brown to brown and mottled grey silty very sandy clay and a very clayey silty sand which was proved to a depth of 12.7 m (37.30 m TBM) and 4.5 m (35.70 m TBM).

5.4 London Clay Formation

The London Clay Formation comprised firm becoming stiff grey silty fissured clay with occasional selenite crystals which graded into a silty sandy clay below a depth of 16.5 m (33.5 m TBM) and extended to the maximum depth investigated of 20.00 m (30.00 m TBM)

No visual or obvious signs of contamination were noted in these soils.

5.5 Groundwater

Groundwater was encountered during drilling within the made ground, Bagshot Formation and Claygate Member at depths of between 2.0 m (38.00 m TBM) and 8.0 m (42.00 m TBM).

The results of monitoring of the standpipes installed at the site are presented in the table below.

Borehole No	Standpipe Depth m (Level m TBM)	Depth to groundwater in m (Level (m TBM))		
		29/11/11	7/12/11	14/12/11
1	7.0 (35.57)	4.05 (38.52)	4.02 (38.55)	4.03 (38.54)
2	7.0 (40.60)	5.11 (42.49)	5.07 (42.53)	5.07 (42.53)
3	8.5 (41.50)	7.12 (42.88)	7.15 (42.85)	7.19 (42.81)
4	13.0 (37.0)	6.65 (43.35)	6.65 (43.35)	6.67 (43.33)

The results of the groundwater monitoring indicate groundwater flowing towards the east, thus following the general topography as expected.

5.6 Soil Contamination

The table below sets out the values measured within six samples of made ground; all concentrations are in mg/kg unless otherwise stated.

Determinant	Maximum concentration recorded (mg/kg)	Minimum concentration recorded (mg/kg)	Number of samples below detection limit	Normalised upper bound US ₉₅
Arsenic	18	10	None	16.4
Cadmium	0.82	0.12	None	0.6
Chromium	20	15	None	19.0
Copper	77	22	None	62.7
Mercury	1.0	0.43	None	1.1
Nickel	17	7.3	None	16.4
Lead	1300	180	None	836.9
Selenium	0.69	<0.20	Two	0.6

Determinant	Maximum concentration recorded (mg/kg)	Minimum concentration recorded (mg/kg)	Number of samples below detection limit	Normalised upper bound US ₉₅
Zinc	490	83	None	369.8
Total Cyanide	0.5	<0.5	Five	0.5
Total Phenols	<0.3	<0.3	Six	0.3
Sulphide	20	2.9	None	13.2
TPH	150	<10	Four	88.5
Total PAH	90	<2	One	59.3
Benzo(a)pyrene	8.6	<0.1	One	5.5
Naphthalene	0.91	<0.1	One	0.7
Total organic carbon %	4.4	0.74	None	4.2
Note: Figure in bold indicates concentration in excess of risk-based soil guideline values, as discussed below				

5.6.1 Generic Quantitative Risk Assessment

The use of a risk-based approach has been adopted to provide an initial screening of the test results to assess the need for subsequent site-specific risk assessments. To this end the contaminants of concern are those that have values in excess of a generic human health risk based guideline values which are either that of the CLEA⁵ Soil Guideline Value where available, or is a Generic Guideline Value calculated using the CLEA UK Version 1.06 software assuming a residential end use.

The key generic assumptions for this end use are as follows:

- ☐ that groundwater is not a critical risk receptor;
- ☐ that the critical receptor for human health will be young female child (aged zero to six years old);
- ☐ that the exposure duration will be six years;
- ☐ that the critical exposure pathways will be direct soil and indoor dust ingestion, consumption of home-grown produce, consumption of soil adhering to home-grown produce, skin contact with soils and dust, and inhalation of dust and vapours; and
- ☐ that the building type equates to a two-storey terraced house.

It is considered that these assumptions are acceptable for this generic assessment of this site; however they are also considered to be conservative for the end use of the site as a school with children aged between 11 and 18 years of age. The tables of generic screening values derived by GEA and an explanation of how each value has been derived are included in the Appendix.

Where contaminant concentrations are measured at concentrations below the generic screening value it is considered that they pose an acceptable level of risk and thus further consideration of these contaminant concentrations is not required. However, where

5 Updated Technical Background to the CLEA Model (Science Report SC050021/SR3) Jan 2009 and Soil Guideline Value reports for specific contaminants; all DEFRA and Environment Agency.

concentrations are measured in excess of these generic screening values there is considered to be a potential that they could pose an unacceptable risk and thus further action will be required which could include;

- ❑ additional testing to zone the extent of the contaminated material and thus reduce the uncertainty with regard to its potential risk;
- ❑ site specific risk assessment to refine the assessment criteria and allow an assessment to be made as to whether the concentration present would pose an unacceptable risk at this site; or
- ❑ soil remediation or risk management to mitigate the risk posed by the contaminant to a degree that it poses an acceptable risk.

When comparing the results from the contamination testing to those in the Soil Guideline Values and Generic Guideline Values, the results of the contamination testing have indicated elevated concentrations of lead, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene and total polycyclic aromatic hydrocarbons (PAH) within four samples of made ground tested. This assessment is based upon the potential for risk to human health, which at this site is considered to be the critical risk receptor.

Contaminant of Concern	Maximum concentration recorded (mg/kg)	Location(s) of elevated concentration(s)	Normalised upper bound US95	Generic Risk-Based Screening Value
Lead	1300	BH1-0.1m, BH6-0.2m	836.9	450
benzo(a)pyrene	8.6	BH1-0.1m, BH3 – 0.2m BH5-0.2	5.5	1.0
Total PAH	90	BH1-0.1m, BH3 – 0.2m BH5-0.2, BH6-0.2m	59.3	6.7

The significance of these results is considered further in Part 2 of the report.

5.7 Existing Foundations

Trial pits completed to date show the boundary retaining wall to be founding upon natural soils between depths of 0.85 m and greater than 1.62 m.

The Sports Hall foundation has only been proved in one location, where the wall was found to be supported by a concrete foundation that steps out from the wall by 0.73 m and was bearing in natural sand at a depth of 1.65 m.

Trial Pit No 2 proved a concrete foundation for the main school building at a depth of 0.6 m bearing on natural sand.

Further work is scheduled to complete the trial pitting and this information will be provided in an addendum report, along with the complete trial pit records.

Part 2: DESIGN BASIS REPORT

This section of the report provides an interpretation of the findings detailed in Part 1, in the form of a ground model, and then provides advice and recommendations with respect to foundation options and other aspects of the development.

6.0 INTRODUCTION

Consideration is being given to the demolition of the sports hall and construction of a three part building comprising a gymnasium, sixth form dance studio and performing arts centre which will have a partial basement. The main school building will be extended to the east at ground floor level only and the playing fields are to undergo some levelling. It is understood that the basement is to be single storey and will be approximately 3.85 m deep, extending to a level of 46.15 m TBM.

Loads have not been provided, but the currently proposed foundation scheme involves spread foundations and a sheet piled wall on the eastern elevation of the basement to maintain stability. The pre-planning structural drawings, reference 0573/050 Rev P2 dated 27.7.2011 from Heyne Tillett Steel have been reviewed to aid recommendations. The depth of the sheet piles are not known but it is assumed they would be approximately 8 m deep (42.00 m TBM), and are to be installed by non-percussive techniques.

7.0 GROUND MODEL

The desk study has revealed that the site has been used as private residences and more recently a school and on the basis of the fieldwork, the ground conditions at this site can be characterised as follows.

- ❑ Beneath a generally moderate, but locally significant thickness of made ground, the Bagshot Formation was recorded to be underlain by the Claygate Member which was in turn underlain by the London Clay Formation which extended to the full depth of the investigation;
- ❑ made ground was found to be absent in one location, but was found to extend to a maximum depth of 5.60 m (36.97 m TBM) and to typically comprise dark brown silty sandy gravelly clay or a clayey sand with fragments of brick and occasionally ash, glass, pottery and clinker;
- ❑ the Bagshot Formation comprised light brown, locally orange-brown and reddish brown occasionally fine to coarse sand, which was occasionally silty and fine gravelly and extended to depths of between 6.50 m (43.50 m TBM) and 6.80 m (40.80 m TBM);
- ❑ a layer of firm light brown silty sandy clay was recorded at a shallow depth within the Bagshot Formation on the higher ground;
- ❑ the Claygate Member comprised a variable sequence of orange-brown mottled grey silty very sandy clay and very clayey silty sand which was proved to depths of 12.7 m (37.30 m TBM) and 4.5 m (35.70 m TBM);
- ❑ the London Clay Formation comprised firm becoming stiff grey silty fissured clay with

occasional selenite crystals which graded into a silty sandy clay below a depth of 16.50 m (33.5 m TBM) and extended to the maximum depth investigated of 20.00 m (30.00 m TBM);

- groundwater was struck during drilling between depths of 2.0 m (38.20 m TBM) and 8.0 m (42.0 m TBM) within the made ground, Bagshot Formation and Claygate Member;
- monitoring of standpipes installed in four boreholes have indicated water to be at approximate depths of 7.0 m (43.00 m TBM) and 4.0 m (38.55 m TBM) at the highest and lowest levels of the site respectively;
- monitoring of the standpipes indicated groundwater flow toward the east; and
- contamination analyses have indicated elevated concentrations of lead, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene and total PAH in four samples of made ground.

8.0 ADVICE AND RECOMMENDATIONS

Excavations for the proposed basement structure will require temporary support to maintain stability of the existing and surrounding structures and to prevent any excessive ground movements, including the stability of the existing slopes and retaining walls, and the completed structures will need to take account of the sloping ground and retaining walls. Based on the groundwater observations to date, groundwater is not likely to be encountered within the basement excavation.

Formation level for the proposed development is likely to be within the Bagshot Formation, which should provide an eminently suitable bearing stratum for spread foundations excavated from basement level. Alternatively, piled foundations would also provide a suitable solution.

It is likely that some form of remediation will be required due to soil contamination, however further testing could limit the amount of work carried out, which may be the most cost effective solution.

8.1 Basement Excavation

It is understood that the new basement will be excavated to a depth of approximately 3.85 m, to a level of 46.15 m TBM. Therefore formation level is likely to be within the medium dense to dense Bagshot Formation. The current proposals include the use of a sheet piled wall on the eastern elevation of the building to allow the construction of spread foundations at basement level.

Groundwater monitoring has measured water at a shallowest depth of 6.65 m, at a level of 43.35 m TBM in the area where the proposed basement will be built; therefore groundwater should not be encountered in the basement excavation. However it is essential that the standpipes are monitored to establish equilibrium levels and determine the extent of any seasonal fluctuations.

If sufficient space is available it may be possible to form at least parts of the excavation in open cut. In situ retaining walls can then be constructed within the excavation and the area behind the walls backfilled on completion. Suitable angles for the battered sides of the excavation are expected to be approximately 30° for the made ground and Bagshot Formation.

It would be prudent to excavate a number of trial pits to obtain a better idea of the stability of the Bagshot Formation if this approach is to be considered.

Care should be taken to protect the sides of any unsupported cut slopes during periods of rainfall and any run-off from construction operations until the retaining walls have been installed. Movement of plant at the top of any open cut should be prevented and daily inspections of the cut faces should be carried out to check stability.

The design of basement support in the temporary and permanent conditions needs to take account of the need to maintain the stability of the excavation, the existing slope, the surrounding structures including the retaining walls, as indicated by the screening and scoping.

If open cut is not appropriate, a contiguous bored pile wall could be installed prior to excavating the basement, and could be designed to support the existing structural loads. Sheet piling could also be used, but consideration will need to be given to the effects of noise and vibrations unless silent techniques are used. If water jetting is to be adopted to assist in installation of sheet piling the specialist piling contractor should provide assurance with respect to the risk of water jetting causing movement of immediately adjacent buildings and slopes. The investigation has indicated that groundwater should not be encountered within the depth of excavation and any localised inflows should be controllable by means of grouting between the piles and / or sump pumping.

The ground movements associated with the basement excavation will depend on the method of excavation and support and the overall stiffness of the basement structure in the temporary condition. Thus, a suitable amount of propping will be required to provide the necessary rigidity. In this respect the timing of the provision of support to the wall will have an important effect on movements. The stability of the existing foundations, if retained and surrounding structures and tress will need to be ensured at all times and the retaining walls will need to be designed to accommodate any loads from nearby foundations and retaining walls.

8.1.1 Slope Stability

The screening assessment has identified the presence of a man made slope with an angle in excess of 7° in the site.

At present slopes are generally well vegetated with grass or trees and generally shows no sign of any significant recent movement. It is understood that the re profiling of the site will not create any new significant slopes, merely moving the slopes backward into higher ground to create larger usable areas and that they will be designed and engineered during the site works.

Retaining walls form some parts of the site boundary, investigation is ongoing to confirm the founding depth and details. However, the proposed structure should incorporate suitable measures to ensure no additional load is passed onto the retaining.

Once the details of the basement excavation and slope reprofiling have been finalised an initial check should be made on overall stability and a slope stability analysis will be required if the work is considered to have any detrimental impact.

8.1.2 Basement Heave

The excavation of the basement will result in an approximate unloading of 80 kN/m², which will result in an elastic heave and long term swelling of the Claygate Member and London Clay. The effects of the longer term swelling movement within the Claygate Member and

London Clay will be mitigated by the continued presence of approximately 8.7 m thickness of sand, coupled with the load applied by the proposed foundations. It would however be prudent to conduct an analysis of these movements once the basement design has been finalised.

8.1.3 Basement Retaining Walls

The following parameters are suggested for the design of the permanent basement retaining walls.

Stratum	Bulk Density (kg/m ³)	Effective Cohesion (c' – kN/m ²)	Effective Friction Angle (Φ – degrees)
Made ground	1700	Zero	27
Bagshot Formation	1800	Zero	35

The design groundwater level should be determined on the basis of continued monitoring of the standpipes and the advice in BS8102:2009⁶ should be followed with respect to waterproofing.

The retaining walls will need to be designed to take account of the overall stability of the slope and this will need to be considered in more detail once the layout has been finalised.

8.2 Spread Foundations

The excavation to form the basement will result in a formation level in the Bagshot Formation at approximately 46.15 m TBM and 43.75 m TBM on different levels. It should be possible to adopt moderate width pad or strip foundations in the medium dense granular soils of the Bagshot Formation at this level, designed to apply a net allowable bearing pressure of 200 kN/m² below the level of the proposed basement floor. This value incorporates an adequate factor of safety against bearing capacity failure and should ensure that settlement remains within normal tolerable limits.

The proposed extension to the main school building could also be founded upon within the Bagshot Formation and it should be possible to adopt moderate width pad or strip foundations in the dense granular soils of the Bagshot Formation at this level, designed to apply a net allowable bearing pressure of 200 kN/m². It would be prudent to incorporate a joint between the old and proposed extension.

In view of the presence of a layer of clay above the sand of the Bagshot Formation and the variability of the Claygate Formation it is recommended that additional targeted shallow investigation is considered once layout and levels are finalised.

8.3 Piled Foundations

For the ground conditions at this site some form of bored pile is likely to be the most appropriate type. A conventional rotary augered pile may be appropriate, with temporary casing installed through the Bagshot Formation and Claygate Member to maintain stability and prevent groundwater inflows. However, in view of the risk of groundwater inflows within the London Clay it is considered that the use of bored piles installed using continuous flight auger (cfa) techniques would be more appropriate.

⁶ BS8102 (2009) Code of practice for protection of below ground structures against water from the ground

The following table of ultimate coefficients may be used for the preliminary design of bored piles, which have been based on the SPT & Cohesion / level graph in the appendix.

Ultimate Skin Friction		kN/m²
Made Ground and Bagshot Formation	All soil above 46.15 m TBM	Ignore (basement)
Bagshot Formation	46.15 m TBM to 43.2 m TBM	35
Claygate Member ($\alpha = 0.4$)	43.2 m TBM to 37.3 m TBM	Increasing linearly from 15 to 30
London Clay ($\alpha = 0.4$)	37.3 m TBM to 30.0 m TBM	Increasing linearly from 30 to 50
Ultimate End Bearing		kN/m²
London Clay ($N_c = 9$)	40.0 m TBM to 30.0 m TBM	Increasing linearly from 540 to 1080

In the absence of pile tests, guidance from the London District Surveyors Association⁷ (LDSA) suggests that a factor of safety of 2.6 should be applied to the above coefficients in the computation of safe theoretical working loads. On the basis of the above coefficients and a factor of safety of 2.6, it has been estimated that 450 mm diameter piles with lengths of 15 m and 20 m, founding at levels of 35.0 m TBM and 30.0 m TBM respectively, should provide safe working loads of 230 kN and 360 kN respectively.

The above examples are not intended to constitute any form of recommendation with regard to pile size or type, but merely serve to illustrate the use of the above coefficients. Specialist piling contractors should be consulted with regard to the design of a suitable piling scheme for this site.

8.4 Shallow Excavations

On the basis of the trial pit findings, it is considered unlikely that it will be feasible to form relatively shallow excavations that extend through the made ground and terminate within the Bagshot Formation without the requirement for lateral support. Where personnel are required to enter excavations, a risk assessment should be carried out and temporary lateral support or battering of the excavation sides will be required in order to comply with normal safety requirements.

Inflows of groundwater into shallow excavations are not generally anticipated, although seepages may be encountered from perched water tables within the made ground, particularly within the vicinity of existing foundations, although such inflows should be suitably controlled by sump pumping.

8.5 Basement Floor Slabs

Following the removal of the made ground, it should be possible to adopt a lightly to moderately loaded ground bearing floor slab bearing on the Bagshot Formation.

⁷ LDSA (2009) *Foundations No 1 – Guidance notes for the design of straight shafted bored piles in London Clay*. LDSA Publication

Consideration may need to be given to designing the slab to accommodate heave movements and this should be considered in more detail once the proposed loads and levels are known. Consideration should also be given to the possible presence of clay at formation level, which should therefore be inspected if the slabs are within the zone of influence of trees.

8.6 Site Specific Risk Assessment

The chemical analyses have highlighted the presence of elevated concentrations of lead and a range of PAHs within four of the six samples of soil tested, at values that are in excess of the adopted generic screening values. This assessment has been conducted against a residential end use with plant uptake; which is considered to be conservative for this site occupied by a school. However, these concentrations could thus pose a potentially unacceptable risk to human health through direct contact, accidental ingestion or inhalation of soil or soil derived dust.

The exact source of the contamination is unknown, although is likely to be attributable to extraneous fragments of material being present within the samples tested. Analysis of the constituent PAHs in the sample from Borehole No 1 at 0.10 m indicate it to be of pyrogenic origin, as a result from partial combustion of hydrocarbons, and may be degraded oil or bitumen. Similar analysis on the sample from Borehole No 3 at 0.2 m indicate the elevated concentrations indicative of partial combustion of hydrocarbons. It is likely that these concentrations are from fragments of ash or clinker noted in some of the made ground at the site. Therefore, the contamination is not considered likely to be in a soluble form as the soil will have been subject to infiltration of rainwater for a significant amount of time, and hence none would remain if that were the case. The measured PAHs are also considered to be non-volatile or of a low volatility, and therefore do not present a significant vapour risk or a significant risk of leaching and migration within any groundwater.

The proposed gymnasium will cover the positions where the elevated concentrations were recorded in Borehole Nos 3 and 6. Direct contact with the soil will therefore be prevented and dusting of the soil is highly unlikely to occur in this location. It is therefore considered that the critical pathways for exposure to these contaminants will not be realised following the completion of the development and thus remedial action in this area would not be required in this respect.

Elevated concentrations within Borehole Nos 1 and 5 will however need further consideration and it would be prudent to conduct further chemical testing which could be carried out separately or incorporated with additional site investigation around the caretaker's house once access is available.

8.6.1 End Users and Landscaped Areas

In areas of soft landscaping, such as the playing fields, end users would potentially be exposed to the lead and PAH contamination in the made ground and in such areas precautions may therefore be required. Clearly it is not reasonable to remove the soil from all of the areas and in view of the short exposure durations it is considered likely that the generic risk assessment adopted is conservative. Additional risk assessment should therefore be carried out in due course following additional testing.

8.6.2 Site Workers

Site workers should be made aware of the contamination and a programme of working should be identified to protect workers handling any soil. The method of site working should be in accordance with guidelines set out by HSE⁸ and CIRIA⁹ and the requirements of the Local

8 HSE (1992) HS(G)66 *Protection of workers and the general public during the development of contaminated land*

Authority Environmental Health Officer.

8.6.3 Services

Consideration may need to be given to the protection of buried plastic services laid within the made ground. Details of the proposed protection measures for buried plastic services will in any case need to be approved by the EHO and the relevant service authority prior to the adoption of any scheme. It is possible that barrier pipe will be required or additional testing will need to be carried out.

8.7 Waste Disposal

Any spoil arising from excavations or landscaping works will need to be disposed of to a licensed tip. Under the European Waste Directive landfills are classified as accepting inert, non-hazardous or hazardous wastes in accordance with the EU waste Directive.

Based upon on the technical guidance provided by the Environment Agency¹⁰ it is considered likely that the made ground from this site, as represented by the six chemical analyses carried out, would be generally classified as a Non-hazardous waste, whilst the natural soils may be classified as an Inert waste. However, it is recommended that a review should be carried out of the excess spoil that is likely to be generated and that should significant quantities of ash and clinker be encountered within this spoil that further testing be carried out to classify it as being a hazardous waste or a non-hazardous waste. WAC leaching tests should then be carried out on any material to be disposed of to landfill that is likely to be classified as being hazardous. Such WAC leaching tests may not be necessary upon samples of natural soils which are to be disposed of as an inert waste as the site may be considered as having had an uncontaminated history.

Under the requirements of the European Waste Directive all waste needs to be pre-treated prior to disposal. The pre-treatment process must be physical, thermal, chemical or biological, including sorting. It must change the characteristics of the waste in order to reduce its volume, hazardous nature, facilitate handling or enhance recovery. The waste producer can carry out the treatment but they will need to provide documentation to prove that this has been carried out. Alternatively, the treatment can be carried out by an approved contractor. The Environment Agency has issued a position paper¹¹ which states that in certain circumstances, segregation at source may be considered as pre-treatment and thus excavated material may not have to be treated prior to landfilling if the soils can be segregated onsite prior to excavation by sufficiently characterising the soils insitu prior to excavation.

The above opinion with regard to the classification of the excavated soils is provided for guidance only and should be confirmed by the receiving landfill once the soils to be discarded have been identified.

The local waste regulation department of the Environment Agency (EA) should be contacted to obtain details of tips that are licensed to accept the soil represented by the test results. The tips will be able to provide costs for disposing of this material but may require further testing.

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- | | |
|----|---|
| | HMSO |
| 9 | CIRIA (1996) <i>A guide for safe working on contaminated sites</i> Report 132, Construction Industry Research and Information Association |
| 10 | Environment Agency May 2008. Hazardous Waste: Interpretation of the definition and classification of hazardous waste. Technical Guidance WM2 Second Edition Version 2.2 |
| 11 | Regulatory Position Statement 'Treating non-hazardous waste for landfill - Enforcing the new requirement' Environment Agency 23 Oct 2007 |

9.0 BASEMENT IMPACT ASSESSMENT

The screening identified a number of potential impacts. The desk study and ground investigation information has been used below to review the potential impacts, to assess the likelihood of them occurring and the scope for reasonable engineering mitigation.

The table below summarises the previously identified potential impacts and the additional information that is now available from the site investigation in consideration of each impact.

Potential Impact	Site Investigation Conclusions
The site is underlain by an aquifer	The investigation has confirmed that the site is underlain by Secondary 'A' Aquifers: the Bagshot Formation and Claygate Member. On the basis of the findings of the investigation the proposed basement will not be located below the measured groundwater level; however, if sheet piles or any other form or piled wall are adopted they may be below the water table, and positioned roughly perpendicular to groundwater flow. However, groundwater flow should not be adversely as there is ample space outside the basement area for groundwater to flow around the piles, and possibly below them if they are shallow. Water should not therefore build up, nor will any dewatering be required.
Is the site within 100 m of a watercourse, well (used/ disused) or potential spring line?	The desk study indicated that the site is not within 100 m of a water course or known well. It may however be within 100 m of a potential spring line. However the investigation has not indicated that the water levels are such that they will be affected by the proposed basement.
The development will reduce grassed areas and increase paved areas	It is understood that additional surface water will be discharged to existing sewers, which if necessary should be increased to cope with the extra capacity. Some grassed areas will still be in existence therefore flow to aquifers will remain.
Slopes greater than 7°	There are some manmade slopes at the site, some of which are vegetated and all appear to be in a stable state. The re-levelling of the site will create new slopes, however they will be suitably engineered to ensure that stability is maintained
Felling of trees	It is understood that the proposed trees that will be felled are mainly in the area of the proposed performance centre, which is mainly on flat land and does not thus present a significant negative impact on slope stability. Desiccation of the shallow clay has not been found in the investigation and on that basis there is not considered to be a risk of clay heave.
Location of public highway	The basement will be located within the site, at approximately 25 m from the closest highway; therefore this is not considered to represent a risk.

The results of the site investigation have therefore been used below to review the remaining potential impacts, to assess the likelihood of them occurring and the scope for reasonable engineering mitigation.

Site is underlain by an aquifer

The site is underlain by a Secondary 'A' aquifer which is in turn underlain by unproductive strata. If groundwater in the upper aquifer were forced to find an alternative flow route past an underground obstruction, that could cause the groundwater level within the zone encompassed by the new flow route to increase locally. The new basement will be underlain by the Bagshot Formation which will permit flow beneath the basement, as it does not toe into the London Clay.

The investigation has indicated that the groundwater level is below the proposed development, such that dewatering should not be necessary, and associated settlement will not occur. However, the proposed construction technique of utilising a sheet piled wall may provide a barrier to groundwater if they are to extend to a level of 42.00 m TBM. It is considered that the use of a sheet piled wall will not provide a significant barrier to groundwater flow as water will be able to pass around it, as there are no nearby basements and may also be able to pass underneath the piles as sand has been recorded to a level of 41.00 m TBM. Any increase in groundwater levels to the west of the sheet piled wall are likely to be minimal and should not cause associated instability.

Significant areas of grassland will remain at the site, so some percolation into the underlying aquifer will continue. The development should therefore not significantly affect the groundwater flow regime by lowering groundwater levels.

Is the site within 100 m of a watercourse, well (used/ disused) or potential spring line?

The basement will not interrupt any flow of groundwater as the groundwater level is lower than the proposed basement, furthermore the amount of groundwater within the aquifer should not rise as some soft landscaping areas will be removed. The development will decrease the amount of percolation at the site, however this is not considered to be significant as large areas of soft landscaping will remain, in the form of the playing fields. Therefore there is not considered to be any scope for detrimental impacts to groundwater.

The development will reduce grassed areas and increase percentage of hard standing

It is understood that extra surface water will be discharged to existing sewers, which if necessary should be increased to cope with the extra capacity, which should ensure that flooding is not caused by the development. Some grassed areas will still be in existence therefore flow to aquifers will remain, meaning there is a limited impact on local ecosystems.

Slopes within and adjacent to the site greater than 7°

At present the site is well vegetated and the existing slopes generally show no sign of any recent movement. It is understood that the re profiling of the site will not create any new significant slopes and will be designed and engineered during the site works.

The adjacent land does not have a known history for land instability, and it is considered that the proposals will not induce any significant forces to induce greater land instabilities off site.

Retaining walls form some parts of the site boundary and further investigation is proposed to confirm the founding depth and details. However, the investigation and proposed structure will incorporate suitable design to ensure no additional load is passed onto the retaining walls.

Location of public highway

The basement excavation will be approximately 25 m from the nearest public highway, such that the construction of the basement will not have a detrimental effect on the stability of adjacent highways.

Felling of trees

It is understood that trees proposed to be removed are in areas of mainly flat land, therefore removal of these trees will not have a detrimental impact on slope stability.

Felling of the trees should not have a significant negative impact on the soils, as they are currently underlain by a substantial thickness of sand, the Bagshot Formation.

10.0 OUTSTANDING RISKS AND ISSUES

This section of the report aims to highlight areas where further work is required as a result of limitations on the scope of this investigation, or where issues have been identified by this investigation that warrant further consideration. The scope of risks and issues discussed in this section is by no means exhaustive, but covers the main areas where additional work may be required.

The ground is a heterogeneous natural material and variations will inevitably arise between the locations at which it is investigated. This report provides an assessment of the ground conditions based on the discrete points at which the ground was sampled, but the ground conditions should be subject to review as the work proceeds to ensure that any variations from the Ground Model are properly assessed by a suitably qualified person.

Elevated concentrations of contaminants have been recorded at the site and additional sampling and testing is recommended to enable any precautions required to be determined.

Trial pits should be excavated to examine the foundation details of the existing retaining wall.

The proposals for levelling of the playing fields will create new slopes, and consideration may need to be given to a slope stability analysis if the proposals significantly alter the current situation at the site.

Continued monitoring of the standpipes installed in the boreholes is essential to allow equilibrium groundwater levels to be established and the magnitude of any seasonal variations in level to be determined.

APPENDIX

Borehole Records

Borehole Cross-Sections

Geotechnical Test Results

SPT / Depth Graph

Chemical Analyses (Soil)

Generic Risk Based Screening Values

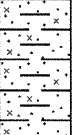
Envirocheck Extracts

Historical Maps

Site Plan

GEA Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Channing School, The Bank, Highgate, London, N6 5HF		Number BH1	
Excavation Method Opendrive Terrier Rig		Dimensions 150 mm to 1.00m		Ground Level (mTBM) 42.57		Client Channing School		Job Number J11240	
		Location		Dates 10/11/2011		Engineer Heyne Tillett Steel		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mTBM)	Depth (m) (Thickness)	Description		Legend	Water
0.10	D	DRY	0,1/1,1,1,1	42.37	(0.20) 0.20	Made ground (dark brown clayey silty sand with occasional gravel of brick)			
0.50	D			(1.00)	Made ground (brown sandy clay with gravel of flint and brick)				
1.00-1.45	SPT N=4			41.37	1.20	Made ground (dark brown silty sandy clay with ash and brick fragments)			
1.50	D			40.87	1.70	Made ground (brown and white sandy gravel of glass, pottery, concrete and old roots)			
1.75	D			40.77	(0.10) 1.80				
2.00	D					Made ground (brown sandy gravelly occasionally cobbly clay with brick, ash and clinker)			
6.00	D		Water strike(1) at 5.00m.		(3.80)	Brown mottled grey very clayey silty SAND			
				36.97	5.60				
					(1.40)				
				35.57	7.00				
						Complete at 7.00m			
Remarks Standpipe installed to 7.0 m Groundwater measured at a depth of 4.05 m (38.52 m TBM) on 29/11/11 Groundwater measured at a depth of 4.02 m (38.55 m TBM) on 7/12/11 Groundwater measured at a depth of 4.03 m (38.54 m TBM) on 14/12/11								Scale (approx) 1:50	Logged By ME
								Figure No. J11240.BH1	

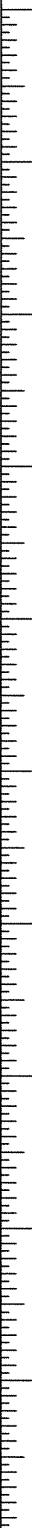
 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Channing School, The Bank, Highgate, London, N6 5HF		Number BH2
Excavation Method Opendrive Terrier Rig		Dimensions 150mm to 1.00m		Ground Level (mTBM) 47.60		Client Channing School		Job Number J11240
		Location		Dates 10/11/2011		Engineer Heyne Tillett Steel		Sheet 1/1
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mTBM)	Depth (m) (Thickness)	Description	Legend	Water
0.50	D					Made ground (brown clayey gravelly sand with occasional ash and cobbles of brick)		
1.00-1.45	CPT N=2	DRY	0,0/1,0,1,0		(2.10)			
2.50	B			45.50	2.10	Loose becoming medium dense light brown fine to medium SAND with little clay		
4.50	B				(4.70)			
5.00-5.45	CPT N=8	5.00	1,1/2,2,2,2					
6.00-6.45	CPT N=11	5.00	Water strike(1) at 6.00m. 2,2/2,3,3,3					
6.90	D			40.80 40.70 40.60	6.80 (0.10) 6.90 (0.10) 7.00	Firm light brown very sandy CLAY Light brown fine to medium clayey SAND Complete at 7.00m		
Remarks Standpipe installed to 7.0 m Groundwater measured at a depth of 5.11 m (42.49 m TBM) on 29/11/11 Groundwater measured at a depth of 5.07 m (42.53 m TBM) on 7/12/11 Groundwater measured at a depth of 5.07 m (42.53 m TBM) on 14/12/11							Scale (approx) 1:50	Logged By ME
							Figure No. J11240.BH2	

				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Channing School, The Bank, Highgate, London, N6 5HF		Number BH3
Excavation Method Opendrive Terrier Rig		Dimensions 150mm to 1.00m		Ground Level (mTBM) 50.00		Client Channing School		Job Number J11240
		Location		Dates 10/11/2011		Engineer Heyne Tillett Steel		Sheet 1/1
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mTBM)	Depth (m) (Thickness)	Description	Legend	Water
0.20	D				(0.40)	Made ground (dark brown clayey gravelly sand with occasional brick fragments)		
0.50	B			49.60	0.40	Medium dense orange-brown and light brown fine to coarse SAND		
1.00-1.45	CPT N=27	DRY	2,3/5,5,8,9	49.00	1.00	Medium dense reddish brown clayey silty fine to coarse SAND		
1.50	B				(1.00)			
2.00-2.45	CPT N=11	DRY	2,2/2,3,3,3	48.00	2.00	Firm light brown silty sandy CLAY		
2.50	D				(0.90)			
3.00-3.45	CPT N=39	DRY	3,5/8,10,10,11	47.10	2.90	Dense becoming medium dense light brown silty fine to medium SAND		
4.00-4.45	CPT 55/295	DRY	5,10/13,13,15,14					
4.00	B				(3.60)			
5.00-5.45	CPT N=34	DRY	5,7/7,9,9,9					
6.00-6.45	CPT N=26	DRY	3,5/5,7,7,7					
				43.50	6.50	Brown clayey very silty SAND		
7.00-7.45	CPT N=27	DRY	1,3/5,7,7,8					
			Water strike(1) at 7.50m.		(2.50)			
8.50	B			41.00	9.00	Complete at 9.00m		
Remarks Standpipe installed to 8.5 m Groundwater measured at a depth of 7.12 m (42.88 m TBM) on 29/11/11 Groundwater measured at a depth of 7.15 m (42.85 m TBM) on 7/12/11 Groundwater measured at a depth of 7.19 m (42.81 m TBM) on 14/12/11							Scale (approx) 1:50	Logged By ME
							Figure No. J11240.BH3	

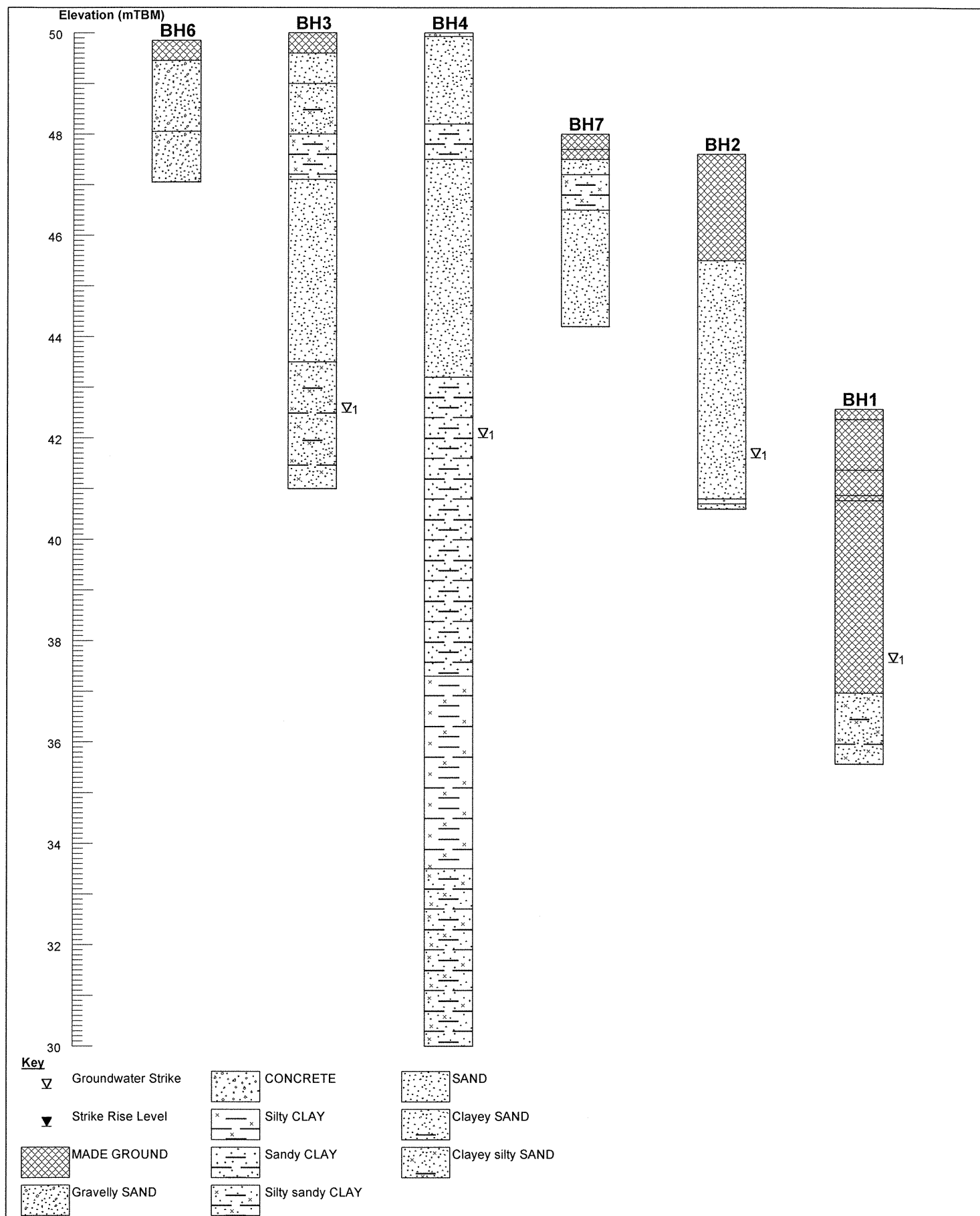
 Geotechnical & Environmental Associates					Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Channing School, The Bank, Highgate, London, N6 5HF		Borehole Number BH4
Boring Method Cable Percussion		Casing Diameter 150mm to 12.00m		Ground Level (mTBM) 50.00		Client Channing School		Job Number J11240	
		Location		Dates 15/11/2011		Engineer Heyne Tillett Steel		Sheet 1/2	
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mTBM)	Depth (m) (Thickness)	Description	Legend	Water
0.40	D1				49.93	(0.07) 0.07	Block paving		
0.90	D2					(1.73)	Loose brown and reddish brown silty fine to coarse SAND		
1.20-1.65 1.20	SPT N=8 S1	1.20	DRY	2,2/2,2,2,2					
1.80	D3				48.20	1.80	Soft becoming firm brown silty very sandy CLAY		
2.00-2.45 2.00	SPT N=13 S2	2.00	DRY	1,2/2,3,3,5		(0.70)			
2.80	D4				47.50	2.50	Dense to medium dense light brown fine SAND		
3.00-3.45 3.00	SPT N=33 S3	3.00	DRY	3,6/7,8,9,9					
4.00-4.45 4.00	SPT N=34 S4	4.00	DRY	5,6/8,8,9,9		(4.30)			
5.00-5.45 5.00	SPT N=35 S5	5.00	DRY	5,6/8,8,9,10					
6.00-6.45 6.00	SPT N=16 S6	6.00	DRY	3,3/4,4,4,4					
7.20	D5				43.20	6.80	Firm orange-brown and grey very silty sandy CLAY, locally sandy		
7.50-7.95	U1								
8.00	D6			Water strike(1) at 8.00m.					
9.00-9.45 9.00	SPT N=8 S7	9.00	8.80	2,2/2,2,2,2		(5.90)			
Remarks Starter pit excavated to 1.2 m, 1hr 15 mins Water added between 3.0 m and 6.8 m to assist drilling Groundwater standpipe installed to a depth of 13.0 m Three hours spent tidying up drilling position Groundwater measured at a depth of 6.65 m (43.35 m TBM) on 29/11/11 Groundwater measured at a depth of 6.65 m (43.35 m TBM) on 7/12/11 Groundwater measured at a depth of 6.67 m (43.33 m TBM) on 14/12/11								Scale (approx) 1:50	Logged By ME
								Figure No. J11240.BH4	

GEA Geotechnical & Environmental Associates					Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Channing School, The Bank, Highgate, London, N6 5HF		Borehole Number BH4	
Boring Method Cable Percussion		Casing Diameter 150mm to 12.00m			Ground Level (mTBM) 50.00		Client Channing School		Job Number J11240	
		Location			Dates 15/11/2011		Engineer Heyne Tillett Steel		Sheet 2/2	
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mTBM)	Depth (m) (Thickness)	Description	Legend	Water	
10.50-10.95	U2	12.00	DRY	2,3/3,3,3,3	37.30	12.70				
11.00	D7									
12.00-12.45 12.00	SPT N=12 S8									
12.80	D8									
13.50-13.95	U3	12.00	14.70	3,3/4,4,5,5	33.50	16.50	Stiff brownish grey silty sandy CLAY with partings of silty sand			
14.00	D9									
15.00-15.45 15.00	SPT N=18 S9									
16.50-16.95	U4									
17.00	D10	12.00	18.90	4,4/5,6,6,7	30.00	20.00				
18.00-18.45	U5									
18.50	D11									
19.50-19.95 19.50	SPT N=24 S10									
Remarks								Scale (approx) 1:50	Logged By ME	
								Figure No. J11240.BH4		

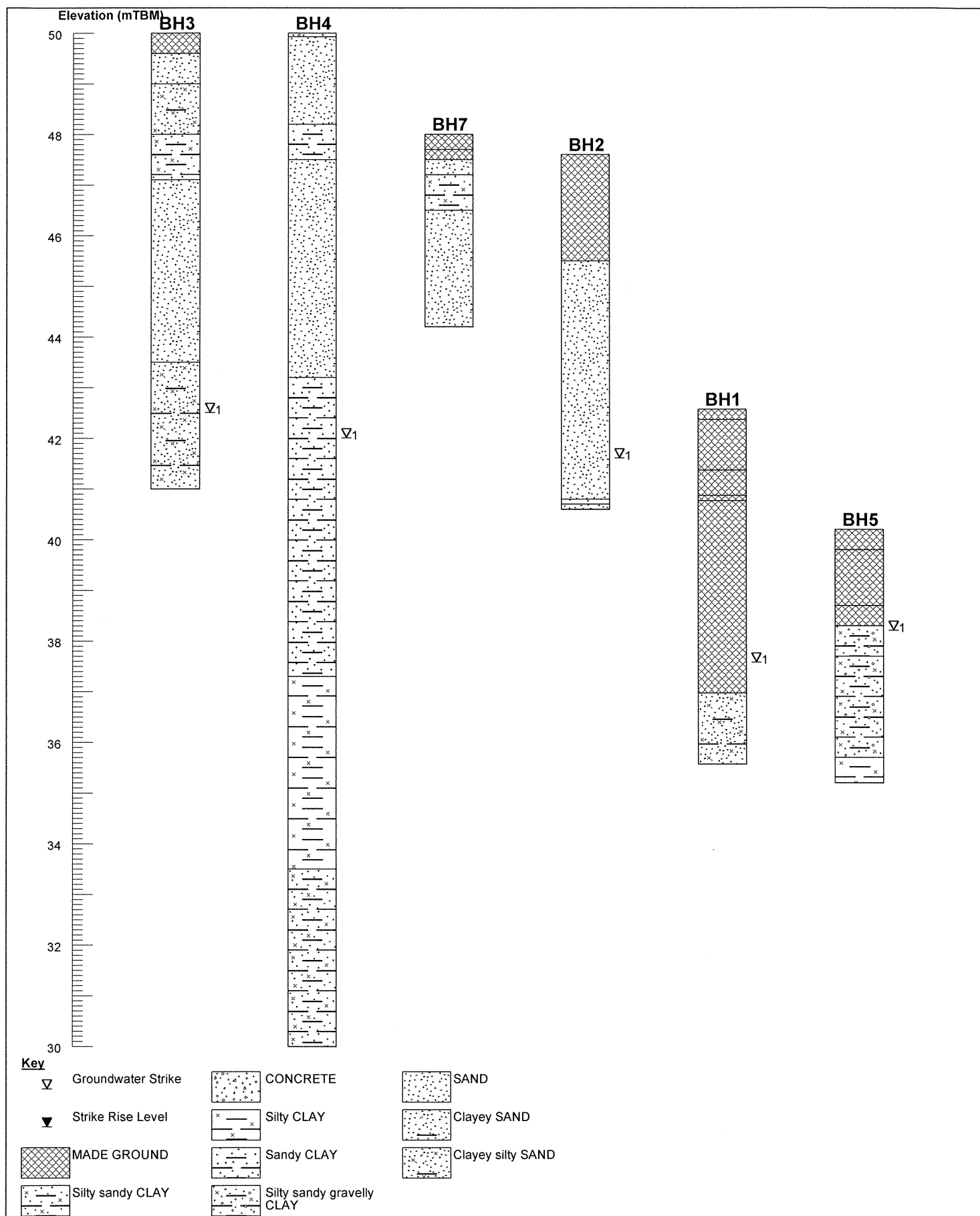
 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Channing School, The Bank, Highgate, London, N6 5HF		Number BH5	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mTBM) 40.20		Client Channing School		Job Number J11240	
		Location		Dates 16/11/2011		Engineer Heyne Tillett Steel		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mTBM)	Depth (m) (Thickness)	Description		Legend	Water
0.20	D		Water strike(1) at 2.00m.	39.80	(0.40) 0.40	Made ground (dark brown mottled reddish brown clayey gravelly sand with occasional flint, ash and brick)			
1.00	D				(1.10)	Made ground (brown clayey gravelly sand with occasional fragments of brick)			
				38.70	1.50 (0.40)	Made ground (grey silty sandy gravelly clay with fragments of flint and brick)			
				38.30	1.90 (0.60)	Soft brown and very dark brown silty sandy gravelly CLAY			
2.60	D			37.70	2.50 (2.00)	Soft brown mottled light grey silty sandy gravelly CLAY			
				35.70	4.50 (0.50)	Soft brown and dark brown silty CLAY			
				35.20	5.00	Complete at 5.00m			
Remarks								Scale (approx)	Logged By
								1:50	ME
								Figure No. J11240.BH5	

 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Channing School, The Bank, Highgate, London, N6 5HF		Number BH6	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mTBM) 49.85		Client Channing School		Job Number J11240	
		Location		Dates 16/11/2011		Engineer Heyne Tillett Steel		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mTBM)	Depth (m) (Thickness)	Description		Legend	Water
0.20	D				(0.40)	Made ground (dark brown clayey silty gravelly organic sand)			
0.50	D				0.40	Light brown gravelly fine to coarse SAND			
					(1.40)				
					1.80	Orange-brown and reddish brown gravelly coarse SAND			
2.00	D				(1.00)				
					2.80	Terminated at 2.80m			
Remarks Groundwater not encountered Borehole terminated at 2.8 m due to density of soil									
								Scale (approx) 1:50	Logged By ME
								Figure No. J11240.BH6	

 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Channing School, The Bank, Highgate, London, N6 5HF		Number BH7	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mTBM) 48.00		Client Channing School		Job Number J11240	
		Location		Dates 16/11/2011		Engineer Heyne Tillett Steel		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mTBM)	Depth (m) (Thickness)	Description		Legend	Water
0.20 0.40	D D			47.70 47.50 47.20	(0.30) 0.30 (0.20) 0.50 (0.30) 0.80	Made ground (dark brown clayey gravelly sand with occasional brick fragment) Made ground (orangeish brown sand and gravel with occasional brick fragment) Brown and reddish brown slightly clayey fine to coarse SAND		  	
1.00	D				(0.70)	Firm light brown mottled grey silty sandy CLAY			
2.00	D			46.50	1.50	Light brown fine to coarse SAND			
					(2.30)				
				44.20	3.80	Complete at 3.80m			
Remarks Groundwater not encountered									
								Scale (approx) 1:50	Logged By ME
								Figure No. J11240.BH7	



GEA Geotechnical & Environmental Associates		Tyttenhanger House Coursers Road St Albans AL4 0PG		Nominal Section	
Site Channing School, The Bank, Highgate, London, N6 5HF		Date Drawn 21/12/2011	Date Checked	Sheet 1/1	Job Number J11240
Client Channing School		Drawn By	Checked By	Scale 1:100[V]	Figure No. J11240.1



Geotechnical &
Environmental
Associates

Tyttenhanger House
Coursers Road
St Albans
AL4 0PG

Nominal Section

Site Channing School, The Bank, Highgate, London, N6 5HF	Date Drawn 21/12/2011	Date Checked	Sheet 1/1	Job Number J11240
Client Channing School	Drawn By	Checked By	Scale 1:100[V]	Figure No. J11240.1

PROJECT NAME

CHANNING SCHOOL, LONDON

Job Number: J11240

GEO / 17594

PROJECT NO:

Date

12/12/2011

Approved

Simon Burke

Page

1 of 2

Sample details			Classification Tests				Density Tests		Undrained Triaxial Compression Tests			Chemical Tests			Other tests and comments	
Borehole No.	Depth (m)	No. Type	MC (%)	LL (%)	PL (%)	PI	<425 mic (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Cell Pressure (kPa)	Deviator Stress (kPa)	Shear Stress (kPa)	pH	2:1 W/S SO4 (g/l)		Ground Water SO4 (g/l)
1	6.00	- D														Particle Size Distribution Test
2	2.50	- B														
2	4.50	- B														
3	1.50	- B											7.3	0.049		
3	2.50	- D	25	54	23	31	100						5.5	0.031		
5	2.60	- D	22	39	19	20	99									
6	2.00	- B														Particle Size Distribution Test
7	1.00	- D	21	56	20	36	100									
4	4.00	3 D														Particle Size Distribution Test
4	7.20	5 D	35	52	23	29	100									
4	7.50	1 U	29					1.95	1.52	150	110	55	7.1	0.12		
4	10.50	2 U	29	39	24	15	100	1.99	1.54	210	46	23				



Geotechnical &
Environmental
Associates

Tythenhanger House
Coursers Road
St Albans
Herts AL4 0PG

SPT & Cohesion / Level Graph

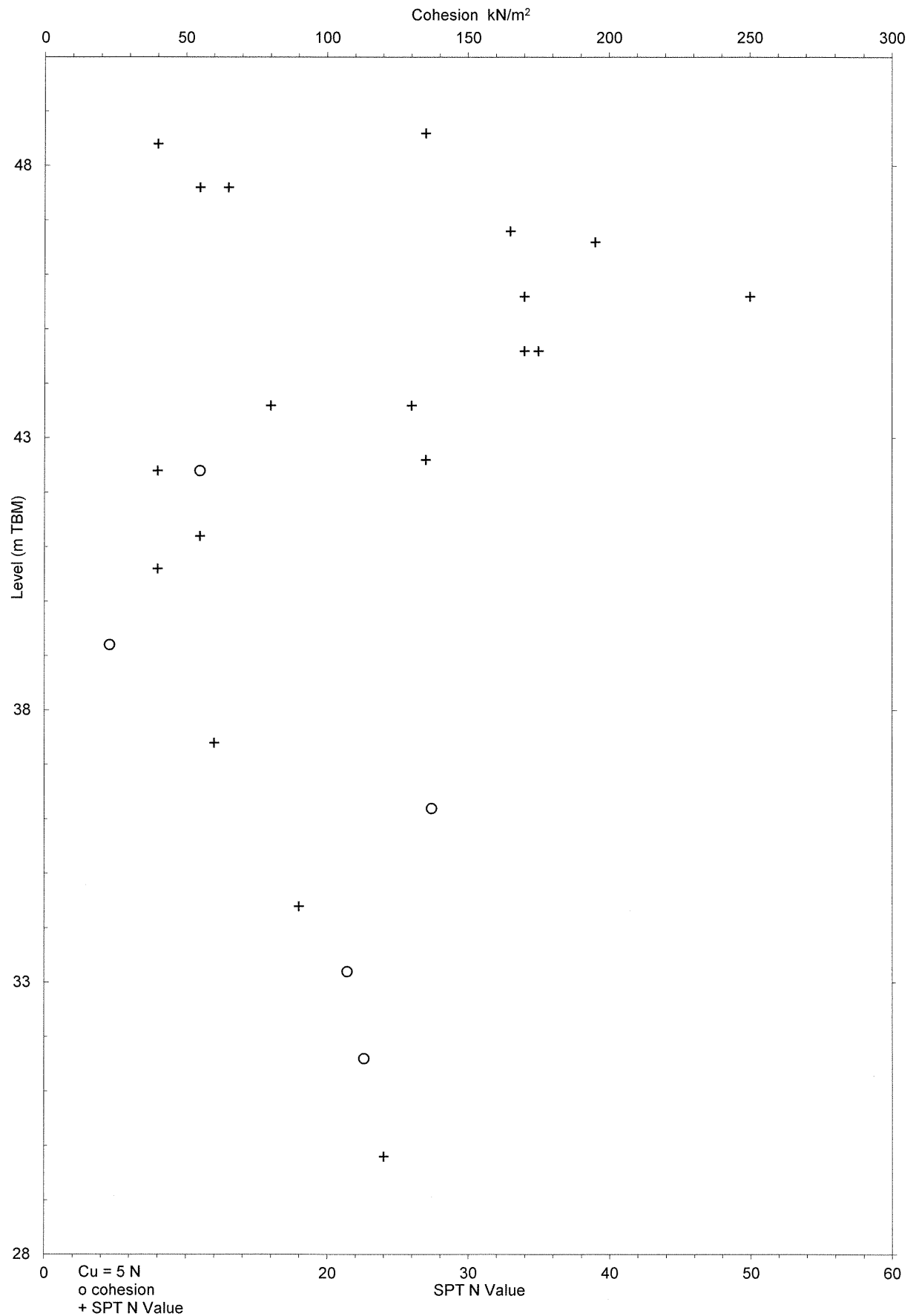
Site Channing School, The Bank, Highgate, London, N6 5HF

Client Channing School

Engineer Heyne Tillet Steel

Job Number
J11240

Sheet
1 / 1



GEA
Tyttenhanger House
Coursers Road
St Albans Herts
AL4 0PG

FAO Matthew Elcock

LABORATORY TEST REPORT

Results of analysis of 6 samples
received 23 November 2011

Canning School, London J11240

Report Date
01 December 2011

Login Batch No		160630						
Chemtest LIMS ID		AG72844	AG72849	AG72850	AG72851	AG72853	AG72855	
Sample ID	Sample No	BH1	BH2	BH3	BH5	BH6	BH7	
Sampling Date		10/11/2011	10/11/2011	10/11/2011	16/11/2011	16/11/2011	16/11/2011	
Depth		0.1m	0.5m	0.2m	0.2m	0.2m	0.2m	
Matrix		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
SOP↓	Determinand↓	Units↓						
2670	2300 Cyanide (total)	M	<0.50	<0.50	0.50	<0.50	<0.50	
	2325 Sulfide	M	20	11	4.0	4.0	2.9	
	2625 Total Organic Carbon	M	4.4	0.74	3.9	4.1	2.8	
	2220 Chloride (extractable)	M	<0.010	<0.010	<0.010	<0.010	<0.010	
	2430 Sulfate (total) as SO4		1600	700	1100	1300	1000	
	2450 Arsenic	M	17	13	12	18	10	
	Cadmium	M	0.82	0.12	0.17	0.48	0.47	
	Chromium	M	17	16	15	20	18	
	Copper	M	61	22	23	42	45	
	Mercury	M	0.82	0.95	1.00	0.65	1.4	
	Nickel	M	17	8.6	7.3	16	17	
	Lead	M	490	360	290	410	1300	
	Selenium	M	0.66	<0.20	0.43	<0.20	0.69	
	Zinc	M	490	92	83	200	350	
2700	TPH >C5-C6	U	<0.1	<0.1	<0.1	<0.1	<0.1	
	TPH >C6-C7	U	<0.1	<0.1	<0.1	<0.1	<0.1	
	TPH >C7-C8	M	<0.1	<0.1	<0.1	<0.1	<0.1	
	TPH >C8-C10	M	<0.1	<0.1	<0.1	<0.1	<0.1	
	TPH >C10-C12	M	<0.1	<0.1	<0.1	<0.1	<0.1	
	TPH >C12-C16	M	<0.1	<0.1	<0.1	<0.1	<0.1	
	TPH >C16-C21	M	<0.1	<0.1	<0.1	<0.1	<0.1	
	TPH >C21-C35	M	37	<0.1	<0.1	15	<0.1	
	Total Petroleum Hydrocarbons	M	110	<0.1	<0.1	46	<0.1	
	Naphthalene	U	150	<10	<10	61	<10	
	Acenaphthylene	M	0.91	<0.1	0.27	0.3	0.6	
	Acenaphthene	M	1.1	<0.1	0.12	0.17	0.15	
	Fluorene	M	0.55	<0.1	0.15	0.37	0.32	
		M	0.33	<0.1	0.1	0.11	<0.1	

All tests undertaken between 21/11/2011 and 28/11/2011

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page.

Column page 1

Report page 1 of 2

LIMS sample ID range AG72844 to AG72855

GEA

Tytenhanger House
Coursers Road
St Albans Herts
AL4 0PG

FAO Matthew Elcock

LABORATORY TEST REPORT

Results of analysis of 6 samples
received 23 November 2011

Canning School, London J11240



Report Date

01 December 2011

160630

		AG72844	AG72849	AG72850	AG72851	AG72853	AG72855
		BH1	BH2	BH3	BH5	BH6	BH7
2700	Phenanthrene	10/11/2011	10/11/2011	10/11/2011	16/11/2011	16/11/2011	16/11/2011
		0.1m	0.5m	0.2m	0.2m	0.2m	0.2m
		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	85018	5	< 0.1	1.6	3.9	0.74	0.49
	Anthracene	120127	mg kg ⁻¹				
		1.6	< 0.1	0.37	0.97	0.23	0.14
	Fluoranthene	206440	mg kg ⁻¹				
		14	< 0.1	2.5	11	1.7	0.95
	Pyrene	129000	mg kg ⁻¹				
		12	< 0.1	1.8	9	1.5	0.72
2920	Benzo[a]anthracene	56553	mg kg ⁻¹				
		7	< 0.1	2.2	5.3	0.22	1.3
	Chrysene	218019	mg kg ⁻¹				
		7.3	< 0.1	1.3	5.9	0.91	0.47
	Benzo[b]fluoranthene	205992	mg kg ⁻¹				
		11	< 0.1	1.1	4.5	0.91	0.54
	Benzo[k]fluoranthene	207089	mg kg ⁻¹				
		4.8	< 0.1	0.71	3.7	0.69	0.24
	Benzo[a]pyrene	50328	mg kg ⁻¹				
		8.6	< 0.1	1.4	4.8	0.96	0.55
2010	Dibenzo[a,h]anthracene	53703	mg kg ⁻¹				
		1.1	< 0.1	0.84	0.46	0.25	< 0.1
	Indeno[1,2,3-cd]pyrene	193395	mg kg ⁻¹				
		6.8	< 0.1	1.2	2.8	0.51	< 0.1
	Benzo[g,h,i]perylene	191242	mg kg ⁻¹				
		7.7	< 0.1	2.6	2.6	0.76	< 0.1
	Total (of 16) PAHs	90	mg kg ⁻¹				
		< 0.3	< 2	18	56	10	6
	Phenols (total)		mg kg ⁻¹				
			< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
2030	pH	2010					
		7.8	7.8	7.2	7.5	7.5	7.3
	Moisture	2030					
		17.9	9.89	10.7	20.2	17.7	20.8
	Stones content (>50mm)						
		n/a	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	Soil colour	2040					
		n/a	brown	brown	brown	brown	brown
	Soil texture		sand	sand	sand	sand	sand
	Other material		stones	stones	stones	stones	stones

All tests undertaken between 21/11/2011 and 28/11/2011

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page.

Column page 1

Report page 2 of 2

LIMS sample ID range AG72844 to AG72855

Site	Channing School, The Bank, Highgate, London, N6 5HF	Job Number J11240
Client	Channing School	Sheet 1 / 1
Engineer	Heyne Tillett Steel	

Proposed End Use Residential with plant uptake

Soil pH 8

Soil Organic Matter content % 6.0

Contaminant	Guideline Value mg/kg	Data Source	Contaminant	Guideline Value mg/kg	Data Source
Metals			Anions		
Arsenic	32	SGV	Soluble Sulphate	0.5 g/l	Structures
Cadmium	10	SGV	Sulphide	50	Structures
Chromium (III)	3000	LQM/CIEH	Chloride	400	Structures
Chromium (VI)	4.3	LQM/CIEH	Others		
Copper	2,330	LQM/CIEH	Organic Carbon	6	Methanogenic potential
Lead	450	withdrawn SGV	Total Cyanide	140	WRAS
Elemental Mercury	1	SGV	Total Mono Phenols	420	SGV
Inorganic Mercury	170	SGV	PAH		
Nickel	130	LQM/CIEH	Naphthalene	8.70	LQM/CIEH
Selenium	350	SGV	Acenaphthylene	850	LQM/CIEH
Zinc	3,750	LQM/CIEH	Acenaphthene	1,000	LQM/CIEH
Hydrocarbons			Fluorene	780	LQM/CIEH
Benzene	0.33	SGV	Phenanthrene	380	LQM/CIEH
Toluene	610	SGV	Anthracene	9,200	LQM/CIEH
Ethyl Benzene	350	SGV	Fluoranthene	670	LQM/CIEH
Xylene	230	SGV	Pyrene	1,600	LQM/CIEH
Aliphatic C5-C6	110	LQM/CIEH	Benzo(a) Anthracene	5.9	LQM/CIEH
Aliphatic C6-C8	370	LQM/CIEH	Chrysene	9	LQM/CIEH
Aliphatic C8-C10	110	LQM/CIEH	Benzo(b) Fluoranthene	7.0	LQM/CIEH
Aliphatic C10-C12	540	LQM/CIEH	Benzo(k) Fluoranthene	10.0	LQM/CIEH
Aliphatic C12-C16	3000	LQM/CIEH	Benzo(a) pyrene	1.00	LQM/CIEH
Aliphatic C16-C35	76,000	LQM/CIEH	Indeno(1 2 3 cd) Pyrene	4.2	LQM/CIEH
Aromatic C6-C7	See Benzene	LQM/CIEH	Dibenzo(a h) Anthracene	0.90	LQM/CIEH
Aromatic C7-C8	See Toluene	LQM/CIEH	Benzo (g h i) Perylene	47	LQM/CIEH
Aromatic C8-C10	151	LQM/CIEH	Total PAH	6.7	B(a)P / 0.15
Aromatic C10-C12	346	LQM/CIEH	Chlorinated Solvents		
Aromatic C12-C16	593	LQM/CIEH	1,1,1 trichloroethane (TCA)	28	LQM/CIEH
Aromatic C16-C21	770	LQM/CIEH	tetrachloroethane (PCA)	4.8	LQM/CIEH
Aromatic C21-C35	1230	LQM/CIEH	tetrachloroethene (PCE)	4.8	LQM/CIEH
PRO (C ₅ -C ₁₀)	1351	Calc	trichloroethene (TCE)	0.49	LQM/CIEH
DRO (C ₁₂ -C ₂₈)	80,363	Calc	1,2-dichloroethane (DCA)	0.014	LQM/CIEH
Lube Oil (C ₂₈ -C ₄₄)	77,230	Calc	vinyl chloride (Chloroethene)	0.00099	LQM/CIEH
TPH	500	Trigger for speciated testing	tetrachloromethane (Carbon tetra)	0.089	LQM/CIEH
			trichloromethane (Chloroform)	2.7	LQM/CIEH

Notes

Concentrations measured below the above values may be considered to represent 'uncontaminated conditions' which do not pose a risk to human health. Concentrations measured in excess of these values indicate a potential risk, and thus require further, site specific risk assessment.

SGV - Soil Guideline Value, derived from the CLEA model and published by Environment Agency 2009

withdrawn SGV - Former SGV, derived from the CLEA 2000 model and published by DEFRA pending confirmation of new approach to modeling lead

LQM/CIEH - Generic Assessment Criteria for Human Health Risk Assessment 2nd edition (2009) derived using CLEA 1.04 model 2009

Calc - sum of nearest available carbon range specified including BTEX for PRO fraction

B(a)P / 0.15 - GEA experience indicates that Benzo(a) pyrene (one of the most common and most carcinogenic of the PAHs) rarely exceeds 15% of the total PAH concentration, hence this Total PAH threshold is regarded as being conservative

Site Channing School, The Bank, Highgate, London, N6 5HF

Client Channing School

Engineer Heyne Tillett Steel

Job Number
J11240

Sheet
1 / 1

PAH SOURCE

Indicative PAH origin indicator

V 1.03

MRP

08/03/2010

Enter concentration data in purple cells below, if any species is below detection limit enter the concentration as the detection limit

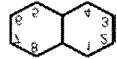
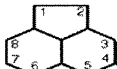
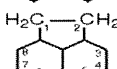
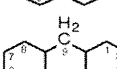
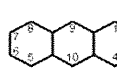
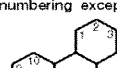
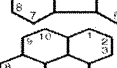
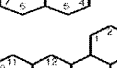
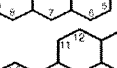
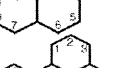
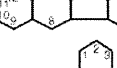
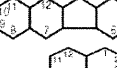
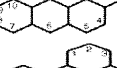
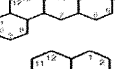
Borehole / TP No. **BH1**
Depth (m) **0.1**

Sample description

Made Ground (grass over dark brown clayey silty sand with occasional gravel of brick)

PAH Species

Concentration
mg/kg

naphthalene		0.91	1.0%
acenaphthylene		1.10	1.2%
acenaphthene		0.55	0.6%
fluorene		0.33	0.4%
phenanthrene		5.00	5.6%
anthracene	 numbering exception	1.60	1.8%
fluoranthene		14.00	15.6%
pyrene		12.00	13.4%
benzo(a)anthracene		7.00	7.8%
chrysene		7.30	8.1%
benzo(b)fluoranthene		11.00	12.3%
benzo(k)fluoranthene		4.80	5.3%
benzo(a)pyrene		8.60	9.6%
indeno(1,2,3-cd)pyrene		6.80	7.6%
dibenzo(a,h)anthracene		1.10	1.2%
benzo(ghi)perylene		7.70	8.6%

Flouranthene:pyrene and Phenanthrene:anthracene ratios suggest this material to be; **Typical made ground with ash etc containing part burnt coal / coal tar / pre-war tarmac** and to be of a **pyrogenic** origin i.e. it originates from the partial combustion of hydrocarbons

Specific proportions of individual PAHs are indicative of this material being; **-- Degraded Oil / Bitumen an unknown material**

Total PAH

89.79

Site Channing School, The Bank, Highgate, London, N6 5HF
Client Channing School
Engineer Heyne Tillett Steel

Job Number
 J11240

Sheet
 1 / 1

PAH SOURCE

Indicative PAH origin indicator

V 1.03

MRP

08/03/2010

Enter concentration data in purple cells below, if any species is below detection limit enter the concentration as the detection limit

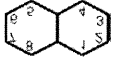
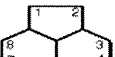
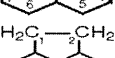
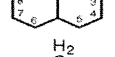
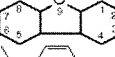
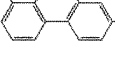
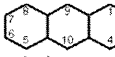
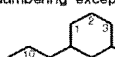
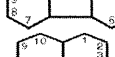
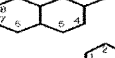
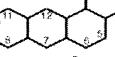
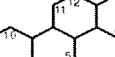
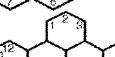
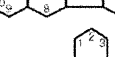
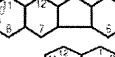
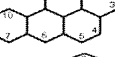
Borehole / TP No. BH3
 Depth (m) 0.2

Sample description

Made Ground (dark brown clayey gravelly sand
 with occasional fragments of brick)

PAH Species

Concentration
 mg/kg

naphthalene		0.27	1.5%
acenaphthylene		0.12	0.7%
acenaphthene		0.15	0.8%
fluorene		0.10	0.5%
phenanthrene		1.60	8.8%
anthracene		0.37	2.0%
fluoranthene		2.45	13.5%
pyrene		1.80	9.9%
benzo(a)anthracene		2.20	12.1%
chrysene		1.30	7.1%
benzo(b)fluoranthene		1.10	6.0%
benzo(k)fluoranthene		0.71	3.9%
benzo(a)pyrene		1.40	7.7%
indeno(1,2,3-cd)pyrene		1.20	6.6%
dibenzo(a,h)anthracene		0.84	4.6%
benzo(ghi)perylene		2.60	14.3%

Fluoranthene:pyrene and
 Phenanthrene:anthracene
 ratios suggest this material to be;
Less common PAH from specific source
 and to be of a **pyrogenic** origin
 i.e. it originates from the partial
 combustion of hydrocarbons

Specific proportions of individual PAHs are
 indicative of this material being;

--

Total PAH
18.21

Envirocheck[®] Report:

Datasheet

Order Details:

Order Number:

36635444_1_1

Customer Reference:

J11240

National Grid Reference:

528770, 187380

Slice:

A

Site Area (Ha):

0.94

Search Buffer (m):

1000

Site Details:

Channing School

Highgate Hill

LONDON

N6 5HF

Client Details:

Mr S Branch

GEA Ltd

Tyttenhanger House

Corsers Road

St Albans

Herts

AL4 0PG

Report Section	Page Number
Summary	-
Agency & Hydrological	1
Waste	6
Hazardous Substances	-
Geological	7
Industrial Land Use	8
Sensitive Land Use	10
Data Currency	11
Data Suppliers	17
Useful Contacts	18

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination. For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Radon Potential dataset Copyright Notice

Information supplied from a joint dataset compiled by The British Geological Survey and the Health Protection Agency.

Report Version v47.0

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Agency & Hydrological					
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 1			1	1
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 1		1	2	4
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 2		Yes		
Pollution Incidents to Controlled Waters	pg 2				2
Prosecutions Relating to Authorised Processes					
Prosecutions Relating to Controlled Waters					
Registered Radioactive Substances	pg 2				15
River Quality					
River Quality Biology Sampling Points					
River Quality Chemistry Sampling Points					
Substantiated Pollution Incident Register					
Water Abstractions					
Water Industry Act Referrals	pg 5				1
Groundwater Vulnerability	pg 5	Yes	n/a	n/a	n/a
Bedrock Aquifer Designations	pg 5	Yes	n/a	n/a	n/a
Superficial Aquifer Designations			n/a	n/a	n/a
Source Protection Zones					
Extreme Flooding from Rivers or Sea without Defences				n/a	n/a
Flooding from Rivers or Sea without Defences				n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)					
Local Authority Recorded Landfill Sites					
Registered Landfill Sites					
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					
Geological					
BGS Recorded Mineral Sites					
BGS 1:625,000 Solid Geology	pg 7	Yes	n/a	n/a	n/a
Brine Compensation Area			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain				n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 7	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards				n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 7	Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 7	Yes		n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 7	Yes		n/a	n/a
Radon Potential - Radon Affected Areas			n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a
Industrial Land Use					
Contemporary Trade Directory Entries	pg 8		13	n/a	n/a
Fuel Station Entries	pg 9			1	1

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Sensitive Land Use					
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves	pg 10			1	1
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones					
Ramsar Sites					
Sites of Special Scientific Interest					
Special Areas of Conservation					
Special Protection Areas					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	Discharge Consents Operator: Thames Water Utilities Ltd Property Type: Reservoir/Borehole Site Location: Highgate Authority: Environment Agency, Thames Region Catchment Area: Not Supplied Reference: Temp.0148 Permit Version: 1 Effective Date: 15th September 1989 Issued Date: 15th September 1989 Revocation Date: 5th October 2000 Discharge Type: Trade Effluent Discharge: Freshwater Stream/River Environment: Receiving Water: River Thames Status: Authorisation revokedRevoked Positional Accuracy: Located by supplier to within 100m	A12SE (W)	390	1	528300 187300
2	Discharge Consents Operator: Thames Water Utilities Ltd Property Type: Reservoir/Borehole Site Location: Maiden Lane Authority: Environment Agency, Thames Region Catchment Area: Not Supplied Reference: Temp.0179 Permit Version: 1 Effective Date: 15th September 1989 Issued Date: 15th September 1989 Revocation Date: 5th October 2000 Discharge Type: Trade Effluent Discharge: Freshwater Stream/River Environment: Receiving Water: River Thames Status: Authorisation revokedRevoked Positional Accuracy: Located by supplier to within 100m	A8SE (S)	817	1	528900 186500
3	Local Authority Pollution Prevention and Controls Name: First Choice Location: 5 Highgate High Street, London, N6 5jr Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC3 Dated: 12th January 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning Status: Permitted Positional Accuracy: Located by supplier to within 10m	A13SW (W)	113	2	528575 187336
4	Local Authority Pollution Prevention and Controls Name: Archway Dry Cleaners Location: 194 Archway Road, London, N6 5bb Authority: London Borough of Haringey, Planning and Environmental Health Permit Reference: DC05 Dated: Not Supplied Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning Status: Permitted Positional Accuracy: Manually positioned to the address or location	A13NE (NE)	255	3	528968 187662
5	Local Authority Pollution Prevention and Controls Name: John Nichol Service Station Location: 31 North Road, LONDON, N6 4BF Authority: London Borough of Haringey, Planning and Environmental Health Permit Reference: PV-11 Dated: 17th April 2001 Process Type: Local Authority Air Pollution Control Description: PG1/14 Petrol filling station Status: Authorised Positional Accuracy: Manually positioned to the address or location	A12NE (NW)	478	3	528296 187611
6	Local Authority Pollution Prevention and Controls Name: Prestige Dry Cleaners Location: 289 Archway Road, London, N6 5aa Authority: London Borough of Haringey, Planning and Environmental Health Permit Reference: DC39 Dated: Not Supplied Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning Status: Permitted Positional Accuracy: Manually positioned to the address or location	A18NW (N)	678	3	528581 188078

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
7	Local Authority Pollution Prevention and Controls Name: Bogards Location: 87 Hazelville Road, London Authority: London Borough of Islington, Environmental Health Department Permit Reference: PPC/DC07/07 Dated: 5th July 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning Status: Permitted Positional Accuracy: Manually positioned to the address or location	A14NE (E)	858	4	529696 187560
8	Local Authority Pollution Prevention and Controls Name: Quicksilver Dry Cleaners Location: 63 Junction Road, London Authority: London Borough of Islington, Environmental Health Department Permit Reference: PPC/DC33/07 Dated: 5th July 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning Status: Permitted Positional Accuracy: Manually positioned to the address or location	A9SW (SE)	893	4	529352 186636
9	Local Authority Pollution Prevention and Controls Name: Golden Dry Cleaners Location: 649 Holloway Road, London Authority: London Borough of Islington, Environmental Health Department Permit Reference: PPC/DC25/07 Dated: 5th July 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning Status: Permitted Positional Accuracy: Manually positioned to the address or location	A9NE (SE)	971	4	529543 186728
	Nearest Surface Water Feature	A13SW (SW)	178	-	528581 187196
10	Pollution Incidents to Controlled Waters Property Type: Not Given Location: Beddington Stw Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Confirmed As A Pollution Incident Incident Date: 14th April 1989 Incident Reference: SE890125 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A8NE (S)	506	1	528800 186800
11	Pollution Incidents to Controlled Waters Property Type: Not Given Location: FINCHLEY Authority: Environment Agency, Thames Region Pollutant: Oils - Unknown Note: Confirmed As A Pollution Incident Incident Date: 28th October 1993 Incident Reference: NE930729 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A12SW (W)	890	1	527800 187280
12	Registered Radioactive Substances Name: Whittington Hospital Nhs Trust Location: St. Marys Wing, Highgate Hill, London, N19 5NF Authority: Environment Agency, Thames Region Permit Reference: BZ9014 Dated: 16th May 2007 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Substantial variation to a registration under the Act of an open source which is also the subject of an authorisation Status: Application has been authorised and any conditions apply to the operator Positional Accuracy: Automatically positioned to the address	A9NW (SE)	517	1	529141 186954

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
12	Registered Radioactive Substances Name: Whittington Hospital Nhs Trust Location: St. Marys Wing, Highgate Hill, London, N19 5NF Authority: Environment Agency, Thames Region Permit Reference: Bw7139 Dated: 1st December 2003 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Minor variation to authorisation under RSA Status: Application has been authorised and any conditions apply to the operatorAuthorised Positional Accuracy: Automatically positioned to the address	A9NW (SE)	517	1	529141 186954
12	Registered Radioactive Substances Name: Whittington Hospital Nhs Trust Location: St. Marys Wing, Highgate Hill, London, N19 5NF Authority: Environment Agency, Thames Region Permit Reference: Bk8648 Dated: 29th June 2001 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Substantial variation to a registration under the Act of an open source which is also the subject of an authorisation Status: Authorisation superseded by a substantial or non substantial variationSuperseded Positional Accuracy: Automatically positioned to the address	A9NW (SE)	517	1	529141 186954
12	Registered Radioactive Substances Name: Whittington Hospital Nhs Trust Location: St. Marys Wing, Highgate Hill, London, N19 5NF Authority: Environment Agency, Thames Region Permit Reference: Bk8630 Dated: 29th June 2001 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Substantial variation to authorisation under RSA Status: Authorisation superseded by a substantial or non substantial variationSuperseded Positional Accuracy: Automatically positioned to the address	A9NW (SE)	517	1	529141 186954
12	Registered Radioactive Substances Name: Whittington Hospital Nhs Trust Location: St. Marys Wing, Highgate Hill, LONDON, Greater London, N19 5NF Authority: Environment Agency, Thames Region Permit Reference: AQ7909 Dated: 18th October 1995 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Substantial variation to authorisation under RSA Status: Authorisation superseded by a substantial or non substantial variationSuperseded Positional Accuracy: Automatically positioned to the address	A9NW (SE)	517	1	529136 186949
12	Registered Radioactive Substances Name: Bloomsbury And Islington Health Authority Location: Whittington Hospital, St. Marys Wing, Highgate Hill, LONDON, Greater London, N19 5NF Authority: Environment Agency, Thames Region Permit Reference: AF3872 Dated: 31st July 1992 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Minor variation to authorisation under RSA Status: Authorisation superseded by a substantial or non substantial variationSuperseded Positional Accuracy: Unknown	A9NW (SE)	517	1	529141 186954
12	Registered Radioactive Substances Name: Whittington Hospital NHS Trust Location: St. Marys Wing, Highgate Hill, LONDON, Greater London, N19 5NF Authority: Environment Agency, Thames Region Permit Reference: AW7673 Dated: 17th June 1997 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Initial variation to an authorisation under RSA Status: Authorisation superseded by a substantial or non substantial variationSuperseded Positional Accuracy: Automatically positioned to the address	A9NW (SE)	518	1	529146 186959

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
12	Registered Radioactive Substances Name: Whittington Hospital Nhs Trust Location: St. Marys Wing, Highgate Hill, LONDON, Greater London, N19 5NF Authority: Environment Agency, Thames Region Permit Reference: AD3049 Dated: 31st March 1991 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Authorisation under RSA Status: Authorisation superseded by a substantial or non substantial variationSuperseded Positional Accuracy: Automatically positioned to the address	A9NW (SE)	521	1	529146 186954
12	Registered Radioactive Substances Name: Whittington Hospital NHS Trust Location: St. Marys Wing, Highgate Hill, LONDON, Greater London, N19 5NF Authority: Environment Agency, Thames Region Permit Reference: AQ7925 Dated: 19th October 1995 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Registration under the Act of multiple open sources which are also the subject of authorisations Status: Authorisation superseded by a substantial or non substantial variationSuperseded Positional Accuracy: Automatically positioned to the address	A9NW (SE)	524	1	529146 186949
13	Registered Radioactive Substances Name: University College London Location: Archway Wing, Archway Road, London, N19 3UA Authority: Environment Agency, Thames Region Permit Reference: CB0021 Dated: 20th February 2007 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Minor variation to authorisation under RSA Status: Application has been authorised and any conditions apply to the operatorAuthorised Positional Accuracy: Automatically positioned to the address	A9NW (SE)	624	1	529293 186970
13	Registered Radioactive Substances Name: University College London Location: University College London School Of Medicine, Archway Wing, Whittington Hospital, Archway Road, LONDON, N19 3UA Authority: Environment Agency, Thames Region Permit Reference: Bz9740 Dated: 1st February 2006 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Minor variation to authorisation under RSA Status: Authorisation superseded by a substantial or non substantial variationSuperseded Positional Accuracy: Manually positioned to the address or location	A9NW (SE)	624	1	529292 186969
13	Registered Radioactive Substances Name: University College London Location: Archway Wing, Archway Road, London, N19 3UA Authority: Environment Agency, Thames Region Permit Reference: Bw7473 Dated: 1st December 2003 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Minor variation to authorisation under RSA Status: Authorisation superseded by a substantial or non substantial variationSuperseded Positional Accuracy: Automatically positioned to the address	A9NW (SE)	624	1	529293 186970
13	Registered Radioactive Substances Name: University College London Location: University College London; School Of Med, Archway Wing, Whittington Hospital Archway Road, LONDON, N19 3UA Authority: Environment Agency, Thames Region Permit Reference: BF4504 Dated: 5th May 1999 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Substantial variation to a registration under the Act of an open source which is also the subject of an authorisation Status: Application has been authorised and any conditions apply to the operatorAuthorised Positional Accuracy: Automatically positioned to the address	A9NW (SE)	624	1	529293 186970

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
13	Registered Radioactive Substances Name: University College London Location: University College London School Of Medicine, Archway Wing, Whittington Hospital, LONDON, N19 3UA Authority: Environment Agency, Thames Region Permit Reference: AS3170 Dated: 19th October 1995 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Registration under the Act of an open source which is also the subject of an authorisation Status: Authorisation superseded by a substantial or non substantial variationSuperseded Positional Accuracy: Automatically positioned to the address	A9NW (SE)	624	1	529293 186970
13	Registered Radioactive Substances Name: University College London Location: University College London ;school Of Med, Whittington Hospital, Archway Road, LONDON, N19 3UA Authority: Environment Agency, Thames Region Permit Reference: BB6793 Dated: 5th February 1999 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Authorisation under RSA Status: Authorisation superseded by a substantial or non substantial variationSuperseded Positional Accuracy: Automatically positioned to the address	A9NW (SE)	627	1	529293 186965
14	Water Industry Act Referrals Name: J Bull Location: 265 Archway Road, LONDON, N6 5BS Authority: Environment Agency, Thames Region Permit Reference: AR7670 Dated: 26th May 1995 Process Type: Permissions or amendments to discharge under the Water Industry Act 1991 Description: Processes which result in the discharge of Special Category effluents under The Trade Effluents (Prescribed Processes and Substances) Regulations Status: Application received by the EA but is not yet authorisedNot Yet Authorised Positional Accuracy: Automatically positioned to the address	A18SW (N)	585	1	528690 188016
	Groundwater Vulnerability Soil Classification: Soils of High Leaching Potential (U) - Soil information for restored mineral workings and urban areas is based on fewer observations than elsewhere. A worst case vulnerability classification (H) assumed, until proved otherwise Map Sheet: Sheet 39 West London Scale: 1:100,000	A13SE (N)	0	1	528773 187375
	Drift Deposits None				
	Bedrock Aquifer Designations Aquifer Desination: Secondary Aquifer - A	A13SE (N)	0	5	528773 187375
	Superficial Aquifer Designations No Data Available				
	Extreme Flooding from Rivers or Sea without Defences None				
	Flooding from Rivers or Sea without Defences None				
	Areas Benefiting from Flood Defences None				
	Flood Water Storage Areas None				
	Flood Defences None				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Local Authority Landfill Coverage Name: London Borough of Haringey - Has supplied landfill data		0	7	528773 187375
	Local Authority Landfill Coverage Name: London Borough of Camden - Has no landfill data to supply		12	8	528729 187305
	Local Authority Landfill Coverage Name: London Borough of Islington - Has no landfill data to supply		119	4	528840 187216

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: London Clay	A13NE (NE)	0	5	528790 187392
	BGS 1:625,000 Solid Geology Description: Barton, Bracklesham and Bagshot Beds	A13SE (N)	0	5	528773 187375
	Coal Mining Affected Areas In an area which may not be affected by coal mining				
	Non Coal Mining Areas of Great Britain No Hazard				
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (N)	0	5	528773 187375
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SE (N)	0	5	528773 187375
	Potential for Ground Dissolution Stability Hazards No Hazard				
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (N)	0	5	528773 187375
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13SE (SE)	149	5	528916 187261
	Potential for Landslide Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13NE (E)	231	5	529079 187376
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	232	5	528579 187134
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13NW (NW)	244	5	528564 187564
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	0	5	528773 187322
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13SE (N)	0	5	528773 187375
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	168	5	528802 187142
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	0	5	528773 187322
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SE (N)	0	5	528773 187375
	Radon Potential - Radon Affected Areas Affected Area: The property is in a lower probability radon area, as less than 1% of homes are above the action level Source: British Geological Survey, National Geoscience Information Service	A13SE (N)	0	5	528773 187375
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A13SE (N)	0	5	528773 187375

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
15	Contemporary Trade Directory Entries Name: Petroleum Development Consultants Location: 4-8, Highgate High Street, London, N6 5JL Classification: Oil & Gas Exploration Supplies & Services Status: Active Positional Accuracy: Automatically positioned to the address	A13SW (W)	73	-	528617 187358
15	Contemporary Trade Directory Entries Name: First Choice Dry Cleaning Location: 5, Highgate High Street, London, N6 5JR Classification: Dry Cleaners Status: Active Positional Accuracy: Automatically positioned to the address	A13SW (W)	114	-	528574 187337
16	Contemporary Trade Directory Entries Name: U C S Dampproofing & Timber Preservation Services Location: 53, Cromwell Avenue, London, N6 5HP Classification: Damp & Dry Rot Control Status: Inactive Positional Accuracy: Automatically positioned to the address	A13NE (E)	84	-	528934 187427
17	Contemporary Trade Directory Entries Name: Highgate Motors Location: 9, Broadbent Close, London, N6 5JW Classification: Garage Services Status: Active Positional Accuracy: Automatically positioned to the address	A13NW (W)	124	-	528587 187410
17	Contemporary Trade Directory Entries Name: Sally Poppy Location: 4, Broadbent Close, London, N6 5JW Classification: Lingerie Manufacturers & Wholesalers Status: Inactive Positional Accuracy: Automatically positioned to the address	A13NW (W)	137	-	528569 187406
17	Contemporary Trade Directory Entries Name: Vagabond Bags Ltd Location: 7, Broadbent Close, London, N6 5JW Classification: Bags, Belts & Accessories - Manufacturers & Suppliers Status: Inactive Positional Accuracy: Automatically positioned to the address	A13NW (W)	151	-	528551 187402
18	Contemporary Trade Directory Entries Name: Cleaners Highgate Location: 37, Highgate High Street, London, N6 5JT Classification: Cleaning Services - Domestic Status: Active Positional Accuracy: Automatically positioned to the address	A13SW (W)	210	-	528478 187352
19	Contemporary Trade Directory Entries Name: A1 Discount Motor Services Location: 177, Archway Road, London, N6 5BL Classification: Garage Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A13NE (NE)	229	-	528919 187658
20	Contemporary Trade Directory Entries Name: Amano Ltd Location: 164, Archway Road, London, N6 5BB Classification: Knitwear Manufacturers & Wholesalers Status: Inactive Positional Accuracy: Automatically positioned to the address	A13NE (NE)	229	-	529015 187582
20	Contemporary Trade Directory Entries Name: Pax Guns Ltd Location: 166, Archway Road, London, N6 5BB Classification: Gunsmiths Status: Inactive Positional Accuracy: Automatically positioned to the address	A13NE (NE)	230	-	529012 187588
21	Contemporary Trade Directory Entries Name: Highgate Launderette Location: 176, Archway Road, London, N6 5BB Classification: Laundries & Launderettes Status: Active Positional Accuracy: Automatically positioned to the address	A13NE (NE)	236	-	528997 187615
21	Contemporary Trade Directory Entries Name: Changing Curtains Location: 186, Archway Road, London, N6 5BB Classification: Blinds, Awnings & Canopies Status: Inactive Positional Accuracy: Automatically positioned to the address	A13NE (NE)	246	-	528980 187642

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
21	Contemporary Trade Directory Entries Name: The Stained Glass Works Location: 188, Archway Road, London, N6 5BB Classification: Stained Glass Designers & Producers Status: Active Positional Accuracy: Automatically positioned to the address	A13NE (NE)	249	-	528978 187648
22	Fuel Station Entries Name: John Nichol Cars Location: 31-33 North Road, Highgate, London, Greater London, N6 4BE Brand: Total Premises Type: Petrol Station Status: Open Positional Accuracy: Manually positioned to the address or location	A12NE (NW)	473	-	528305 187616
23	Fuel Station Entries Name: Sunnyside Service Station Location: 87 Sunnyside Road, Crouch End, LONDON, N19 3SL Brand: Obsolete Premises Type: Not Applicable Status: Obsolete Positional Accuracy: Automatically positioned to the address	A19SE (E)	910	-	529704 187730

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
24	Local Nature Reserves Name: Parkland Walk Multiple Area: Y Area (m2): 143120.34 Source: Natural England Designation Date: 1st January 1990	A18SE (NE)	452	6	529077 187825
25	Local Nature Reserves Name: Queen'S Wood Multiple Area: N Area (m2): 210696.8 Source: Natural England Designation Date: 1st January 1990	A18NE (N)	836	6	528881 188282

Agency & Hydrological	Version	Update Cycle
Contaminated Land Register Entries and Notices London Borough of Hackney - Environmental Health Department London Borough of Enfield - Environmental Services London Borough of Islington - Public Protection London Borough of Brent - Environmental Health Department London Borough of Haringey - Planning and Environmental Health Westminster City Council - Environmental Health Department London Borough of Barnet - Environmental Health Department London Borough of Camden - Pollution Projects Team London Borough of Waltham Forest - Environmental Health Department	August 2011 December 2010 July 2011 June 2011 March 2011 March 2011 May 2011 May 2011 October 2011	Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update
Discharge Consents Environment Agency - Thames Region	July 2011	Quarterly
Enforcement and Prohibition Notices Environment Agency - Thames Region	September 2011	Quarterly
Integrated Pollution Controls Environment Agency - Thames Region	October 2008	Not Applicable
Integrated Pollution Prevention And Control Environment Agency - Thames Region	July 2011	Quarterly
Local Authority Integrated Pollution Prevention And Control London Borough of Waltham Forest - Environmental Health Department London Borough of Haringey - Planning and Environmental Health London Borough of Islington - Environmental Health Department Westminster City Council - Environmental Health Department London Borough of Hackney - Environmental Health Department London Borough of Barnet - Environmental Health Department London Borough of Enfield - Environmental Health Department London Borough of Brent - Environmental Health Department London Borough of Camden - Pollution Projects Team	April 2011 December 2010 July 2011 July 2011 June 2011 May 2011 May 2011 September 2011 September 2011	Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update
Local Authority Pollution Prevention and Controls London Borough of Waltham Forest - Environmental Health Department London Borough of Haringey - Planning and Environmental Health London Borough of Islington - Environmental Health Department Westminster City Council - Environmental Health Department London Borough of Hackney - Environmental Health Department London Borough of Barnet - Environmental Health Department London Borough of Enfield - Environmental Health Department London Borough of Brent - Environmental Health Department London Borough of Camden - Pollution Projects Team	April 2011 December 2010 July 2011 July 2011 June 2011 May 2011 May 2011 September 2011 September 2011	Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update
Local Authority Pollution Prevention and Control Enforcements London Borough of Waltham Forest - Environmental Health Department London Borough of Haringey - Planning and Environmental Health London Borough of Islington - Environmental Health Department Westminster City Council - Environmental Health Department London Borough of Hackney - Environmental Health Department London Borough of Barnet - Environmental Health Department London Borough of Enfield - Environmental Health Department London Borough of Brent - Environmental Health Department London Borough of Camden - Pollution Projects Team	April 2011 December 2010 July 2011 July 2011 June 2011 May 2011 May 2011 September 2011 September 2011	Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update
Nearest Surface Water Feature Ordnance Survey	June 2011	Quarterly
Pollution Incidents to Controlled Waters Environment Agency - Thames Region	September 1999	Not Applicable
Prosecutions Relating to Authorised Processes Environment Agency - Thames Region	September 2011	Monthly

Agency & Hydrological	Version	Update Cycle
Prosecutions Relating to Controlled Waters Environment Agency - Thames Region	July 2011	Monthly
Registered Radioactive Substances Environment Agency - Thames Region	July 2011	Quarterly
River Quality Environment Agency - Head Office	November 2001	Not Applicable
River Quality Biology Sampling Points Environment Agency - Head Office	January 2011	Annually
River Quality Chemistry Sampling Points Environment Agency - Head Office	January 2011	Annually
Substantiated Pollution Incident Register Environment Agency - Thames Region - North East Area	July 2011	Quarterly
Water Abstractions Environment Agency - Thames Region	July 2011	Quarterly
Water Industry Act Referrals Environment Agency - Thames Region	July 2011	Quarterly
Groundwater Vulnerability Environment Agency - Head Office	January 2011	Not Applicable
Drift Deposits Environment Agency - Head Office	January 1999	Not Applicable
Bedrock Aquifer Designations British Geological Survey - National Geoscience Information Service	September 2011	Annually
Superficial Aquifer Designations British Geological Survey - National Geoscience Information Service	September 2011	Annually
Source Protection Zones Environment Agency - Head Office	July 2011	Quarterly
Extreme Flooding from Rivers or Sea without Defences Environment Agency - Head Office	August 2011	Quarterly
Flooding from Rivers or Sea without Defences Environment Agency - Head Office	August 2011	Quarterly
Areas Benefiting from Flood Defences Environment Agency - Head Office	August 2011	Quarterly
Flood Water Storage Areas Environment Agency - Head Office	August 2011	Quarterly
Flood Defences Environment Agency - Head Office	August 2011	Quarterly

Waste	Version	Update Cycle
BGS Recorded Landfill Sites British Geological Survey - National Geoscience Information Service	June 1996	Not Applicable
Historical Landfill Sites Environment Agency - Thames Region - North East Area	October 2011	Quarterly
Integrated Pollution Control Registered Waste Sites Environment Agency - Thames Region	October 2008	Not Applicable
Licensed Waste Management Facilities (Landfill Boundaries) Environment Agency - Thames Region - North East Area	July 2011	Quarterly
Licensed Waste Management Facilities (Locations) Environment Agency - Thames Region - North East Area	April 2011	Quarterly
Local Authority Landfill Coverage London Borough of Barnet London Borough of Brent - Environmental Health Department London Borough of Camden London Borough of Enfield - Environmental Health Department London Borough of Hackney London Borough of Haringey - Planning Department London Borough of Islington - Environmental Health Department London Borough of Waltham Forest - Environmental Health Department Westminster City Council - Environmental Health Department	May 2000 May 2000 May 2000 May 2000 May 2000 May 2000 May 2000 May 2000 May 2000 May 2000	Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable
Local Authority Recorded Landfill Sites London Borough of Enfield - Environmental Health Department London Borough of Barnet London Borough of Brent - Environmental Health Department London Borough of Camden London Borough of Hackney London Borough of Haringey - Planning Department London Borough of Islington - Environmental Health Department London Borough of Waltham Forest - Environmental Health Department Westminster City Council - Environmental Health Department	February 2003 May 2000 May 2000 May 2000 May 2000 May 2000 May 2000 May 2000 May 2000 May 2000	Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable
Registered Landfill Sites Environment Agency - Thames Region - North East Area	March 2003	Not Applicable
Registered Waste Transfer Sites Environment Agency - Thames Region - North East Area	March 2003	Not Applicable
Registered Waste Treatment or Disposal Sites Environment Agency - Thames Region - North East Area	March 2003	Not Applicable

Hazardous Substances	Version	Update Cycle
Control of Major Accident Hazards Sites (COMAH) Health and Safety Executive	July 2011	Bi-Annually
Explosive Sites Health and Safety Executive	January 2011	Bi-Annually
Notification of Installations Handling Hazardous Substances (NIHHS) Health and Safety Executive	November 2000	Not Applicable
Planning Hazardous Substance Enforcements London Borough of Haringey London Borough of Hackney London Borough of Waltham Forest - Environmental Services Westminster City Council London Borough of Islington London Borough of Enfield - Planning Department London Borough of Barnet London Borough of Camden London Borough of Brent	April 2011 February 2011 February 2011 February 2011 July 2011 June 2011 March 2011 March 2011 October 2011	Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update
Planning Hazardous Substance Consents London Borough of Haringey London Borough of Hackney London Borough of Waltham Forest - Environmental Services Westminster City Council London Borough of Islington London Borough of Enfield - Planning Department London Borough of Barnet London Borough of Camden London Borough of Brent	April 2011 February 2011 February 2011 February 2011 July 2011 June 2011 March 2011 March 2011 October 2011	Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update

Geological	Version	Update Cycle
BGS Recorded Mineral Sites British Geological Survey - National Geoscience Information Service	October 2011	Bi-Annually
BGS 1:625,000 Solid Geology British Geological Survey - National Geoscience Information Service	August 1996	Not Applicable
Brine Compensation Area Cheshire Brine Subsidence Compensation Board	November 2002	Not Applicable
Coal Mining Affected Areas The Coal Authority - Mining Report Service	August 2011	As notified
Mining Instability Ove Arup & Partners	October 2000	Not Applicable
Non Coal Mining Areas of Great Britain British Geological Survey - National Geoscience Information Service	February 2011	Not Applicable
Potential for Collapsible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	February 2011	Annually
Potential for Compressible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	February 2011	Annually
Potential for Ground Dissolution Stability Hazards British Geological Survey - National Geoscience Information Service	February 2011	Annually
Potential for Landslide Ground Stability Hazards British Geological Survey - National Geoscience Information Service	February 2011	Annually
Potential for Running Sand Ground Stability Hazards British Geological Survey - National Geoscience Information Service	February 2011	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards British Geological Survey - National Geoscience Information Service	February 2011	Annually
Radon Potential - Radon Affected Areas British Geological Survey - National Geoscience Information Service	July 2011	As notified
Radon Potential - Radon Protection Measures British Geological Survey - National Geoscience Information Service	July 2011	As notified
Industrial Land Use	Version	Update Cycle
Contemporary Trade Directory Entries Thomson Directories	May 2011	Quarterly
Fuel Station Entries Catalist Ltd - Experian	August 2011	Quarterly

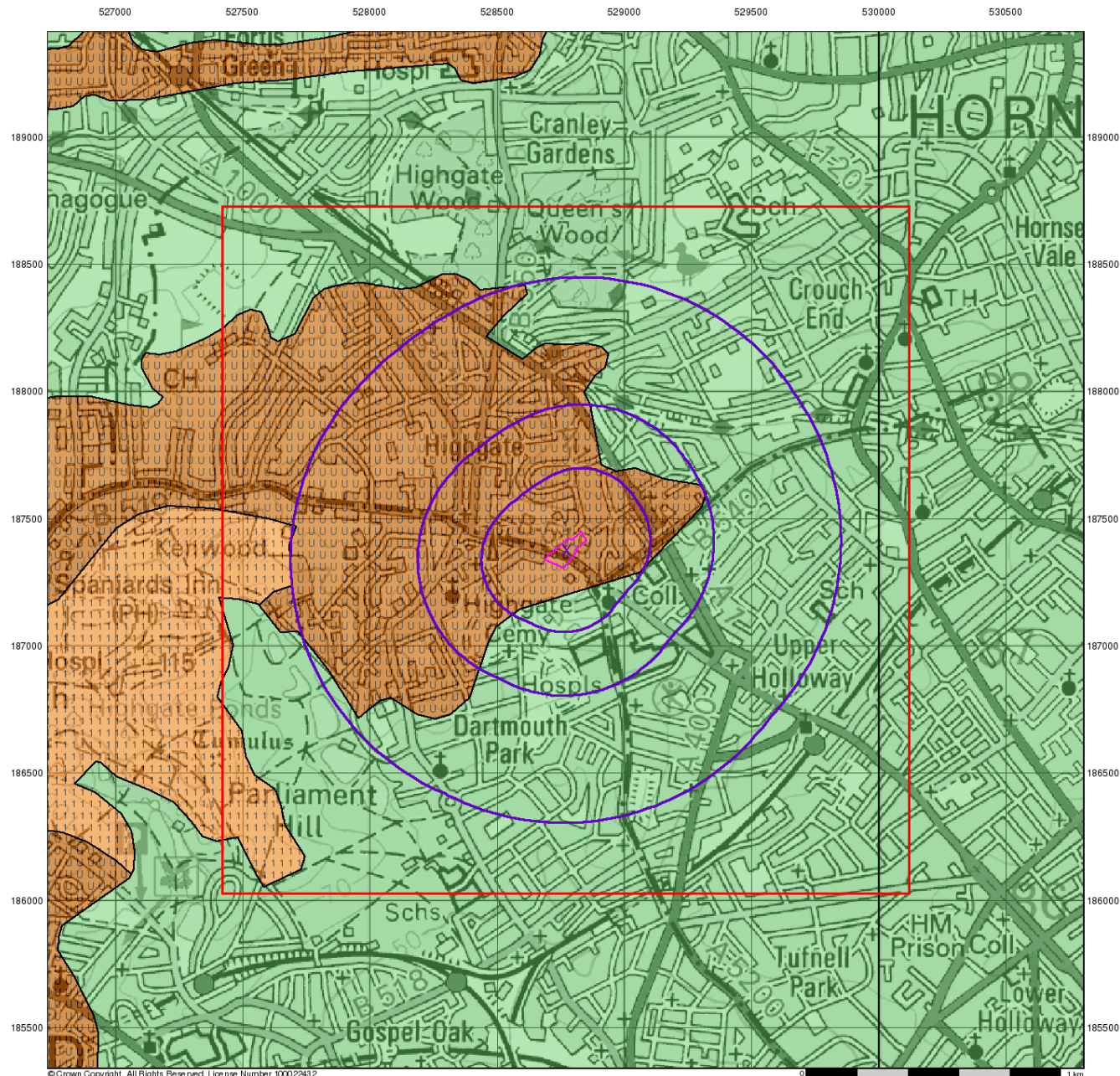
Sensitive Land Use	Version	Update Cycle
Areas of Adopted Green Belt London Borough of Barnet London Borough of Enfield London Borough of Haringey London Borough of Waltham Forest	May 2011 May 2011 May 2011 May 2011	As notified As notified As notified As notified
Areas of Unadopted Green Belt London Borough of Barnet London Borough of Enfield London Borough of Haringey London Borough of Waltham Forest	May 2011 May 2011 May 2011 May 2011	As notified As notified As notified As notified
Areas of Outstanding Natural Beauty Natural England	September 2011	Bi-Annually
Environmentally Sensitive Areas Natural England	September 2011	Annually
Forest Parks Forestry Commission	April 1997	Not Applicable
Local Nature Reserves Natural England	September 2011	Bi-Annually
Marine Nature Reserves Natural England	September 2011	Bi-Annually
National Nature Reserves Natural England	September 2011	Bi-Annually
National Parks Natural England	September 2011	Bi-Annually
Nitrate Sensitive Areas Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	March 2003	Not Applicable
Nitrate Vulnerable Zones Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	February 2011	Annually
Ramsar Sites Natural England	September 2011	Bi-Annually
Sites of Special Scientific Interest Natural England	September 2011	Bi-Annually
Special Areas of Conservation Natural England	September 2011	Bi-Annually
Special Protection Areas Natural England	September 2011	Bi-Annually

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
Environment Agency	
Scottish Environment Protection Agency	
The Coal Authority	
British Geological Survey	
Centre for Ecology and Hydrology	
Countryside Council for Wales	
Scottish Natural Heritage	
Natural England	
Health Protection Agency	
Ove Arup	
Peter Brett Associates	

Contact	Name and Address	Contact Details
1	Environment Agency - National Customer Contact Centre (NCCC) PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 08708 506 506 Email: enquiries@environment-agency.gov.uk
2	London Borough of Camden - Pollution Projects Team Seventh Floor, Town Hall Extension, Argyle Street, London, WC1H 8EQ	Telephone: 020 7278 4444 Fax: 020 7860 5713 Website: www.camden.gov.uk
3	London Borough of Haringey - Planning and Environmental Health 639 High Road, Tottenham, London, N17 8BD	Telephone: 0208 489 5183 Fax: 0208 489 5117 Website: www.haringey.gov.uk
4	London Borough of Islington - Environmental Health Department 159 Upper Street, Islington, London, N1 1RE	Telephone: 020 7527 2000 Fax: 020 7477 3057 Website: www.islington.gov.uk
5	British Geological Survey - Enquiry Service British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
6	Natural England Northminster House, Northminster Road, Peterborough, Cambridgeshire, PE1 1UA	Telephone: 0845 600 3078 Fax: 01733 455103 Email: enquiries@naturalengland.org.uk Website: www.naturalengland.org.uk
7	London Borough of Haringey - Planning Department Civic Centre, 639 High Road, Tottenham, London, N17 8BD	Website: www.haringey.gov.uk
8	London Borough of Camden Town Hall, Judd Street, London, WC1H 9JE	Telephone: 020 7974 4444 Fax: 020 7974 6866 Email: info@camden.gov.uk Website: www.camden.gov.uk
-	Health Protection Agency - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@hpa.org.uk Website: www.hpa.org.uk
-	Landmark Information Group Limited The Smith Centre, Henley On Thames, Oxfordshire, RG9 6AB	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

Please note that the Environment Agency / SEPA have a charging policy in place for enquiries.



Groundwater Vulnerability

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

Agency and Hydrological

Geological Classes

Major Aquifer (Highly Permeable)

Minor Aquifer (Variably Permeable)

Non Aquifer (Negligibly Permeable)

Water or Sea

Drift Deposit

Soil Classes

High (H) 1, 2, 3, U
Intermediate (I) 1, 2
Low

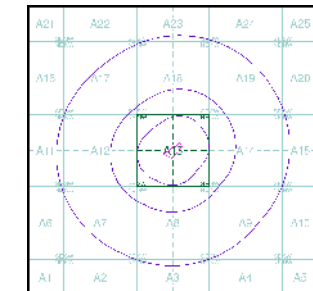
High (H) 1, 2, 3, U
Intermediate (I) 1, 2
Low

High (H) 1, 2, 3, U
Intermediate (I) 1, 2
Low

High (H) 1, 2, 3, U
Intermediate (I) 1, 2
Low

High (H) 1, 2, 3, U
Intermediate (I) 1, 2
Low

Site Sensitivity Context Map - Slice A

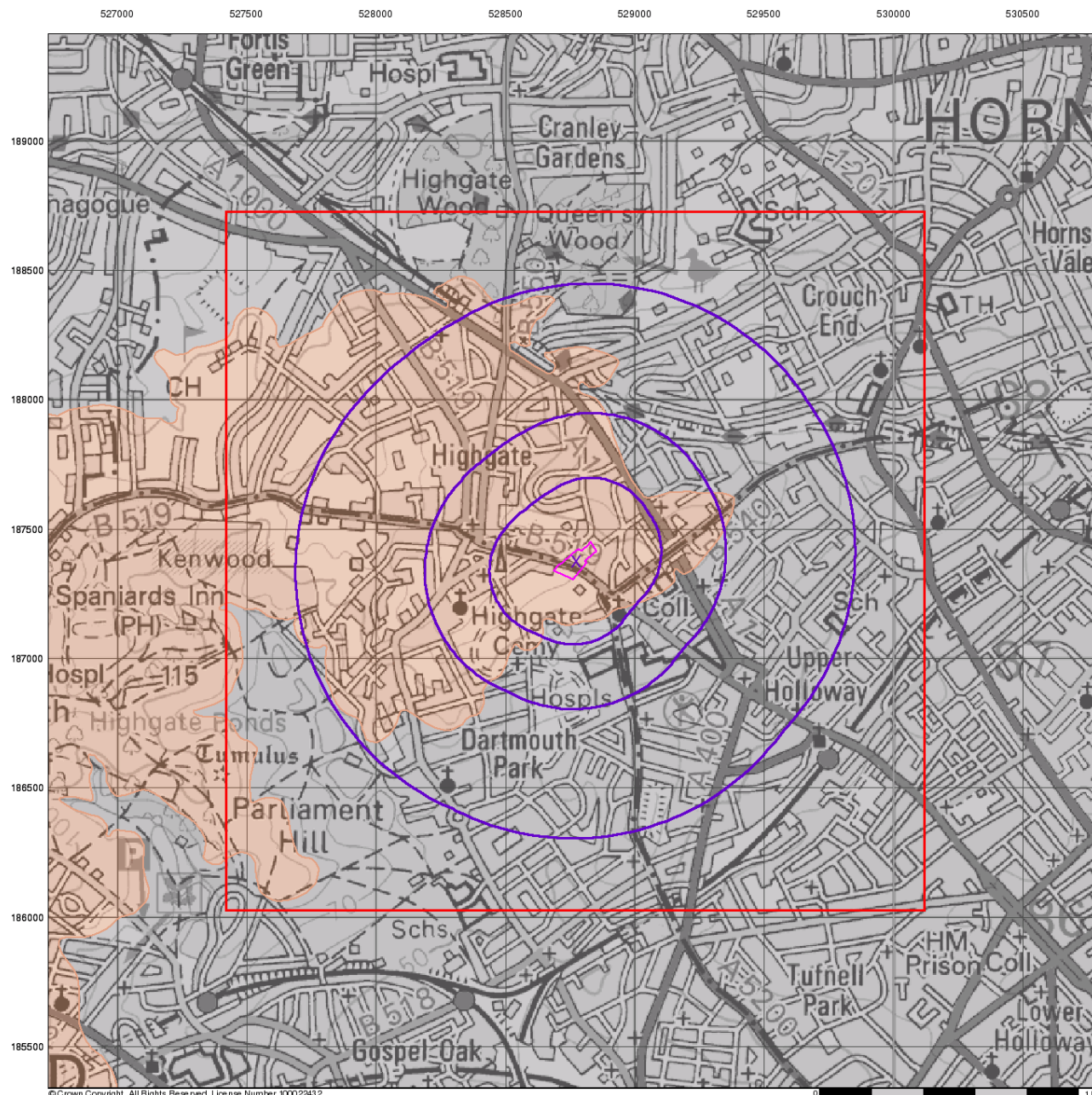


Order Details

Order Number: 36635444_1_1
Customer Ref: J11240
National Grid Reference: 528770, 187380
Slice: A
Site Area (Ha): 0.94
Search Buffer (m): 1000

Site Details

Channing School, Highgate Hill, LONDON, N6 5HF



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Bedrock Aquifer Designation

General

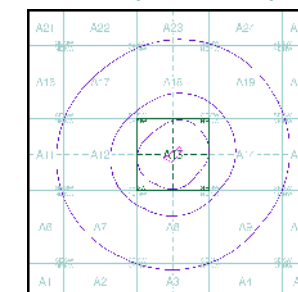
- Specified Site
- Specified Buffer(s)
- Slice
- Map ID
- Bearing Reference Point

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown

Site Sensitivity Context Map - Slice A

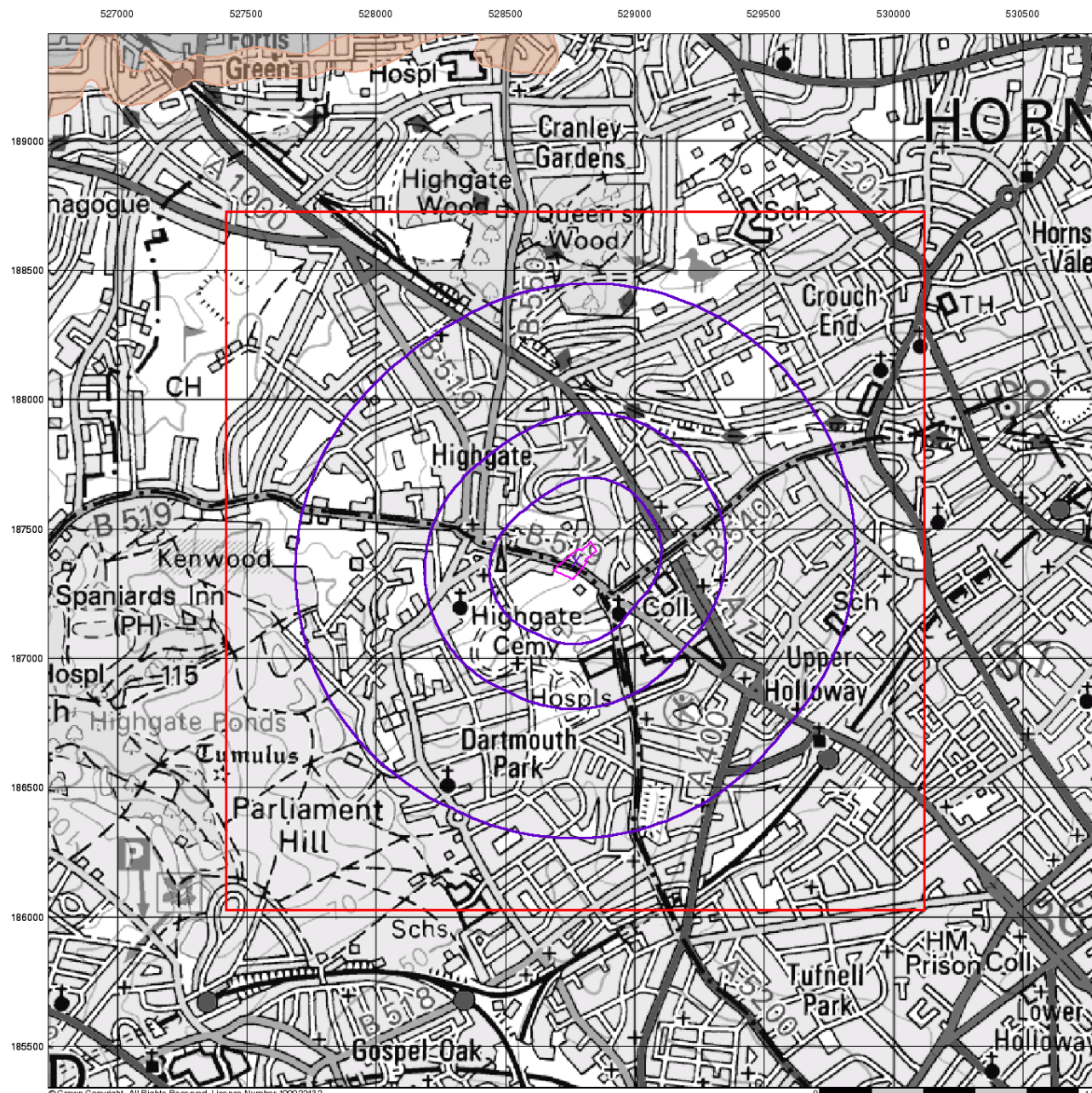


Order Details

Order Number: 36635444_1_1
 Customer Ref: J11240
 National Grid Reference: 528770, 187380
 Slice: A
 Site Area (Ha): 0.94
 Search Buffer (m): 1000

Site Details

Channing School, Highgate Hill, LONDON, N6 5HF



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Superficial Aquifer Designation

General

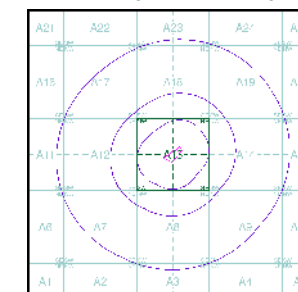
- ◆ Specified Site
- Specified Buffer(s)
- ✕ Bearing Reference Point
- Slice
- Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown

Site Sensitivity Context Map - Slice A

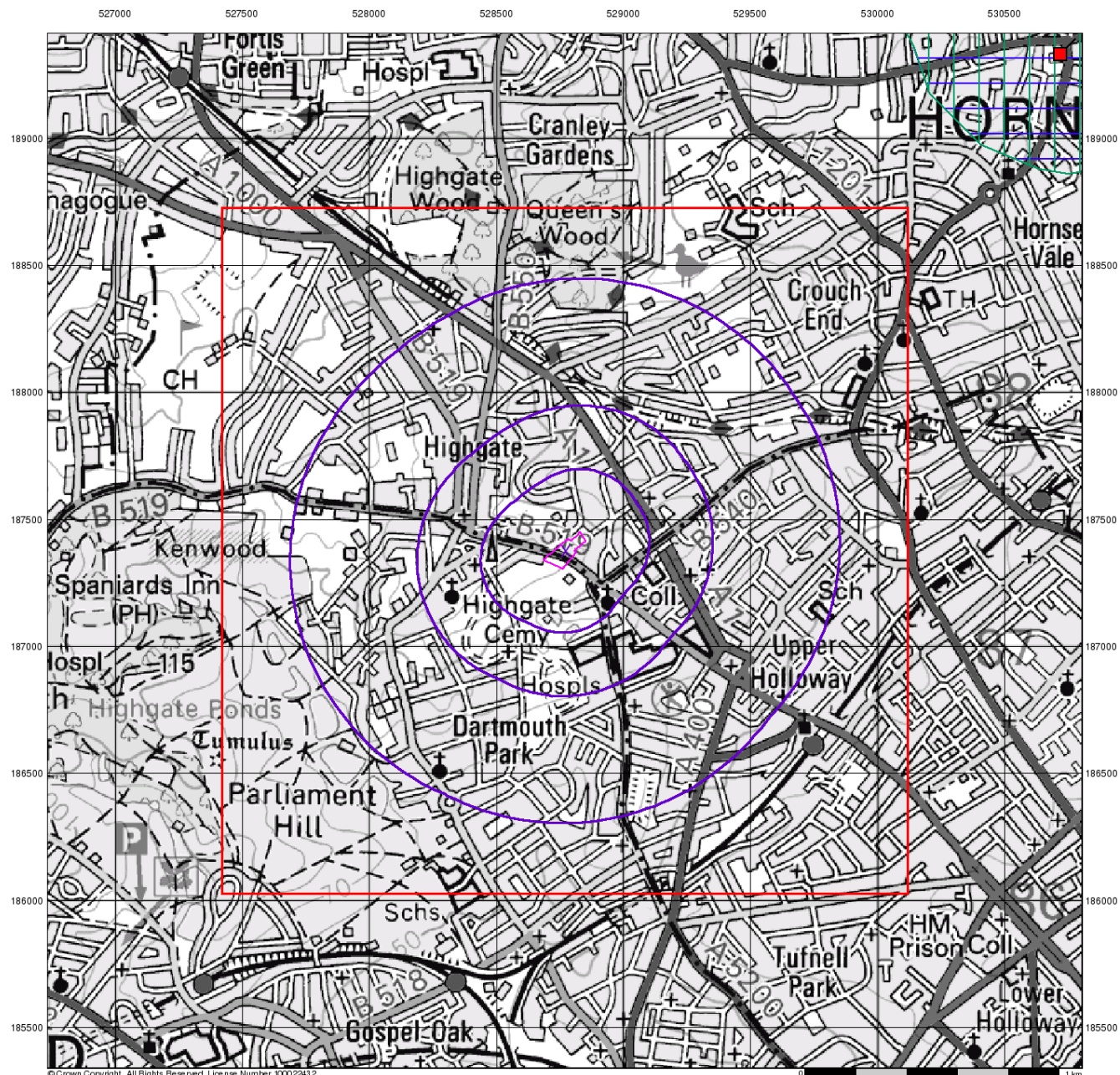


Order Details

Order Number: 36635444_1_1
 Customer Ref: J11240
 National Grid Reference: 528770, 187380
 Slice: A
 Site Area (Ha): 0.94
 Search Buffer (m): 1000

Site Details

Channing School, Highgate Hill, LONDON, N6 5HF



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Source Protection Zones

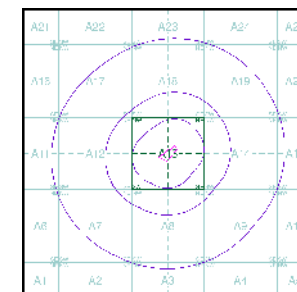
General

- ◆ Specified Site ○ Specified Buffer(s) X Bearing Reference Point
- Slice B Map ID

Agency and Hydrological

- Source Protection Zone I
- Source Protection Zone II
- Source Protection Zone III
- Zone of Special Interest
- Source Protection Zone Borehole

Site Sensitivity Context Map - Slice A

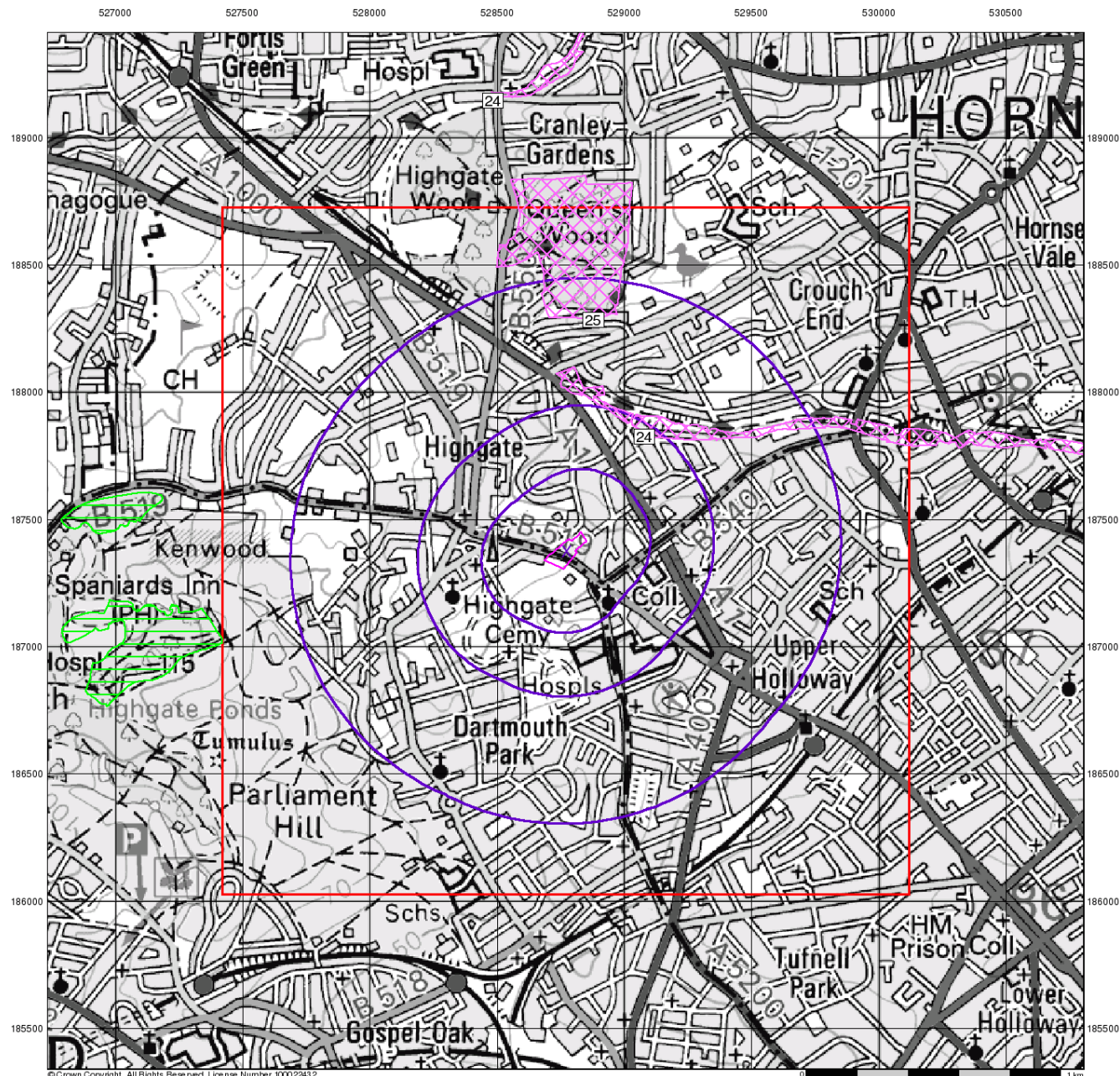


Order Details

Order Number: 36635444_1_1
 Customer Ref: J11240
 National Grid Reference: 528770, 187380
 Slice: A
 Site Area (Ha): 0.94
 Search Buffer (m): 1000

Site Details

Channing School, Highgate Hill, LONDON, N6 5HF



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Sensitive Land Uses

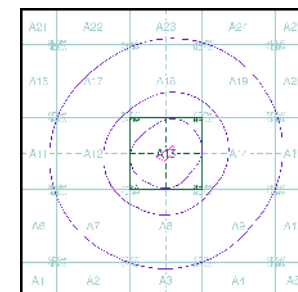
General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

Sensitive Land Uses

- Area of Adopted Green Belt
- Area of Unadopted Green Belt
- Area of Outstanding Natural Beauty
- Environmentally Sensitive Area
- Forest Park
- Local Nature Reserve
- Marine Nature Reserve
- National Nature Reserve
- National Park
- Nitrate Sensitive Area
- Nitrate Vulnerable Zone
- Ramsar Site
- Site of Special Scientific Interest
- Special Area of Conservation
- Special Protection Area

Site Sensitivity Context Map - Slice A

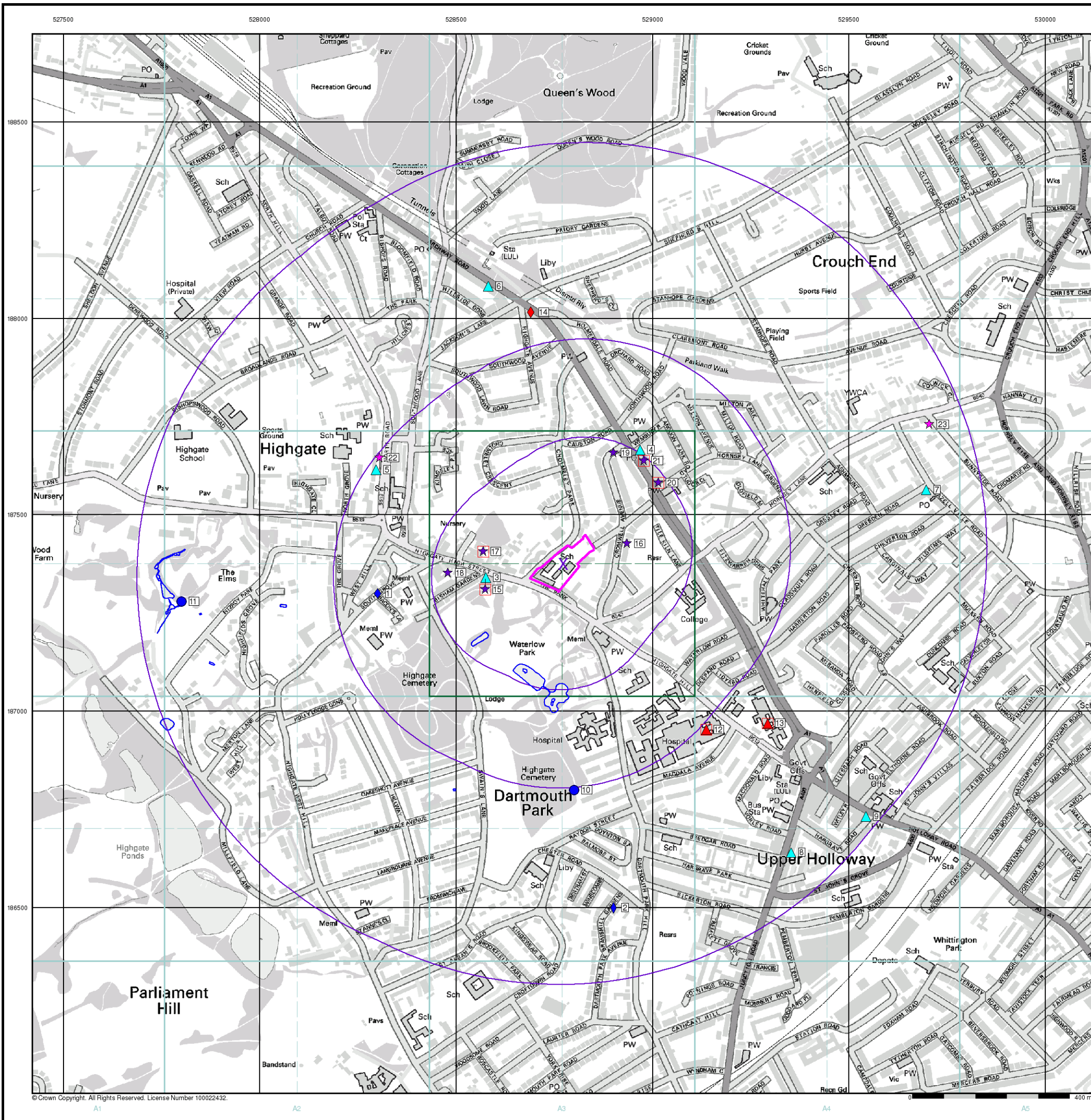


Order Details

Order Number: 36635444_1_1
 Customer Ref: J11240
 National Grid Reference: 528770, 187380
 Slice: A
 Site Area (Ha): 0.94
 Search Buffer (m): 1000

Site Details

Channing School, Highgate Hill, LONDON, N6 5HF



General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- River Quality Sampling Point
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buffered Point)
- EA Historic Landfill (Polygon)
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facility (Landfill Boundary)
- Licensed Waste Management Facility (Location)
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

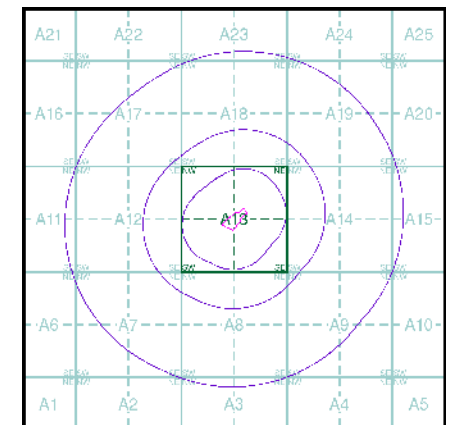
Geological

- BGS Recorded Mineral Site

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry
- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

Site Sensitivity Map - Slice A



Order Details

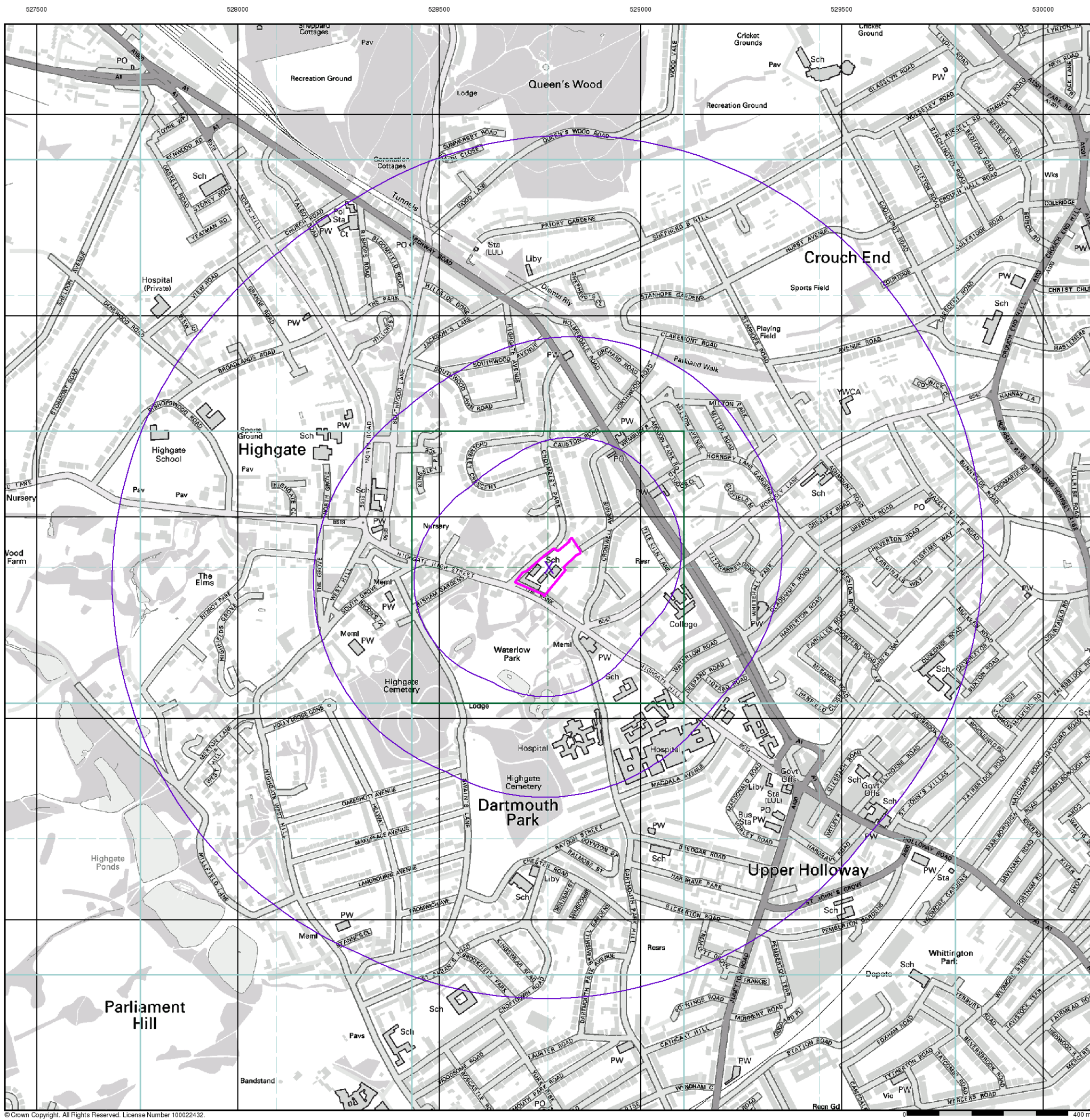
Order Number: 36635444_1_1
Customer Ref: J11240
National Grid Reference: 528770, 187380
Slice: A
Site Area (Ha): 0.94
Search Buffer (m): 1000

Site Details

Channing School, Highgate Hill, LONDON, N6 5HF



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



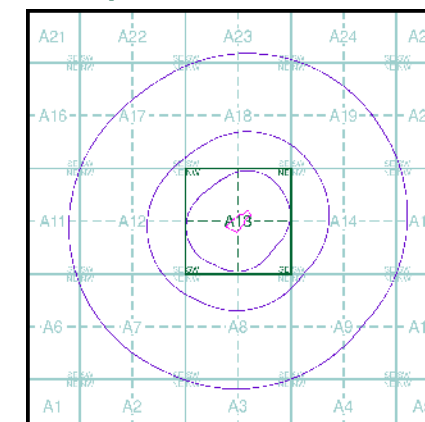
General

- ◊ Specified Site
- Specified Buffer(s)
- X Bearing Reference Point

Agency and Hydrological (Flood)

- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Flood Map - Slice A

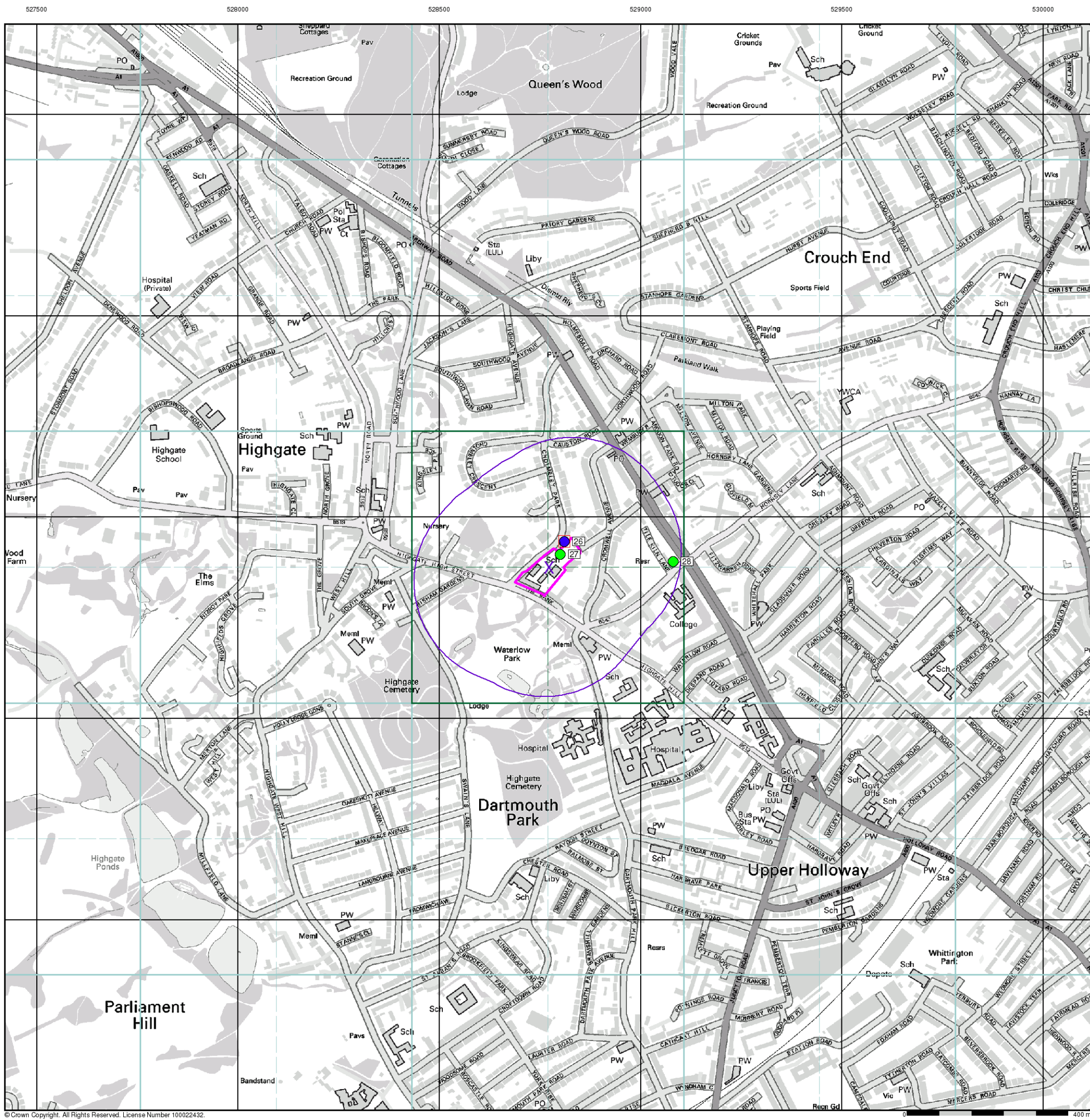


Order Details

Order Number: 36635444_1_1
 Customer Ref: J11240
 National Grid Reference: 528770, 187380
 Slice: A
 Site Area (Ha): 0.94
 Search Buffer (m): 1000

Site Details

Channing School, Highgate Hill, LONDON, N6 5HF



General

- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point
- Map ID
- Several of Type at Location

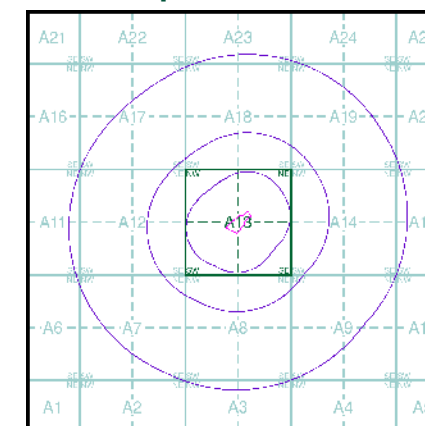
Agency and Hydrological (Boreholes)

- BGS Borehole Depth 0 - 10m
- BGS Borehole Depth 10 - 30m
- BGS Borehole Depth 30m +
- Confidential
- Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice A



Order Details

Order Number: 36635444_1_1
 Customer Ref: J11240
 National Grid Reference: 528770, 187380
 Slice: A
 Site Area (Ha): 0.94
 Search Buffer (m): 1000

Site Details

Channing School, Highgate Hill, LONDON, N6 5HF



Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk

528600

528800

529000

187600

187400

187200

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location
- Pylon
- Overhead Transmission Line

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- River Quality Sampling Point
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral
- BGS Recorded Mineral Site
- Contemporary Trade Directory Entry
- Fuel Station Entry

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buffered Point)
- EA Historic Landfill (Polygon)
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facility (Landfill Boundary)
- Licensed Waste Management Facility (Location)
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

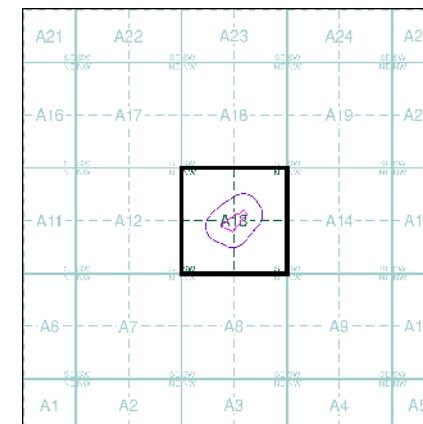
Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

Geological

Industrial Land Use

Site Sensitivity Map - Segment A13

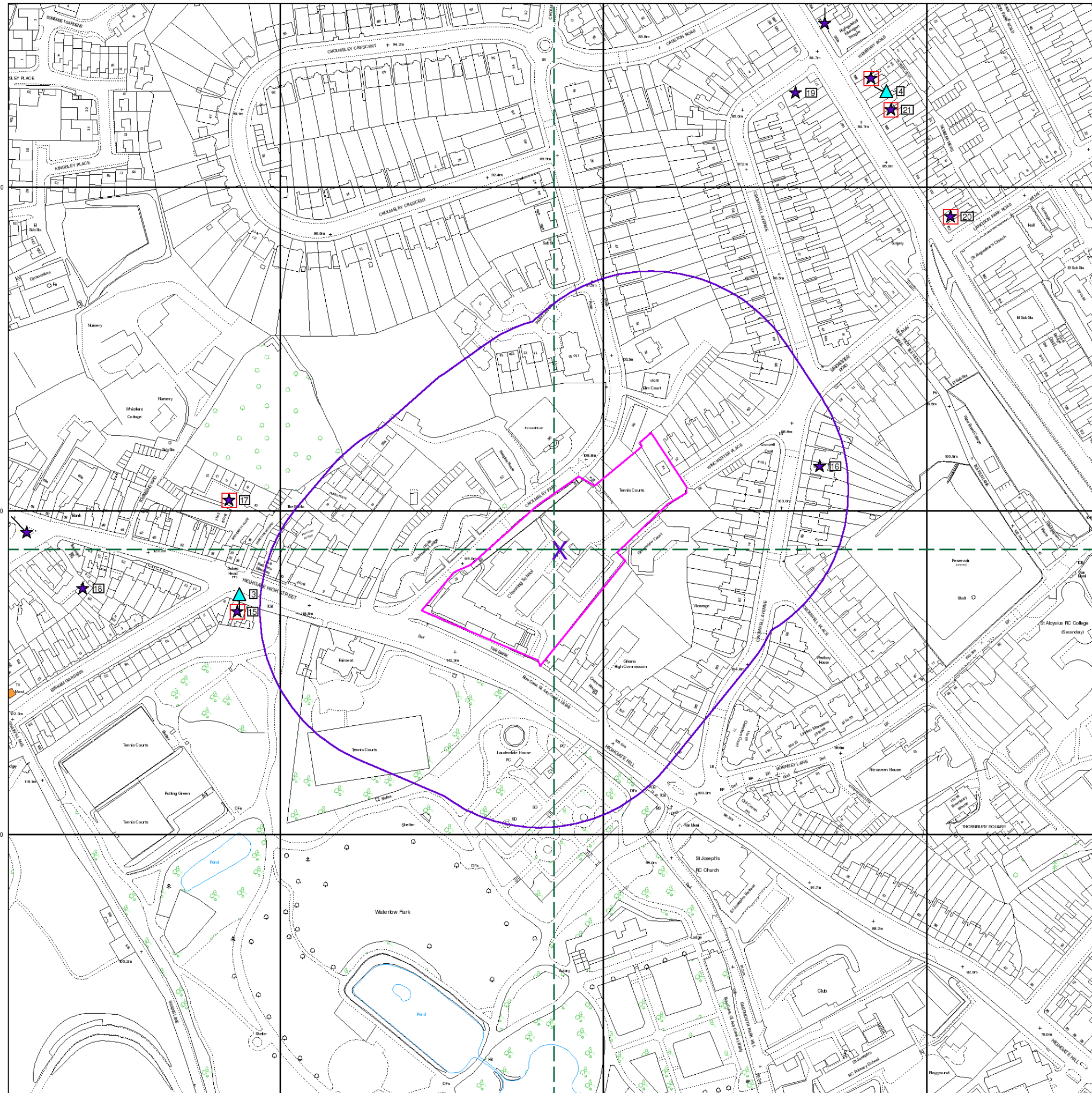


Order Details

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 Customer Ref: J11240
 National Grid Reference: 528770, 187380
 Slice: A
 Site Area (Ha): 0.94
 Plot Buffer (m): 100

Site Details

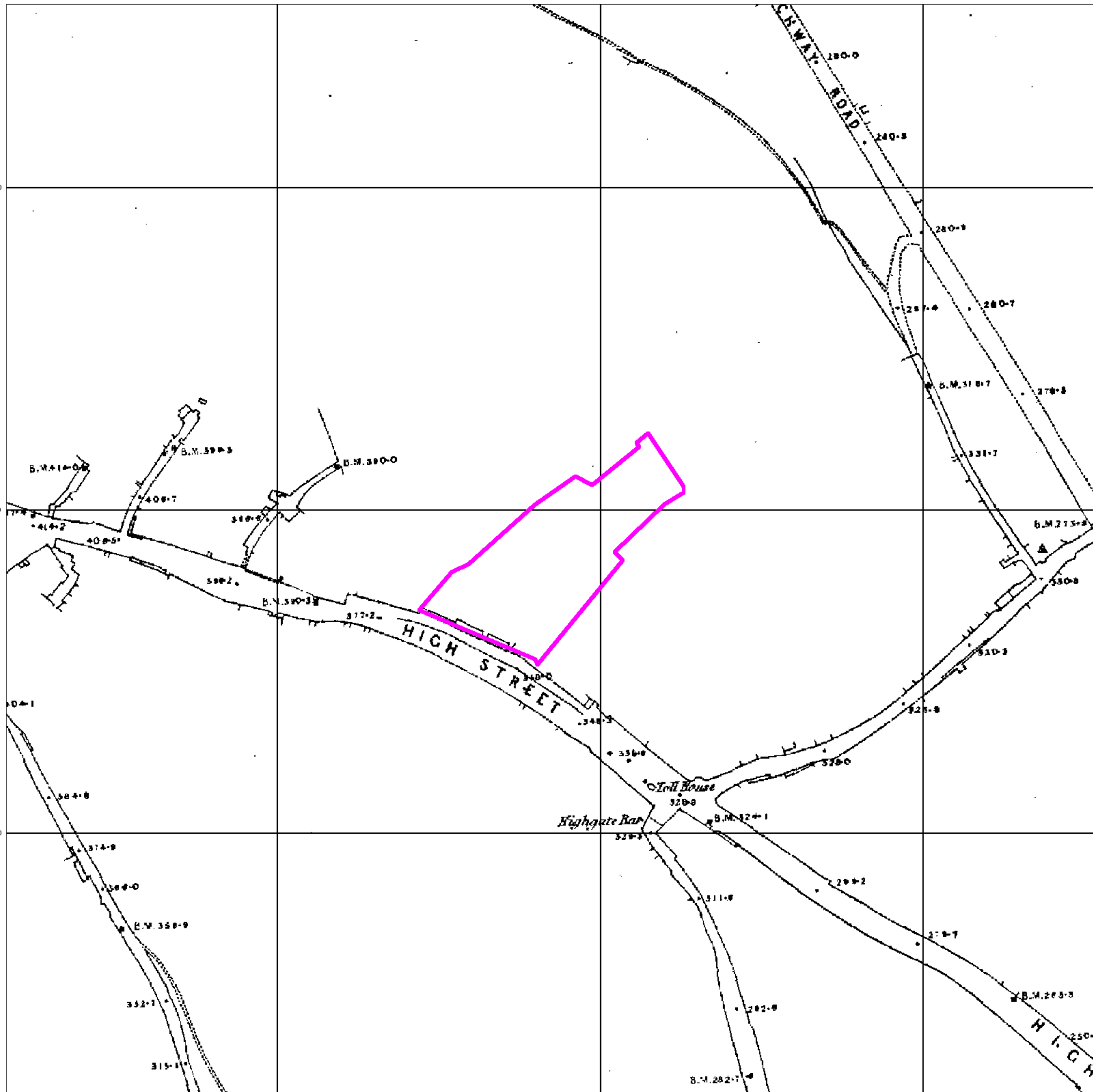
Channing School, Highgate Hill, LONDON, N6 5HF



528600 528800 529000

187600 187400 187200

187600 187400 187200



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London

Published 1850

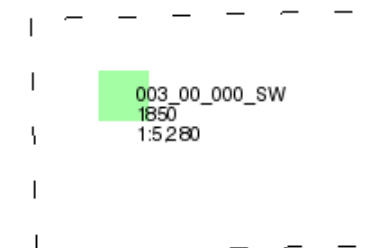
Source map scale - 1:5,280

The historical town plans shown derive from Ordnance Survey mapping from the early to mid 1850s. The 1:2640 scale was introduced in the early 1850s, to survey districts covered by the Local Boards of Health and for a map of the Osborne Estate of Queen Victoria. The general style is similar to that of the early 1:2500s published shortly afterwards.

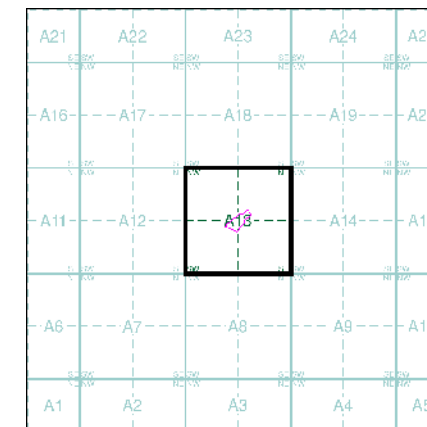
1:5280 scale was surveyed shortly afterwards in the mid 1850s as general purpose mapping with a standard of content similar to the more contemporary 1:10,560 mapping. The scale was also used for a reduction of the 1:1056 'skeleton survey' of London that was undertaken between 1848 and 1850.

Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

Map Name(s) and Date(s)



Historical Town Plan - Segment A13



Order Details

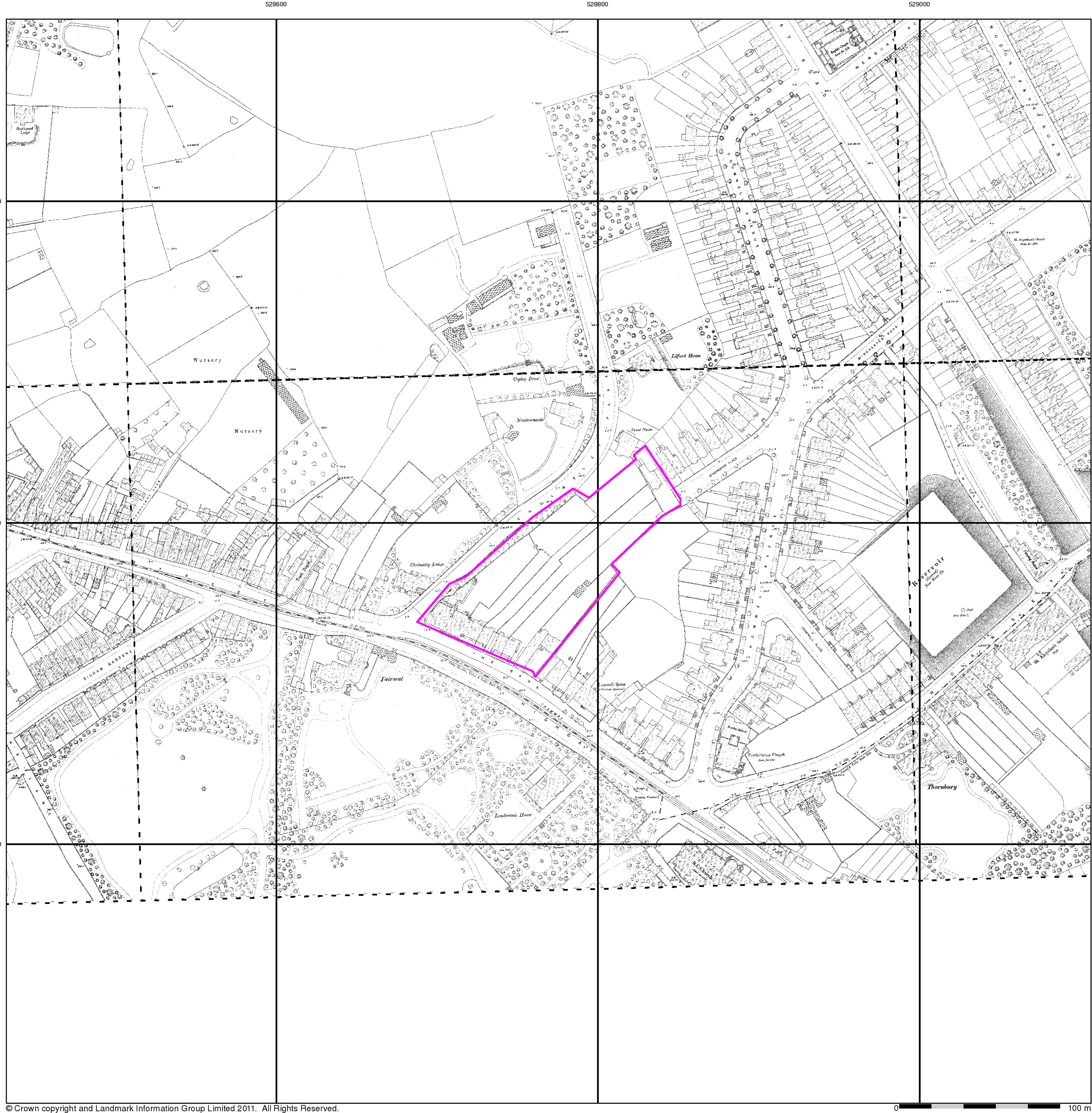
Order Number: 36635444_1_1
Customer Ref: J11240
National Grid Reference: 528770, 187380
Slice: A
Site Area (Ha): 0.94
Search Buffer (m): 0

Site Details

Channing School, Highgate Hill, LONDON, N6 5HF



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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0 100 m



Middlesex

Published 1895

Source map scale - 1:528

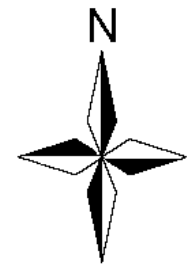
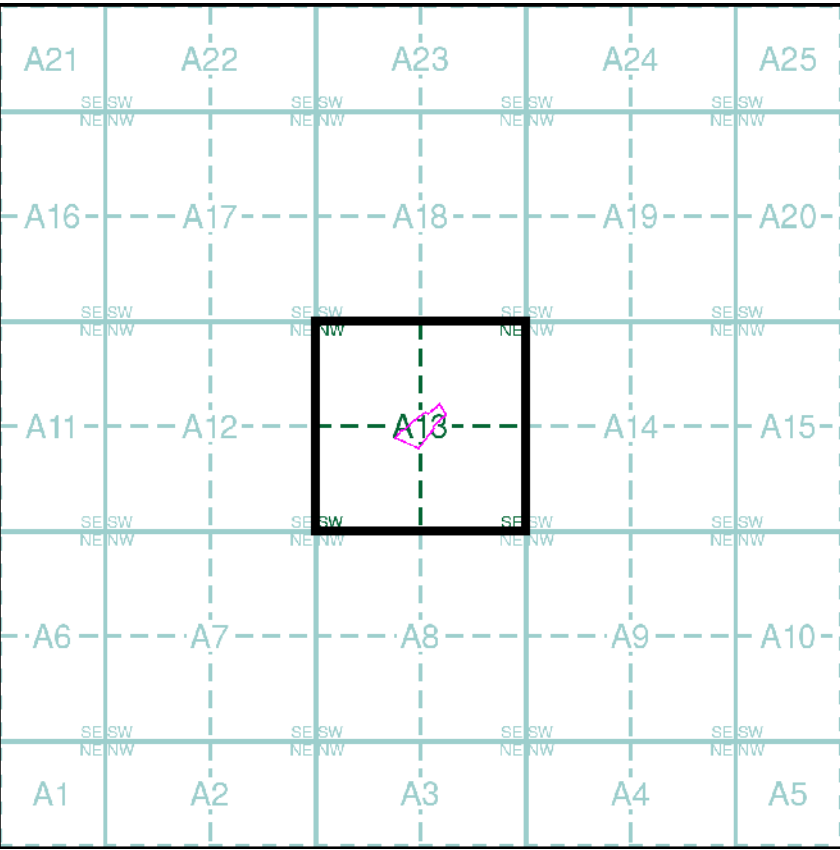
The 1:528 scale Ordnance Survey mapping was adopted in 1850 as an alternative to the 1:1056 scale, that had been deemed to be inadequate for sanitary planning, which had come very much to the fore following the passing of the Public Health Act of 1948. Around 29 towns in England and Wales were surveyed at this scale, the bulk of which were undertaken between 1850 and 1855. These were predominantly towns that were outside the areas being surveyed at 1:10,560 or 1:2500 scale. As well as showing the details characteristic of the later 1:500 plans, they show features of sanitary interest such as privies, taps, cow houses, cess pits, brew and bake houses and cart sheds and stables.

Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

Map Name(s) and Date(s)

003_00_061_NE 1895 1:528	003_00_062_NW 1895 1:528	003_00_062_NE 1895 1:528
003_00_061_SE 1895 1:528	003_00_062_SW 1895 1:528	003_00_062_SE 1895 1:528

Historical Town Plan - Segment A13



Order Details

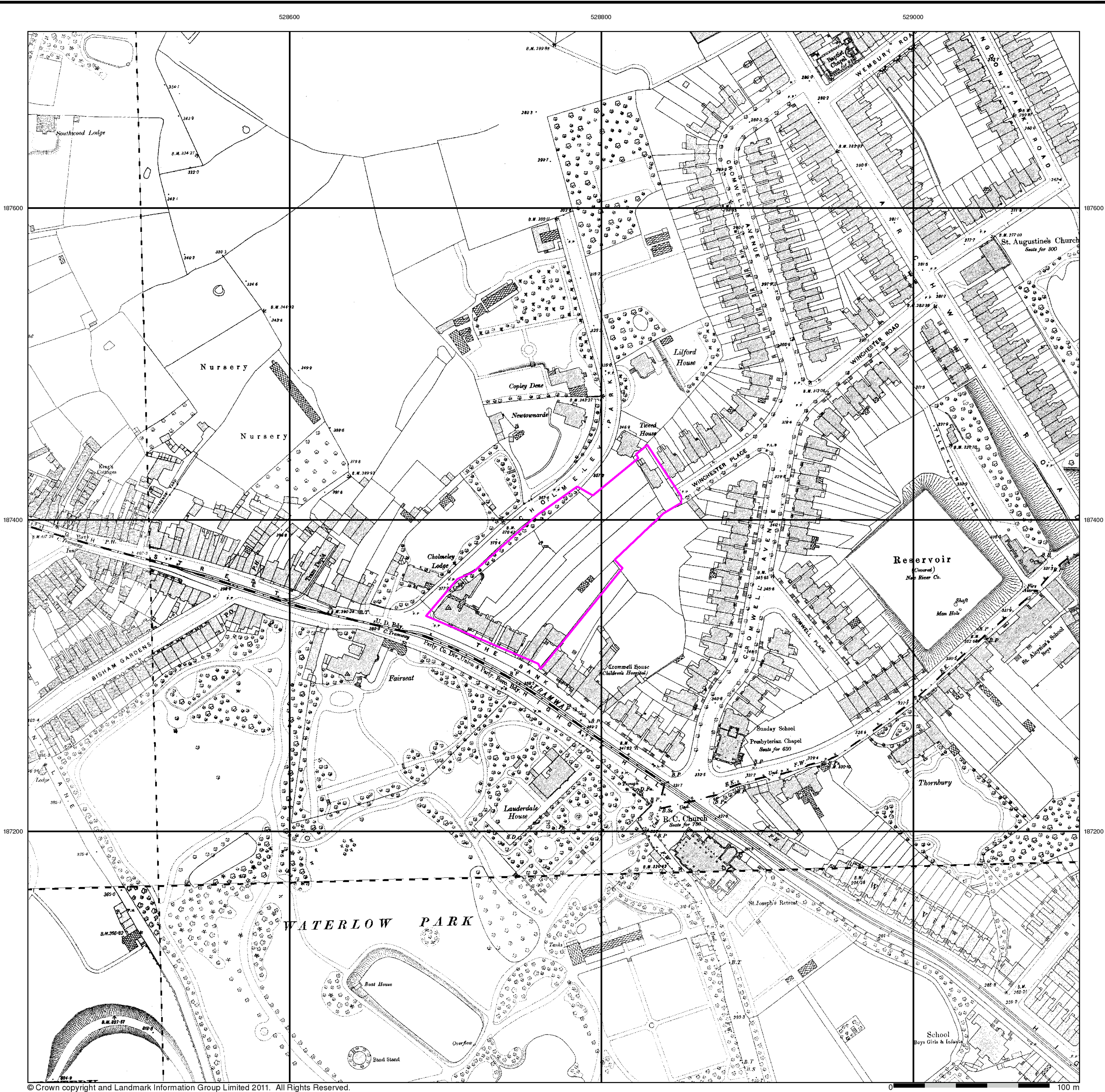
Order Number: 36635444_1_1
Customer Ref: J11240
National Grid Reference: 528770, 187380
Slice: A
Site Area (Ha): 0.94
Search Buffer (m): 0

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London

Published 1895

Source map scale - 1:1,056

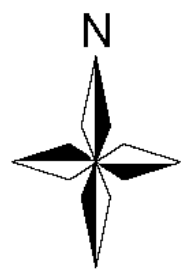
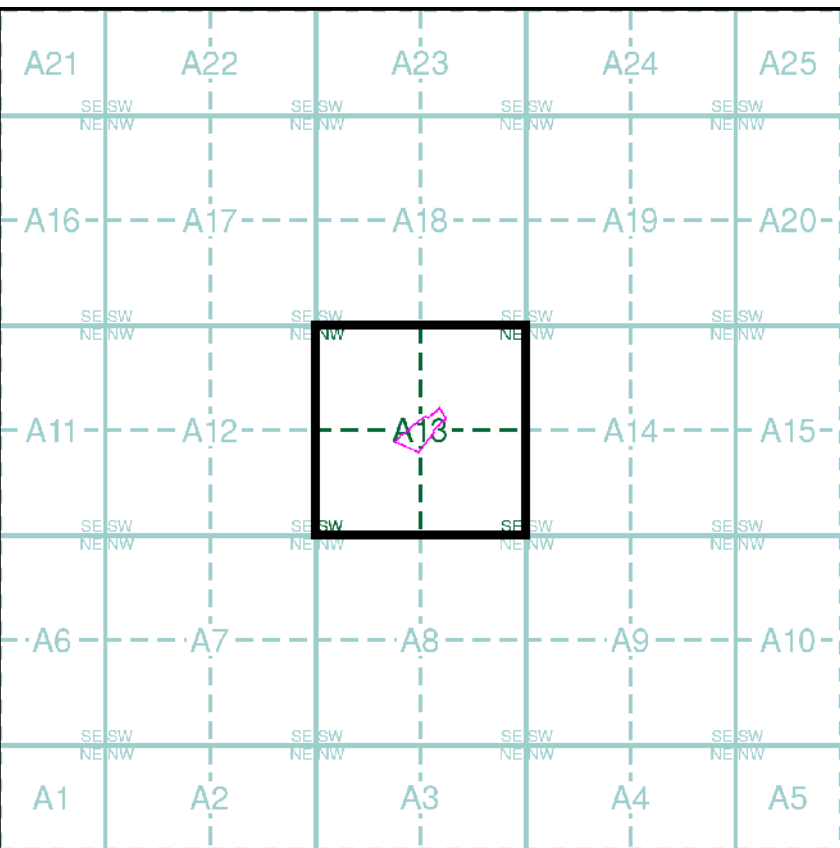
The 1:1056 scale of Ordnance Survey mapping was adopted from Ireland in 1848 and was used to survey towns with a population of over 4000, plus county towns of lesser population, in those counties mapped at the six-inch scale in 1841-55. The scale was the largest scale at which London was mapped by the Ordnance Survey and a 'skeleton' survey of the capital, showing little more than streets, street names, frontages and altitudes, was undertaken between 1848 and 1850. The majority of the 1:1056 surveys were later replaced by 1:500 surveys; although almost all the remainder were revised at this scale, sometimes more than once before 1895. The type of detail shown on the 1:1056 scale is broadly similar to that on 1:500; the apparent omission of minor details such as sewer access points and street lights may be as much a reflection of the generally earlier date of these plans, as of the specification of the map.

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Map Name(s) and Date(s)

003_00_061 1895 1:1,056	003_00_062 1895 1:1,056
003_00_071 1895 1:1,056	003_00_072 1895 1:1,056

Historical Town Plan - Segment A13



Order Details

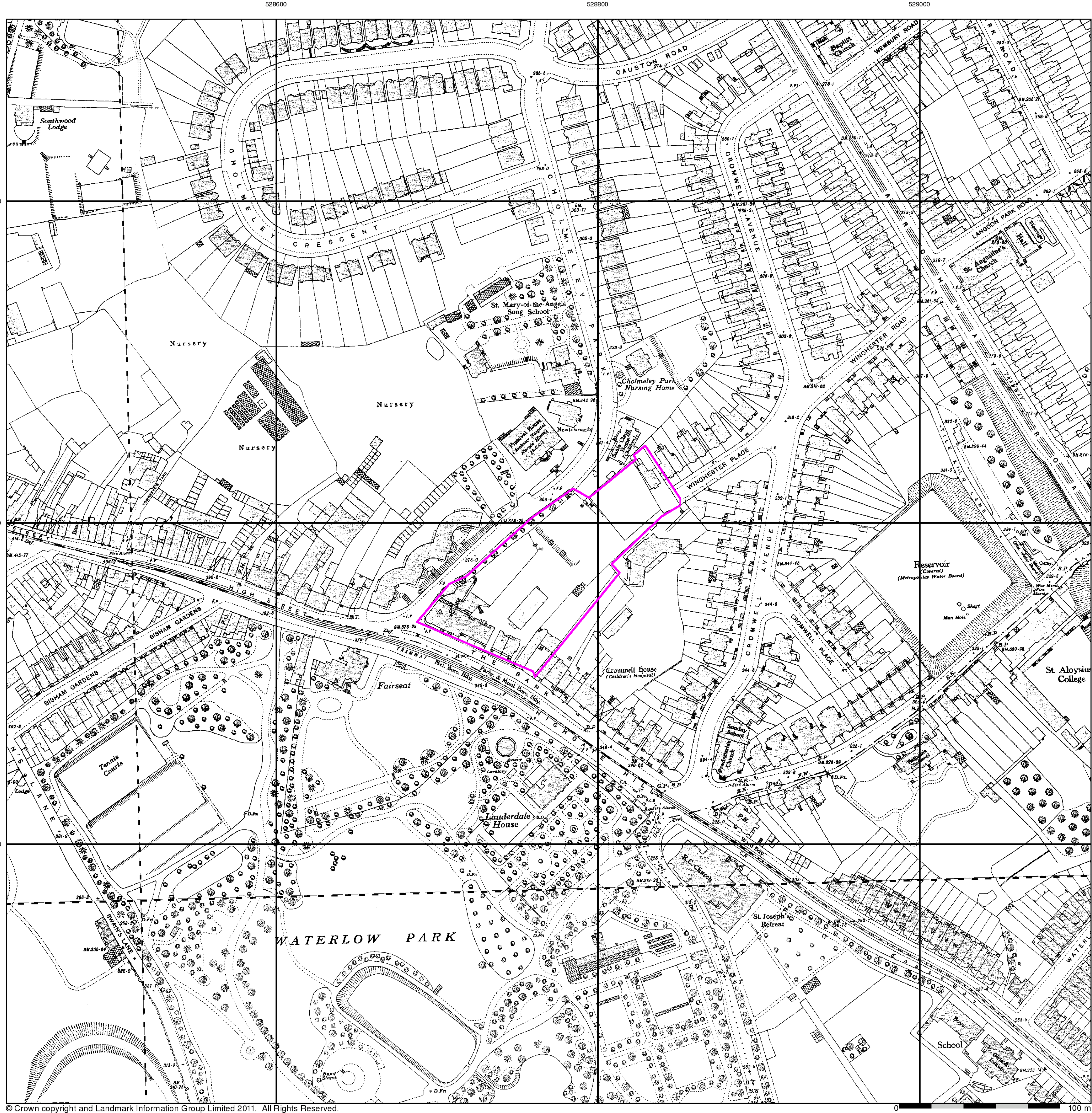
Order Number: 36635444_1_1
Customer Ref: J11240
National Grid Reference: 528770, 187380
Slice: A
Site Area (Ha): 0.94
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London

Published 1937

Source map scale - 1:1,056

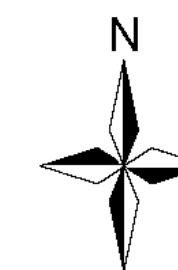
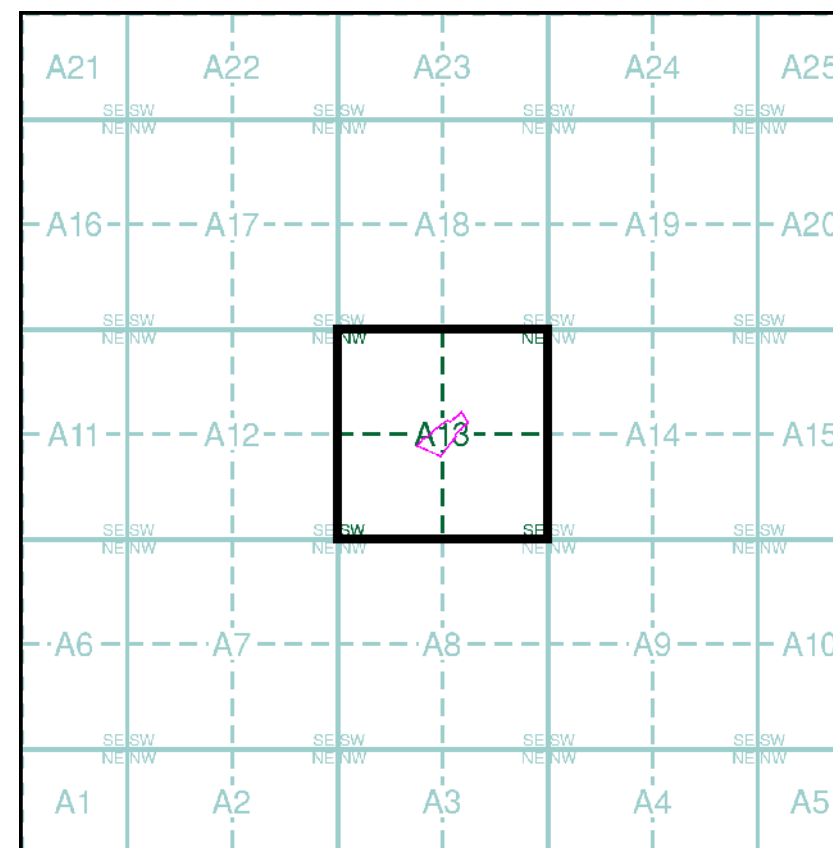
The 1:1056 scale of Ordnance Survey mapping was adopted from Ireland in 1848 and was used to survey towns with a population of over 4000, plus county towns of lesser population, in those counties mapped at the six-inch scale in 1841-55. The scale was the largest scale at which London was mapped by the Ordnance Survey and a 'skeleton' survey of the capital, showing little more than streets, street names, frontages and altitudes, was undertaken between 1848 and 1850. The majority of the 1:1056 surveys were later replaced by 1:500 surveys; although almost all the remainder were revised at this scale, sometimes more than once before 1895. The type of detail shown on the 1:1056 scale is broadly similar to that on 1:500; the apparent omission of minor details such as sewer access points and street lights may be as much a reflection of the generally earlier date of these plans, as of the specification of the map.

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Map Name(s) and Date(s)

003_00_061 1937 1:1,056	003_00_062 1937 1:1,056
003_00_071 1937 1:1,056	003_00_072 1937 1:1,056

Historical Town Plan - Segment A13



Order Details

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National Grid Reference: 528770, 187380
Slice: A
Site Area (Ha): 0.94
Search Buffer (m): 0

Site Details

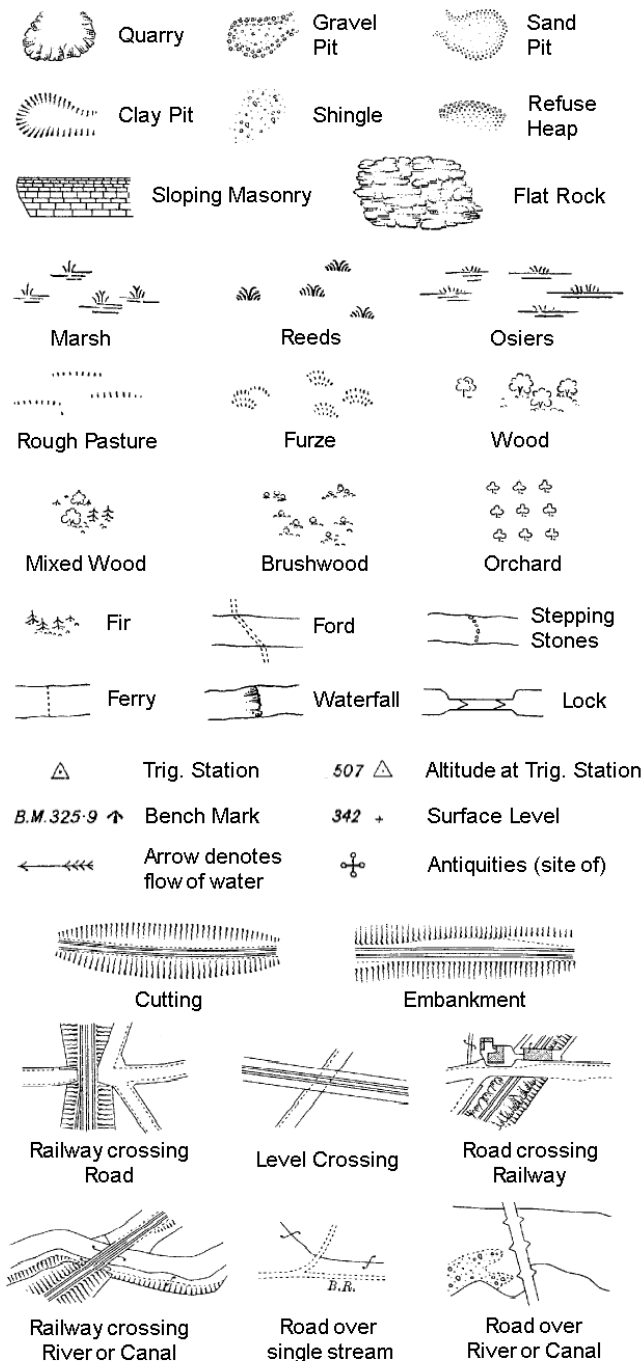
Channing School, Highgate Hill, LONDON, N6 5HF



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Historical Mapping Legends

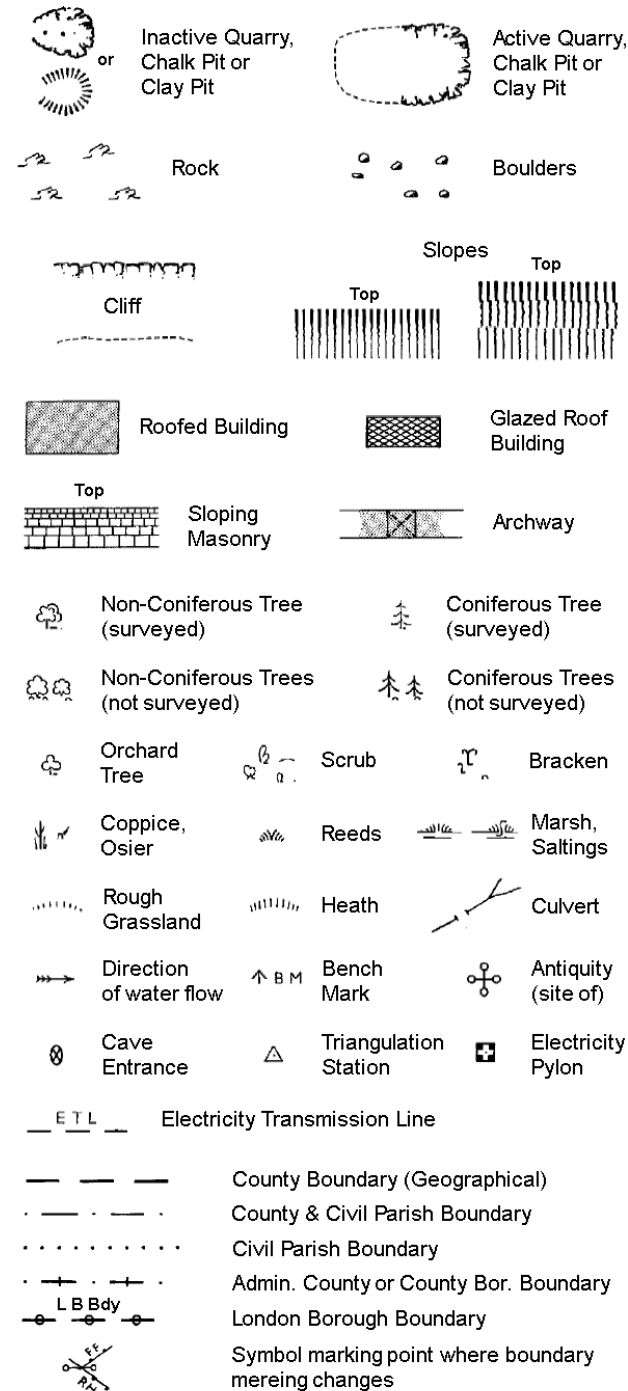
Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



- County Boundary (Geographical)
- County & Civil Parish Boundary
- Administrative County & Civil Parish Boundary
- County Borough Boundary (England)
- County Burgh Boundary (Scotland)

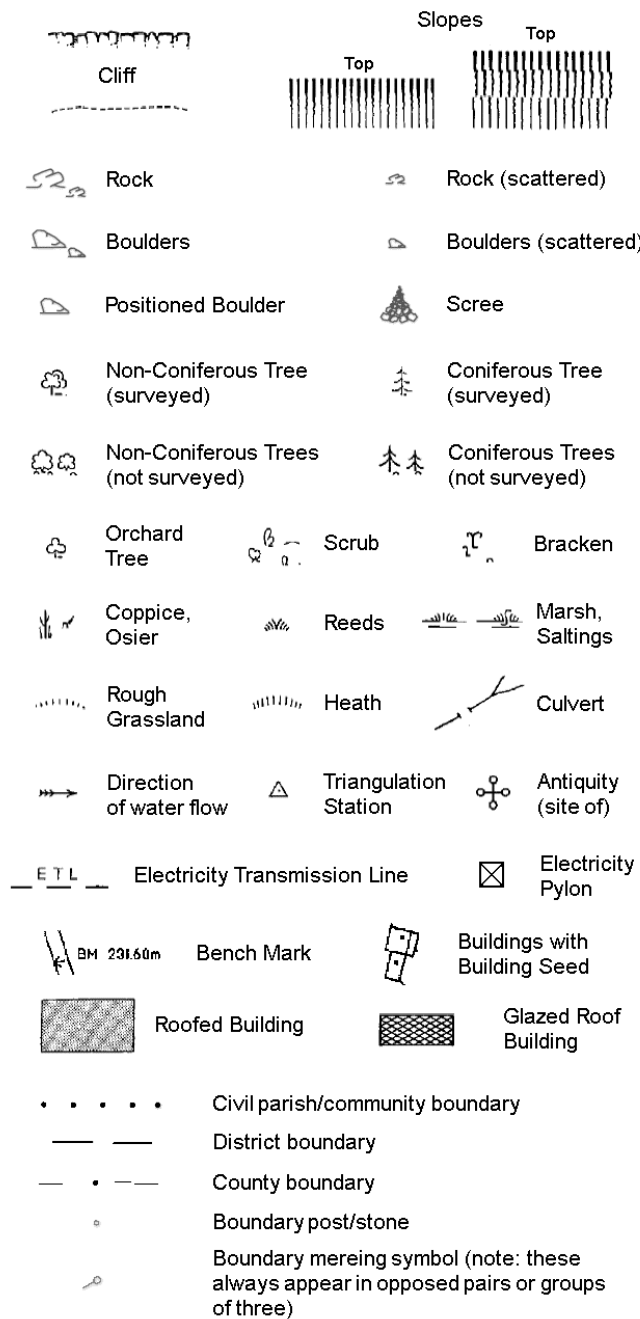
- Boundary Post or Stone
- B.R. Bridle Road
- E.P. Electricity Pylon
- F.B. Foot Bridge
- F.P. Foot Path
- G.P. Guide Post or Board
- M.S. Mile Stone
- M.P.M.R. Mooring Post or Ring
- P.C.B. Police Call Box
- P. Pump
- S.P. Signal Post
- SL. Sluice
- Sp. Spring
- T.C.B. Telephone Call Box
- Tr. Trough
- W. Well

Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



- BH Beer House
- BP, BS Boundary Post or Stone
- Cn, C Capstan, Crane
- Chy Chimney
- D Fn Drinking Fountain
- EI P Electricity Pillar or Post
- FAP Fire Alarm Pillar
- FB Foot Bridge
- GP Guide Post
- H Hydrant or Hydraulic
- LC Level Crossing
- MH Manhole
- MP Mile Post or Mooring Post
- MS Mile Stone
- NTL Normal Tidal Limit
- P Pillar, Pole or Post
- PO Post Office
- PC Public Convenience
- PH Public House
- Pp Pump
- SB, S Br Signal Box or Bridge
- SP, SL Signal Post or Light
- Spr Spring
- Tk Tank or Track
- TCB Telephone Call Box
- TCP Telephone Call Post
- Tr Trough
- Wt Pt, Wt T Water Point, Water Tap
- W Well
- Wd Pp Wind Pump

Large-Scale National Grid Data 1:2,500 and 1:1,250



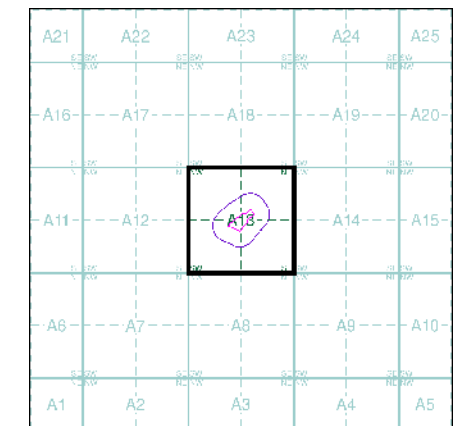
- Bks Barracks
- Bty Battery
- Cemy Cemetery
- Chy Chimney
- Cis Cistern
- Dismtd Rly Dismantled Railway
- EI Gen Sta Electricity Generating Station
- EI P Electricity Pole, Pillar
- EI Sub Sta Electricity Sub Station
- FB Filter Bed
- Fn / D Fn Fountain / Drinking Ftn.
- Gas Gov Gas Valve Compound
- GVC Gas Governor
- GP Guide Post
- MH Manhole
- MP, MS Mile Post or Mile Stone
- P Pillar, Pole or Post
- PO Post Office
- PC Public Convenience
- Pp Pump
- Ppg Sta Pumping Station
- PW Place of Worship
- Sewage Ppg Sta Sewage Pumping Station
- SB, S Br Signal Box or Bridge
- SP, SL Signal Post or Light
- Spr Spring
- Tk Tank or Track
- Tr Trough
- Wd Pp Wind Pump
- Wt Pt, Wt T Water Point, Water Tap
- Wks Works (building or area)
- W Well



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
London	1:2,500	1870	2
Middlesex	1:2,500	1894	3
London	1:2,500	1896	4
London	1:2,500	1915	5
London	1:2,500	1935	6
Historical Aerial Photography	1:1,250	1946 - 1949	7
Ordnance Survey Plan	1:1,250	1952	8
Ordnance Survey Plan	1:2,500	1952	9
Additional SIMs	1:2,500	1952	10
Additional SIMs	1:1,250	1952 - 1985	11
Ordnance Survey Plan	1:1,250	1962 - 1979	12
Ordnance Survey Plan	1:1,250	1968 - 1979	13
Additional SIMs	1:1,250	1968 - 1986	14
Ordnance Survey Plan	1:2,500	1970	15
Supply of Unpublished Survey Information	1:1,250	1974	16
Supply of Unpublished Survey Information	1:1,250	1976	17
Ordnance Survey Plan	1:1,250	1978	18
Large-Scale National Grid Data	1:1,250	1991	19
Large-Scale National Grid Data	1:1,250	1992 - 1997	20
Large-Scale National Grid Data	1:1,250	1996	21

Historical Map - Segment A13



Order Details

Order Number: 36635444_1_1
Customer Ref: J11240
National Grid Reference: 528770, 187380
Slice: A
Site Area (Ha): 0.94
Search Buffer (m): 100

Site Details

Channing School, Highgate Hill, LONDON, N6 5HF



Tel: 0844 844 9952
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Web: www.envirocheck.co.uk

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

	Gravel Pit		Sand Pit		Other Pits
	Quarry		Shingle		Orchard
	Osiers		Reeds		Marsh
	Mixed Wood		Deciduous		Brushwood
	Fir		Furze		Rough Pasture
	Arrow denotes flow of water		Trigonometrical Station		
	Site of Antiquities		Bench Mark		
	Pump, Guide Post, Signal Post		Well, Spring, Boundary Post		
	Surface Level				
	Sketched Contour		Instrumental Contour		
	Main Roads		Fenced Un-Fenced		Minor Roads
	Sunken Road		Raised Road		
	Road over Railway		Railway over River		
	Railway over Road		Level Crossing		
	Road over River or Canal		Road over Stream		
	Road over Stream				
	County Boundary (Geographical)				
	County & Civil Parish Boundary				
	Administrative County & Civil Parish Boundary				
	County Borough Boundary (England)				
	County Burgh Boundary (Scotland)				
	Rural District Boundary				
	Civil Parish Boundary				

Ordnance Survey Plan 1:10,000

	Chalk Pit, Clay Pit or Quarry		Gravel Pit
	Sand Pit		Disused Pit or Quarry
	Refuse or Slag Heap		Lake, Loch or Pond
	Dunes		Boulders
	Coniferous Trees		Non-Coniferous Trees
	Orchard		Scrub
	Coppice		
	Bracken		Heath
	Marsh		Reeds
	Saltings		
	Building		Direction of Flow of Water
	Glasshouse		Shingle
	Sloping Masonry		Sand
	Pylon		Electricity Transmission Line
	Pole		
	Cutting		Embankment
	Standard Gauge Multiple Track		
	Standard Gauge Single Track		
	Siding, Tramway or Mineral Line		
	Narrow Gauge		
	Geographical County		
	Administrative County, County Borough or County of City		
	Municipal Borough, Urban or Rural District, Burgh or District Council		
	Borough, Burgh or County Constituency Shown only when not coincident with other boundaries		
	Civil Parish Shown alternately when coincidence of boundaries occurs		
	Boundary Post or Stone		Police Station
	Church		Post Office
	Club House		Public Convenience
	Fire Engine Station		Public House
	Foot Bridge		Signal Box
	Fountain		Spring
	Guide Post		Telephone Call Box
	Mile Post		Telephone Call Post
	Mile Stone		Well

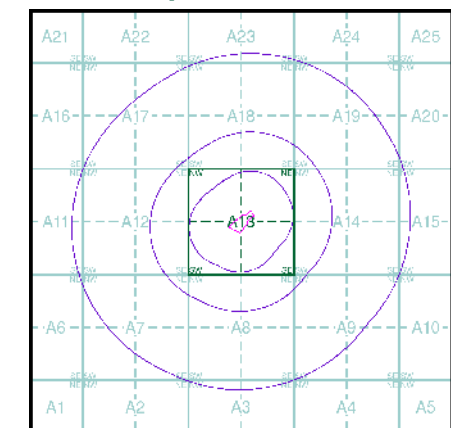
1:10,000 Raster Mapping

	Gravel Pit		Refuse tip or slag heap
	Rock		Rock (scattered)
	Boulders		Boulders (scattered)
	Shingle		Mud
	Sand		Sand Pit
	Slopes		Top of cliff
	General detail		Underground detail
	Overhead detail		Narrow gauge railway
	Multi-track railway		Single track railway
	County boundary (England only)		Civil, parish or community boundary
	District, Unitary, Metropolitan, London Borough boundary		Constituency boundary
	Area of wooded vegetation		Non-coniferous trees
	Non-coniferous trees (scattered)		Coniferous trees
	Coniferous trees (scattered)		Positioned tree
	Orchard		Coppice or Osiers
	Rough Grassland		Heath
	Scrub		Marsh, Salt Marsh or Reeds
	Water feature		Flow arrows
	Mean high water (springs)		Mean low water (springs)
	Telephone line (where shown)		Electricity transmission line (with poles)
	Bench mark (where shown)		Triangulation station
	Point feature (e.g. Guide Post or Mile Stone)		Pylon, flare stack or lighting tower
	Site of (antiquity)		Glasshouse
	General Building		Important Building

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Middlesex	1:10,560	1873	3
Middlesex	1:10,560	1879	4
London	1:10,560	1896	5
Essex	1:10,560	1920	6
London	1:10,560	1920	7
Middlesex	1:10,560	1936	8
Middlesex	1:10,560	1938	9
Essex	1:10,560	1938	10
Historical Aerial Photography	1:10,560	1950	11
Ordnance Survey Plan	1:10,000	1951	12
Ordnance Survey Plan	1:10,000	1958	13
Ordnance Survey Plan	1:10,000	1962 - 1968	14
Ordnance Survey Plan	1:10,000	1967	15
Ordnance Survey Plan	1:10,000	1975 - 1976	16
Ordnance Survey Plan	1:10,000	1984	17
London	1:25,000	1985	18
Ordnance Survey Plan	1:10,000	1990 - 1996	19
10K Raster Mapping	1:10,000	1999	20
10K Raster Mapping	1:10,000	2006	21
10K Raster Mapping	1:10,000	2011	22

Historical Map - Slice A



Order Details

Order Number: 36635444_1_1
Customer Ref: J11240
National Grid Reference: 528770, 187380
Slice: A
Site Area (Ha): 0.94
Search Buffer (m): 1000

Site Details

Channing School, Highgate Hill, LONDON, N6 5HF

528600

528800

529000

187600

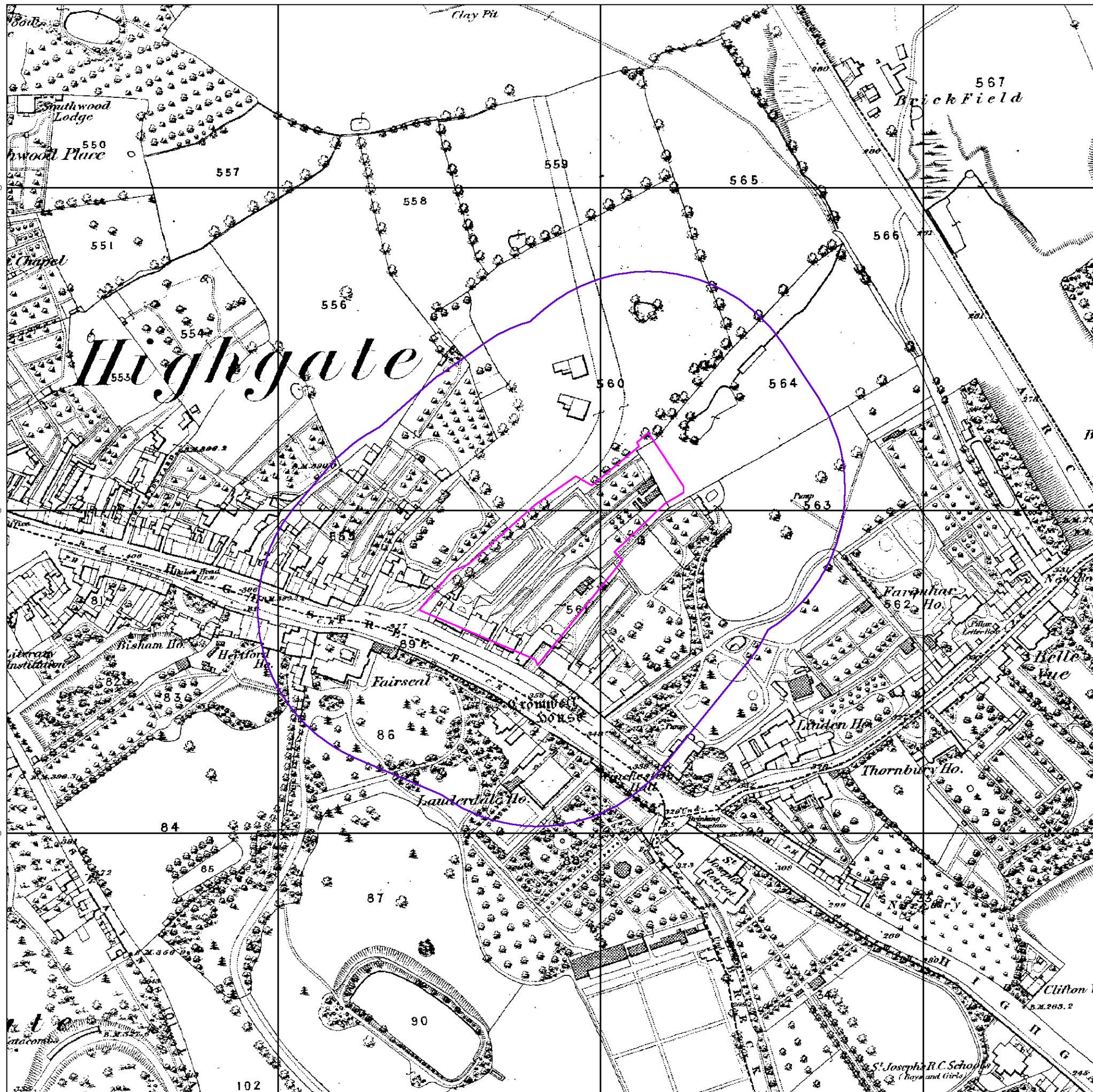
187600

187400

187400

187200

187200



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0 100 m



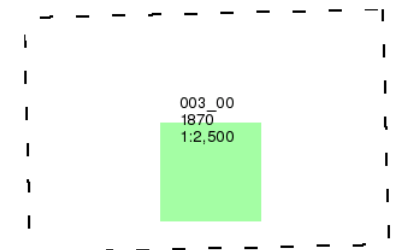
London

Published 1870

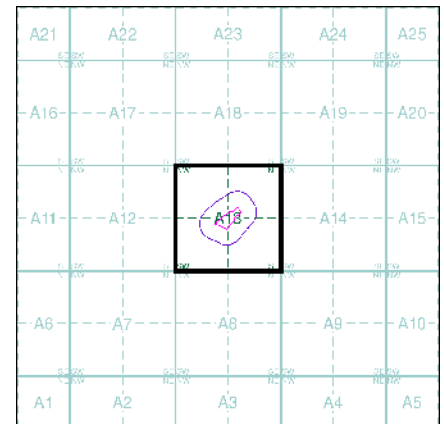
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

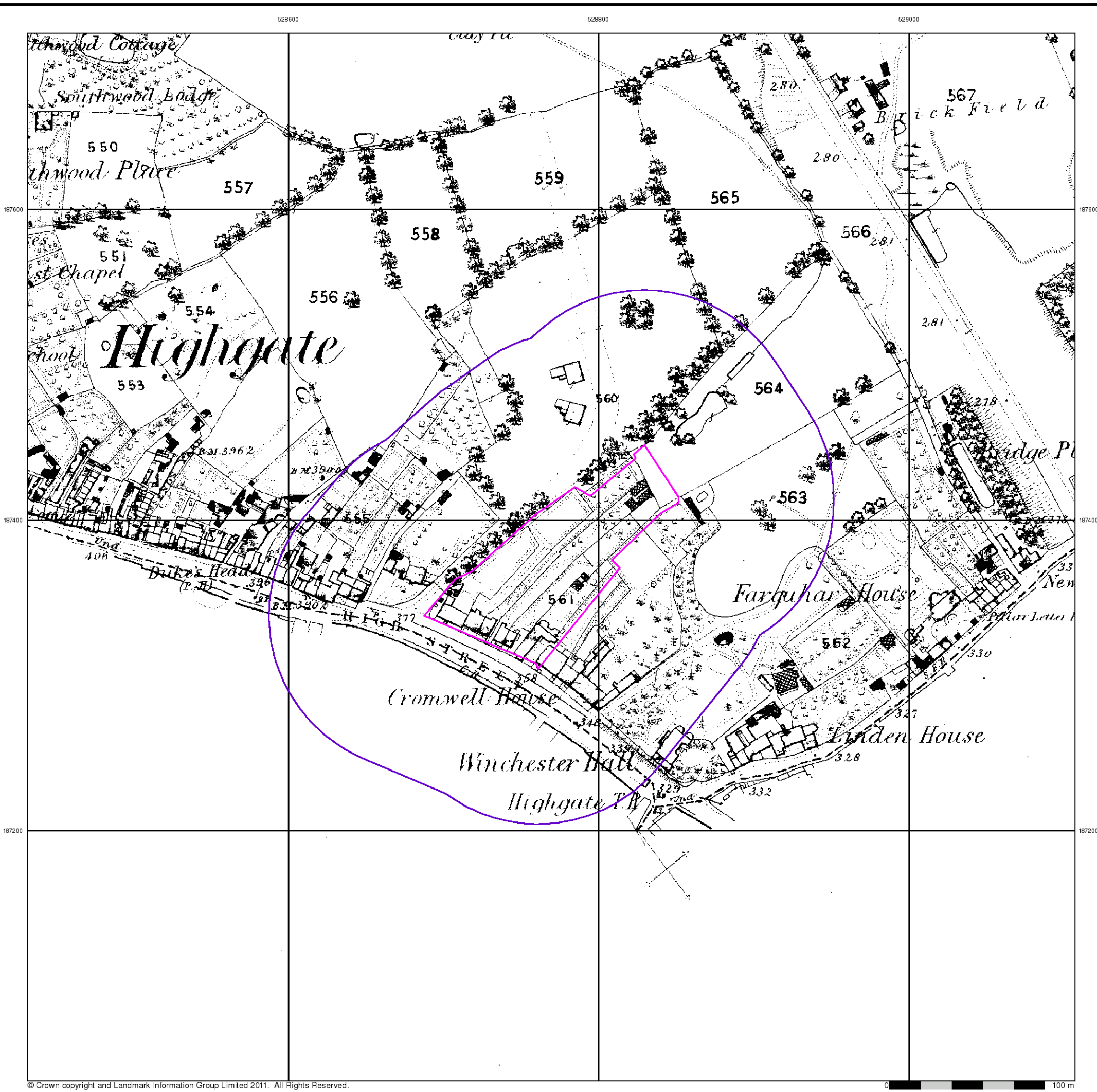
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 Site Area (Ha): 0.94
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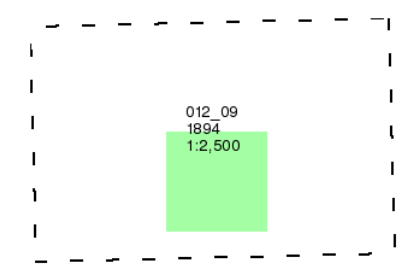
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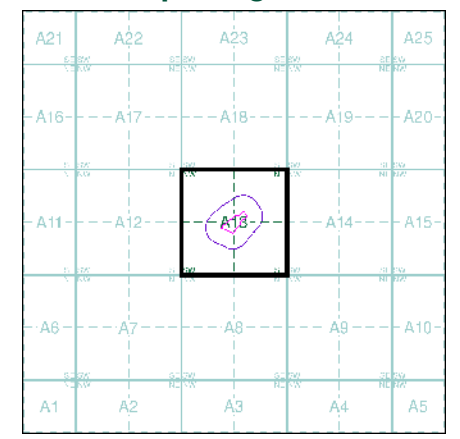
Middlesex
Published 1894
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

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